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RESEARCH SYMPOSIUM 2021

Impactful Research Through an Interdisciplinary Approach



University of  
Colombo

**PROCEEDINGS OF THE ANNUAL RESEARCH SYMPOSIUM  
2021  
UNIVERSITY OF COLOMBO, SRI LANKA**

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## **UNIVERSITY OF COLOMBO, SRI LANKA**

### **OUR MOTTO**

*'Buddhi Sarvathra Bhrajate'*

*Wisdom Enlightens*

### **OUR VISION**

*To be a centre of global excellence in education, research and stakeholder engagement to enrich human potential for the betterment of society.*

### **OUR MISSION**

*To discover and disseminate knowledge; enhance innovation; and promote a culture of broad inquiry throughout and beyond the university through engagement and collaboration with industry and community.*

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## MESSAGE FROM THE VICE CHANCELLOR UNIVERSITY OF COLOMBO

The Annual Research Symposium (ARS) of the University of Colombo, which is the flagship event in our almanac, is of special significance this year for multiple reasons. It signifies the culmination of the yearlong centenary celebrations of our faculties of Arts and Science and of the Main Library, in parallel with honouring 151 years of Medical Education.



The ARS of 2021 presents the collation of quality research carried out by our own staff and students from nine faculties, seven institutes, the Sri Palee campus and the School of Computing, along with 23 specialized centres and 22 specialized units. As a novel feature, we have identified the impactful research outcomes that are useful to policy makers while emphasizing multidisciplinary research.

Our university, while celebrating decades of excellence, highlights the connected view of education, research and scholarship. Knowledge creation and active learning are the main objectives of 21<sup>st</sup> century higher education that address the sustainable development goals and illustrates value addition. The rich diversity of our university's research capacity and output is exemplified by the continued commitment of our staff and students. I am encouraged by the enthusiasm and support of all sectors of our university that helped sustain their research projects, despite encountering multiple challenges from the COVID 19 pandemic. Their able adaptation to the digital transformation helped continue with pre-planned activities, while overcoming the numerous setbacks in laboratory, clinical and field-based data collection. Additionally, the administrative and financial managers remained focussed to support research despite the lockdowns. Our university ranking has gained substantially, with the upscaling of regional and international collaborations in research and academic partnerships with the best of the best. Technology transfer and commercialization have been addressed consistently with thematic research groups created in agricultural entrepreneurship and precision diagnosis of cancer with greater inter-disciplinary involvement. I look forward to multiple gains in the coming years through these novel initiatives. I pledge the best of support from the central administration.

I thank the Chairperson of the ARS 2021, Senior Professor Priyadharshani Galappathy, and her excellent group of academic partners and students for giving of their expertise and valuable time to ensure all arrangements progress smoothly and effectively. A big thank you to the Editors, Professor Enoka Corea and Mr Sajith Peiris, the faculty and institute Research Committee representatives, Directors and staff of the UCSC and NOC and the multitude of administrators and support staff ably coordinated by the administration. I take this opportunity to thank Senior Research Advisor, Professor Shervanthi Homer-Vanniasinkam, the Directors, Research Development Centre and University Business Linkage and Mr M Shifar and the team from the Academic Publication division of College House for your excellent contributions.

May you all stay safe and well, enjoy the proceedings, develop fresh ideas and networks, and help take our research outreach to the next level.

**Chandrika Wijeyaratne**  
**Vice Chancellor**  
**University of Colombo**

## MESSAGE FROM THE CHIEF GUEST

I feel honoured to be associated with the Annual Research Symposium 2021 of the University of Colombo. Congratulations are due to organizers for selecting a very relevant theme, “Impactful Research through an Interdisciplinary Approach”, for the Symposium. I would like to commend University of Colombo and its leadership for contributing to academic excellence and high quality of research through such initiatives as this symposium.



Integration of Science, Technology and Innovation goals into national policies helps achieve sustained economic growth and social development, Contemporary and several emerging challenges make the research landscape increasingly more interdisciplinary. This mandates the researchers to build networks and develop new perspectives and ideas for cost-effective and efficient solutions.

Both India and Sri Lanka share rich traditions of respect for learning, knowledge and wisdom, and regard for scholars. Our academic linkages are historically strong and many eminent scholars in both countries have benefitted from them. Centre for Contemporary Indian Studies (CCIS) at University of Colombo has contributed to greater awareness about India and also to educational ties. Both countries have regular exchange of scholars and scientists through exploratory visits, trainings, workshops, etc. Areas identified by the India- Sri Lanka Joint Committee on Science & Technology such as Food Technology, Plant based medicine, Materials, Metrology, Space Research and Applications, Robotics & Automation, Industrial Electronics, Renewable Energy, Waste Management etc., have significant potential for further collaboration. India- Sri Lanka Foundation has augmented support for collaborative research and exchanges. Virtual platforms have supported valuable interaction amongst researchers during COVID- 19 pandemic. I am sure that scholars, researchers and academics of the two countries will avail of numerous opportunities for the joint advancement of research and innovation for betterment of our societies.

I am confident that the Annual Research Symposium will encourage researchers to pursue interdisciplinary research and academic excellence.

**His Excellency Gopal Baglay**  
**High Commissioner of India to Sri Lanka**



## MESSAGE FROM THE SYMPOSIUM CHAIR ANNUAL RESEARCH SYMPOSIUM 2021

The Annual Research Symposium (ARS) unifying 18 Faculties, Institutes, Campus, School and the Library of the University of Colombo is a key event in the University calendar. ARS 2021 also marks the conclusion of the centenary celebrations of the predecessor of the University of Colombo, the Ceylon University College established in 1921. It is my great pleasure and privilege to pen this message as the Chairperson of the ARS 2021. The theme of the Symposium, *“Impactful research through an interdisciplinary approach”* is appropriate in view of current international trends in the conduct of research. We are very grateful to our chief guest, His Excellency Gopal Baglay, the High Commissioner of India, our keynote speaker, Professor Mohan Munasinghe, former Vice-Chair of the UN Intergovernmental Panel on Climate Change that shared the Nobel Peace Prize in 2007 and our special guest, Hon. Professor G L Peiris for their gracious presence at the ARS 2021. I am immensely thankful to Senior Professor Chandrika N. Wijeyaratne, Vice-Chancellor of the University for her guidance and leadership and to all the committee members representing the faculties, institutes, campus, school, and library for their unstinted support. A feature of this year’s symposium, as we mark this centenary year, is the recognition of distinguished alumni and academics of the University for their contribution at university, national and international level. I thank Dr. Nirmali Wijegoonawardena for attending to the details of this important activity and Professor Samantha Herath for the publicity campaign. Professor Enoka Corea the editor of the proceedings along with Co-editor Mr. Sajith Peiris undertook the additional responsibility of compiling recommendations from research which will be useful to policymakers for implementation. A special word of thanks to Professor K. P. Hewagamage, Dr S. Matara Arachchi, Ms. A Srimalee and the team at the UCSC for compiling this volume within a very short period. I thank Mr. Mohamad Shifar, AR of academic publications for all his numerous contributions, Mr. Layan Chaturanga of the NOC and Dr. M. N. Kaumal and Dr. Hiran Jayaweera for their support to make this event a success and university student, Ms. Poornima Thanayamwatta, for the meaningful logo and for doing the creative artwork for the flyers, banners and the cover pages. I hope you will enjoy the proceedings of ARS 2021 and disseminate the findings of the valuable research conducted at our university.



**Professor Priyadarshani Galappaththy**  
**Faculty of Medicine**  
**University of Colombo**

## PROFILE OF KEYNOTE SPEAKER

### Professor Mohan Munasinghe

2021 Blue Planet Prize Laureate  
 Chairman, Presidential Expert Commission on Sustainable  
 Sri Lanka 2030 Vision  
 Former Vice Chair, UN Intergovernmental Panel on  
 Climate Change



Professor Mohan Munasinghe is the Founder Chairman of the Munasinghe Institute of Development (MIND) and MIND Group, Colombo. He has earned post-graduate degrees in engineering, physics and development economics from Cambridge University (UK), MIT (USA), and McGill and Concordia Universities (Canada), as well as several honorary doctorates (honoris causa).

He is the 2021 Blue Planet Prize Laureate (equivalent to Environmental Nobel Prize); Vice Chair, UN Intergovernmental Panel on Climate Change (IPCC-AR4), who shared the 2007 Nobel Peace Prize; Officer of National Order of the Legion of Honour - highest French decoration bestowed on him by the French President; recipient of the Deshamanya award – highest Sri Lankan decoration bestowed on him by the Sri Lanka President; and many other world awards. He is also Chairman, Presidential Expert Commission on Sustainable Sri Lanka 2030 Vision; and Honorary Senior Advisor to the Sri Lanka Government.

Formerly, he served as Senior Energy Advisor to the Sri Lanka President; and Senior Advisor/Manager, World Bank. He was also Director-General, Sustainable Consumption Institute, Manchester University, UK; and Chancellor, International Water Academy, Oslo. He has served as expert advisor/consultant to many world bodies.

After working five decades internationally, he is a world-renowned expert on sustainable development, climate change, energy and environment. He is especially known for ideas like sustainomics framework, balanced inclusive green growth (BIGG), and Millennium Consumption Goals which were incorporated into the UN sustainable development goal 12. He has worldwide field experience in climate change, disaster management, economics, environment, energy, telecommunications, transport, urban infrastructure, and water resources projects. He has authored over 120 books and 350 technical papers. He is Fellow of several international Academies of Science, and editorial board member of 20 journals.

He is a keen sportsman and honorary Vice Patron, Sri Lanka Tennis Association. He has represented Sri Lanka (Juniors) and Cambridge University in tennis and won a number of Sri Lanka National and other titles. His interests include swimming, wind surfing, chess, bridge, amateur astronomy, saxophone, singing, judo, tai-chi, and meditation.

## KEYNOTE ABSTRACT

### **Transdisciplinary methods to implement sustainable development and climate change policy based on the sustainomics framework and balanced inclusive green growth (BIGG)**

Transdisciplinary research is essential to practically address two major global challenges—sustainable development and climate change. Developmental problems such as poverty, hunger, illness and resource scarcity are already formidable. Climate change exacerbates other crises. Most unfairly, its worst impacts fall on the poor who are least responsible for the problem. Integrated solutions and multistakeholder cooperation are urgently required, that address multiple sustainable development issues together, including climate change. Sustainomics is a comprehensive transdisciplinary framework, first presented at the 1992 Rio Earth Summit. It has been taught and applied practically for three decades.<sup>1</sup>

The first principle of sustainomics seeks to make development more sustainable by empowering everyone to take action now. The second principle requires harmonization of the three dimensions of the sustainable development triangle – economic, social and environmental. The third principle encourages us to transcend traditional mental boundaries that limit us in terms of value systems, disciplines, time and spatial scales, stakeholder viewpoints, etc. The final principle sets out a practical implementation framework based on the balanced inclusive green growth (BIGG) path to sustainable development. The UN SDG provides a useful metric to monitor progress.

The BIGG path facilitates the incorporation of ecological and social concerns into the existing economic decision-making process. The first step is to integrate environmental issues into economic policies and projects, as described in the green growth model and tunnel path to sustainable development proposed in 1995. The second step described in 2010 is to use the BIGG path, which integrates social goals into green growth, to help implement the SDG and UN Agenda 2030.

Some case studies illustrate practical applications of the approach. Although the issues are complex and serious, both the climate change and sustainable development problems could be solved together using sustainomics.

<sup>1</sup> Mohan Munasinghe, *Sustainability in the 21<sup>st</sup> Century: Sustainomics and Balanced Inclusive Green Growth (BIGG)*, Cambridge University Press, UK.

**PROGRAMME OF THE INAUGURATION CEREMONY****23<sup>rd</sup> November 2021**

<b>Time</b>	<b>Programme</b>
8.30 am – 9.30am	Arrival of Guests
9:30 am – 9.35am	National Anthem
	Lighting the Lamp of Learning
9:35 am – 9.40am	Welcome Address <i>Professor Priyadarshani Galappatthy</i> Chairperson, ARS 2021
9:40 am – 9.45 am	Research Symposia Update - Faculties, Institutes, Campus and School of the University of Colombo <i>Professor Samantha Herath</i>
9:45 am – 9.50am	Synopsis of Research & Development of UoC 2020/2021 <i>Dr Janaki Jayawardena</i>
9.50 am - 9.55am	Abstracts & Recommendations - ARS 2021 <i>Professor Enoka Corea</i>
9:55 am-10.00am	Address by Vice Chancellor <i>Professor Chandrika N. Wijeyaratne</i>
10:00 am – 10.05 am	Introduction of the Chief Guest <i>Professor Chandrika Wijeyaratne</i>
10:05 am – 10.20 am	Address by the Chief Guest <i>His Excellency Gopal Baglay</i> High Commissioner of India in Sri Lanka
10.20 am – 10.30 am	Address by Special Guest <i>Hon. Professor GL Peiris</i>
10:30 am – 11.00 am	Commemorating a Centenary of Research and excellence Distinguished Alumni & Academics – Session 1
11:00 am – 11.05 am	Introduction of the Keynote Speaker <i>Professor Nirmalie Pallewatta</i>
11:05 am – 11. 35 am	Keynote Address Transdisciplinary methods to implement sustainable development and climate change policy based on the sustainomics framework and balanced inclusive green growth (BIGG) <i>Professor Mohan Munasinghe</i> 2021 Blue Planet Prize Laureate, Chairman, Presidential Expert Commission on Sustainable Sri Lanka 2030 Vision, Former Vice Chair, UN Intergovernmental Panel on Climate Change
11:35 am – 12.05 pm	Commemorating a Centenary of Research and excellence Distinguished Alumni & Academics– Session 2
12. 05 pm – 12.10 pm	Award of certificate to winner of the logo competition
12:10 pm – 12.15 pm	Vote of Thanks <i>Dr Nirmali Wijegoonawardana</i>



## Celebrating the Centenary of the founding of the Ceylon University College (1921-1942)

Professor Enoka Corea  
Co-Editor



Crest of the Ceylon University College

University education in Ceylon began with the establishment of the Ceylon University College in 1921. Prior to this, opportunities for higher education in the country were confined to Medicine where a Licentiate in Medicine and Surgery (LMS) was awarded at the Ceylon Medical College (founded in 1870) and Law at the Ceylon Law College (founded in 1874). In the main, students had to travel to Britain or India to obtain university degrees and this was accessible only to the wealthy or via a government scholarship. A few “affiliated colleges, such as Royal College, prepared students to sit for external examinations conducted by foreign universities such as the University of London and the Calcutta University, though most did not proceed beyond the Intermediate Examination. An excessive amount of time of the best teachers in these Colleges was spent in coaching a single or a handful of students for these examinations.

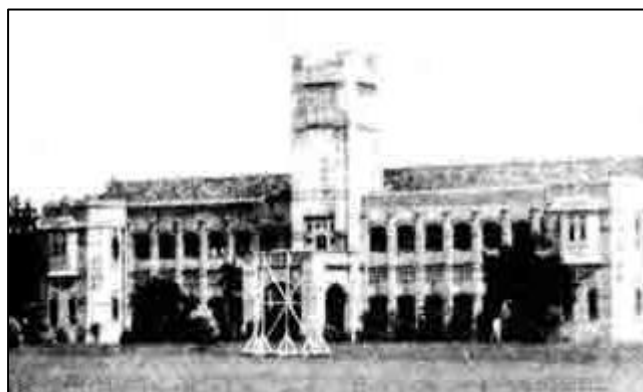
Agitation to establish a university for Ceylon “*adapted to local needs*” which would impart an education and not merely “*estimate the amount of knowledge possessed by examinées*” was led by the so-called educated Ceylonese, including Sir Ponnambalam Arunachalam, Ananda Coomaraswamy, Sir Ponnambalam Ramanathanan, Sir James Pieris, Sir Marcus Fernando, Sir DB Jayatilaka and other nationalists, through the Ceylon University Association which was set up in 1906 for this purpose. As Professor Marrs reminisced later “*...the agitation for a university cannot be said to have taken shape, until the small body of men of all communities formed themselves into a university association and clamoured, with a conviction of enthusiasts, almost of prophets, for a university*”. The Association even published its own

journal. They rejected the system of affiliated Colleges and the London University examinations as alien to Ceylon and committed to the promotion of indigenous Ceylonese culture through the establishment of a University.

A recommendation to establish a University College for Ceylon was put forward by the Macleod Committee of the Legislative Council of Ceylon in 1912 and was accepted by the Colonial Government of the time. The initial proposal included a residential structure with hostel accommodation and the admission of women, a very progressive move for that time. However, the First World War took place shortly afterwards and it was only after the War that any progress was made on this issue. The Director of Education, Mr. E.B. Denham pushed for an early opening of the College and “Regina Walauwwa” on Thurstan Road, later renamed “College House”, was purchased in 1920 and adapted for this purpose.



College House



Old Royal College Building

The Ceylon University College was officially opened on 24<sup>th</sup> January 1921 under the Acting Director of Education, Mr. Edwin Evans, rather hastily (according to Jennings) as “*the product... of an impulsive act by Sir Edward Denham (the then Director of Education) than of deliberate planning*”. By the end of the year, Mr. Robert Marrs, M.A. (Oxon), assumed the post of first Principal of the Ceylon University College and remained at the helm till 1939. Rev W S Senior was the first Registrar. The old Royal College Building on Thurstan Road was transferred to the College and remains one of its most iconic locations. The President of the College and Council was *ex officio* the Governor of Ceylon. The College was run by a Principal and a Registrar and its Council included such dignitaries as the Chief Justice, Director of Medical and Sanitary Services, Director of Education, Director of Agriculture, the Anglican Bishop of Colombo and eminent Ceylonese. The Academic Committee set up to recommend

and implement the courses of study was made up of members of the teaching staff and eminent men in the area of education.

Being only a College (i.e. an institution that provided tertiary education but did not have full or independent university status) affiliated to the University of London, the Ceylon University College could only prepare students to sit the external examinations of the University of London and did not award its own degrees. The syllabuses were prescribed by the University of London and graduates were awarded a B.A. (General), B.A. (Honours), B. Sc. (General) or B.Sc. (Special), London In terms of administration the Ceylon University College was, in effect, a Government Department and not an autonomous institution and in terms of university education it was an affiliated University College, more concerned with coaching students to pass examinations than training them to think or providing them a university atmosphere with a tradition of creativity and research.

The courses offered at the Ceylon University College included Sanskrit, Pali, Latin, Greek, English, Sinhalese, Tamil, Logic, Ethics, History, Geography, Economics, Pure Mathematics, Applied Mathematics, Physics, Chemistry, Botany and Zoology. Students sat for the University of London Intermediate and Final (Arts and Science) examinations. The general degrees were of three years duration while the honours degrees took 4 years. Honours courses were offered in Indo-Aryan (Sanskrit and Pali), Classics, English, History, Mathematics, Physics, Chemistry, Botany and Zoology. It also ran courses preparing students for the Pre-medical Examination of the Ceylon Medical College and the first M.B. and second M.B. (Part 1) examinations of the University of London and a two year Diploma in Economics specially adapted for Ceylon.

In the first year of its existence, 115 students registered at the College and by the end of that academic year 7 obtained B.A. and B. Sc. degrees from the University of London. Admission, initially, was by invitation, in that personal letters were written to all students graduating with honours from the Cambridge Senior Examination and the London Matriculation exam inviting them to register at the College. The student roll increased from 166 in 1921 to 540 in 1935 (including 55 women students). By that time, 337 students, including 25 women had obtained University of London degrees.

THE FIRST COUNCIL OF CEYLON UNIVERSITY COLLEGE



CEYLON UNIVERSITY COLLEGE STAFF.



Photo by Photo Gal

Back Row—P. Kirikisingha, G. W. Ameyasinghe, H. A. Passa, L. D. Smith, S. Baliga, A. W. Maitavagana, W. Fernando.  
 Second Row—H. E. Easight, Rev. F. Kingsbury, Rev. R. Sidhartha, J. C. De. E. F. C. Ludowyk, B. J. T. de Silva, P. C. Sachchithani, S. Nachraiser,  
 Rev. P. L. Jansa, E. L. Fonseka, J. L. C. Rodrigo, B. B. Das Gupta.  
 Seated—F. H. V. Ganesalingam, G. P. Mahalingam, N. G. Ball, W. S. Rao, R. Marra, E. A. Pokemsa, J. W. Hinson, J. P. C. Chandrasena, D.R.H. Bari.



The nucleus of the College Library was made up of two valuable bequests from the libraries of Arunachalam Padmanabha, son of Sir Ponnambalam Arunchalam and Professor T.W. Rhys Davids. The library was ensconced in the Villa Venetia on Queens's Road. In the words of Tissa Devendra *"the Villa was a baroque two-storied pink building flanked by elegantly twisted columns, and overhung by an ornate balcony that would have enthralled Romeo. A large ground floor room charmed its readers by walls frescoed by scenes from Greek and Roman mythology, closely copied from Venetian originals. The top floor housed the library proper and the spacious reading room. This was an era long before the invasion of electronic gadgetry. Reference books were ranged subject-wise on wooden shelves to be withdrawn, on request, by helpful, and surprisingly literate, Library Assistants. The spacious and airy reading room held long desks and chairs for readers silently poring over reference books."*

A number of prizes and medals in the various subjects were endowed by philanthropists. The Coomaraswamy Prize for the best student in Science was won in 1923 by PA Pillai, later the Very Rev Peter Pillai, Rector of St. Joseph's College, in 1926 by MLM. Salgado, later Director of the Coconut Research Institute and in 1932 and 1933 by BA Baptist and AA Hoover, later Professors of Chemistry at Universities in Ceylon. The W. Daniel Fernando Waidysekara Prize for Pali was won by O.H.deA. Wijesekara who was, later, the first Ceylonese Chair of Sanskrit. The hostels were instituted by religious societies and by private subscription in buildings leased by the government, with the Christian Hostel (Brodie House, Bagatelle Road) run by the YMCA and the Union Hostel (Guildford Crescent) with two branches, Arunachalam Hall and Jayatilaka Hall, founded by a *"body of Buddhist and Hindu gentlemen"* opening in October 1922 while the Catholic Hostel (Havelock Road) under Catholic management opened in November. A hostel for women students (Cruden, Queen's Road), founded by the Christian Council in Ceylon, was inaugurated in June 1932. They were all within easy reach of the College and provided full board and lodging at a reasonable price.

It was compulsory for all students to become members of the Ceylon University College Union Society (later divided into the University College Union Society and the University College Amalgamation Club). Other Societies included a Biological Society, Chemical Society, Physical Society, English Study Circle, Sinhalese Society, Tamil Society, Curia Historica, the Mela and a Dramatic and Musical Society.

All the courses were fee-levying but there were a few scholarships and bursaries. Three free studentships were granted annually to the two boys and one girl who scored highest at the Cambridge Senior Certificate Examination, as long as their parental income was less than Rs.6000 per annum. The first scholarship, tendered in 1921 itself, was received by this author's paternal grandfather, Mr C.B.P. Perera, who was later selected to the Ceylon Civil Service. University College Scholarships and Exhibitions, effective for one year, were awarded on the basis of an annual examination. Future academics of the University of Ceylon, such as ECF Ludowyk and EOE Pereira, future statesmen, such as Colvin R de Silva, and future religious leaders, such as Bishop Cyril Abeynaike were recipients of such scholarships. The Sir H. M. Fernando Agricultural Scholarship for 1935 was won by B. A. Abeywickrama, who later became a Vice Chancellor of the University of Colombo. Graduates of the Ceylon University College were assisted to pursue further studies at universities in the United Kingdom by four Government University Scholarships, for Arts, Oriental Languages, Science and Mathematics, awarded on the results of the Final Honours examination.

The establishment of the Ceylon University College was only the first step in the process of founding a fully-fledged university "*awarding degrees of permanent value, and of value outside Ceylon*" and work began immediately to prepare for a University of Ceylon. In fact, Marrs had already drawn up a draft university ordinance by 1925 and a draft constitution was ready by 1930. However, the long drawn out "battle of the sites" to decide where the university should be located (Colombo vs Peradeniya) postponed the process and it took 21 years before the University of Ceylon was born on 1 July 1942, through the *Ceylon University Ordinance No. 20 of 1942*, amalgamating the Ceylon Medical College and the three faculties of the Ceylon University College, Arts, Science and Oriental Languages. Dr (later Sir) Ivor Jennings had taken over from Marrs as the Principal of the Ceylon University College in 1940 and it was he who inaugurated the University of Ceylon as its first Vice-Chancellor.

In the 21 years of its existence, the Ceylon University College did yeoman service in providing higher education opportunities to a multitude of Ceylonese. Alumni of the College went on to serve in the University of Ceylon and other centres of higher education (ECF Ludowyk, Ediriweera Sarathchandra, Arumugam Mailvaganam, GC Mendis, Doric de Souza, EOE Pereira, RH Paul, LH Sumanadasa, BA Baptist, AA Hoover, O.H.de A Wijesekara, BA Abeywickrama, CW Amerasinghe, Wilfred Fernando, WJF LaBrooy, V Appapillai, HJ Balmound, Registrar), Ceylon Civil Service (SF Amarasinghe, M Rajendra, HE Tennakoon,

VSM de Mel, NQ Dias, GRW de Silva, MLD Caspersz, Jinadasa Hettiarachchi, AMA Azeez, M Rajendra, VL Wirasinha, CBP Perera), in Government Departments (S Arumugam, Irrigation Dept, BD Rampala, Dept of Railways, MLM Salgado, Coconut Research Institute, JLTE Dassenaik, S Karthigesu, JC Chanmugam and FH Gunasekara, Percival Ratnatunga, Survey Department, HE Peries, Department of Census and Statistics, CH Holmes, RA de Rosayro, Forest Department, Arthur Van Langenberg), at the United Nations (Shirley Amarasinghe, WVD Pieris), in Parliament (Colvin R de Silva, CP de Silva, JR Jayawardene, NM Perera, Pieter Keuneman, MHM Naina Marikkar, Layard Jayasundera) and as staff and principals of schools (Fr Peter Pillai, Cedric James Oorloff, Sujatha Nimalasuriya, EFC Pereira) often holding multiple such roles throughout their careers as well as contributing to the political and social and cultural advancement of Ceylon (Cardinal Thomas Cooray, the first local head of the See, Victor Tennakoon, Chief Justice, Bishop Cyril Abenaike, Anglican Bishop of Colombo, Arthur Van Langenberg, Artist and Actor).

The University of Colombo is proud to trace the founding of its Science and Arts Faculties and its Library back to the establishment of the Ceylon University College.

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**DISTINGUISHED ALUMNI AND ACADEMICS NOMINATED BY  
FACULTIES AND INSTITUTES TO BE HONOURED AT THE  
CENTENARY CELEBRATIONS OF THE UNIVERSITY OF  
COLOMBO**



**Professor J. B. Disanayaka**

**Professor Emeritus, Faculty of Arts**

Professor Emeritus Deshamanya J. B. Disanayaka BA (Ceylon), MA (California), PhD (Colombo), DLitt (Colombo), occupies a prominent place among Sinhala scholars in contemporary Sri Lanka. He joined the University of Colombo in 1967 and became the founder Head of its newly established Department of Linguistics, which was later relocated to the University of Kelaniya. Professor Disanayaka continued to teach at Colombo, at its Department of Sinhala, for thirty-five years (1967 – 2002) and played a leading role in popularizing Sinhala language studies in Sri Lanka, making a lasting contribution to advance knowledge on Sinhala grammar, language, and culture. He served as the Head, Department of Sinhala and also as the Coordinator of the Journalism Unit, Faculty of Arts. Professor Disanayaka was a pioneer in writing a new grammar for contemporary Sinhala and analyzing Sinhala usage in keeping with the different aims of modern linguistics. His major works on Sinhala culture and folklore provide a large corpus of knowledge about their different aspects. Along with the vast number of Sinhala publications on the Sinhala Language and grammar, he also published many books in English, on both the Sinhala language and Sinhalese culture. As a linguist, Professor Disanayaka took a leading role in the empowerment of local languages in the ICT field, joining hands with his computer science colleagues. He has gained both national and international recognition and prestige for his scholarship and academic contributions. He was a Senior Fellow at the School of Oriental and African Studies, University of London (1992-93) and Ambassador of Sri Lanka to Thailand, Cambodia and Laos (2007-2011). In recognition of his distinguished contribution to the advancement of knowledge, the University of Colombo conferred him an honorary D.Litt. in 2003. In 2005, he was awarded the presidential honorary title *Deshamānya* by the Government of Sri Lanka for services rendered to the country.



**Professor Indrani Munasinghe**

**Professor Emeritus, Faculty of Arts**

Professor Emeritus Indrani Munasinghe entered the University of Ceylon, Peradeniya, in 1961 and graduated with Honours in History in 1965. She obtained a PhD in History from the University of London in 1972. She joined the Department of History, University of Colombo in 1965 as a Temporary Assistant Lecturer and retired from the same University as a Senior Professor and the Chair Professor of History in 2006. Professor Munasinghe served as the Head of the Department of History and Political Science from 1983-1985 and 1986-1987. The University of Colombo conferred on her the title 'Professor Emeritus of History' for her invaluable contribution. She led a very active academic life and published widely on the history of transport and on women in Sri Lanka. She passionately engaged in the campaign for popularizing history and the reintroduction of history into the national school curriculum at a time when many historians either left the country or shifted to other disciplines as history had been considered an obstacle for the country's development. Professor Munasinghe, together with a small group of historians, founded the Sri Lanka Historical Association to launch this campaign and held many positions in the Association. She also served as a member of the advisory committee for the development of the history curriculum at the National Institute of Education and was also the controlling Chief Examiner for GCE (Advanced Level) History at the Department of Examinations. Professor Munasinghe is fondly remembered by her students as a rare teacher who possessed great passion for and commitment to teaching and for the compassion with which she got involved in supporting students.

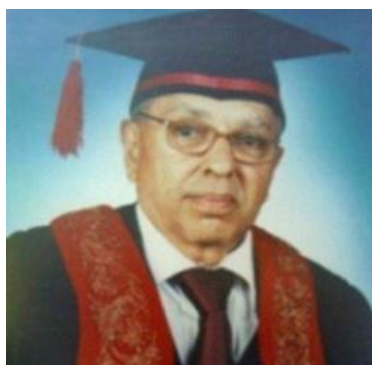




**Professor W. D. Lakshman**

**Professor Emeritus, Faculty of Arts**

Professor Emeritus Deshamanya W.D. Lakshman has a long and illustrious career beginning at the University of Peradeniya in 1964 followed by his appointment to the Department of Economics, University of Colombo, as the Chair Professor of Economics in 1981. He has held the following key positions at the University of Colombo since then: Head (1982-1991), Dean, Faculty of Graduate Studies (1991-1994) and Vice Chancellor (1994-1999). On his retirement in 2007, he was bestowed the title of Professor Emeritus. As Head, Department of Economics, he introduced the first postgraduate taught course in economics in the country, the Postgraduate Diploma in Economics (1984) which was followed by the Master's Degree in Economics (1991) and, thereafter, he spearheaded the introduction of the MPhil/PhD programme (1997). Among his endeavours was the departmental collaboration with The Institute of Social Science in Hague (1987-2000), which strengthened the human and infrastructural resources of the department significantly. As Dean, Faculty of Graduate Studies, he was instrumental in the reorganization of the faculty, diversifying the courses offered and strengthening teaching resources. As Vice Chancellor, he was responsible for the setting up of important institutions such as the Career Guidance Unit; the Staff Development Centre; the Waligatte Project (currently the Institute for Agro-Technology & Rural Sciences) and the Sri Palee Campus. He oversaw the adoption of the semester-based course unit system and the provision of much needed physical infrastructure: the Main Library, faculty buildings and student hostels. Professor Lakshman undertook research in many areas ranging from inequality, migration, industrialization, international trade, public enterprises, structural adjustment, and employment. His numerous textbooks are widely referenced. He was a visiting Professor in renowned universities such as Ryukoku University, Japan, University of Queensland, Australia, JNU in India and ISS in the Netherlands. Professor W.D. Lakshman contributed immensely to national policy throughout his career holding many posts such as Governor of the Central Bank, Vice-Chairperson of the National Development Council, Chairman of the Institute of Policy Studies and Senior Advisor to the Ministry of Finance.



**Dr. Tilak Hettiarachchy**  
**Faculty of Arts**

Dr Tilak Hettiarachchy, retired Professor, Faculty of Arts, obtained his primary and secondary education at St. Mary's College, Veyangoda. He entered the University of Ceylon, Peradeniya, in 1961 and graduated with a first-class honours degree in History and was appointed as an Assistant Lecturer at the University of Peradeniya in the same year. Dr Hettiarachchy received his Master's Degree from the University of Manchester, Canada, in 1976 and his Ph.D. in History from the University of London in 1970. In addition to his studies in history, he received field training in social studies at the University of Leiden in the Netherlands. Dr. Hettiarachchy joined the University of Colombo as a Senior Lecturer in Sociology. He held appointments as the Head of the Department of Sociology (1989-1991), the Dean of the Faculty of Graduate Studies (1996-1999), Rector of Sri Palee Campus (2000-2002) and, finally, the Vice Chancellor of the University of Colombo (2002-2007). He was a member of the Council of the University of Colombo from 1996 to 2008 and retired from university service in 2008. Dr. Hettiarachchy's scholarly contribution in the field of history and sociology is well recognized. His books, "History of Kingship of Ceylon" and "Sinhala Peasant" are recognized as important contributions to the field. He has also authored a book titled "Media Boards" for sociology students.



**Professor Amal Jayawardane**

**Professor Emeritus, Faculty of Arts**

Professor Amal Jayawardane, an alumnus of the University of Ceylon, Peradeniya (1969), joined the University of Ceylon, Colombo in 1970 as an Assistant Lecturer at the Department of History. He obtained his M.A (1974) and Ph.D. (1982) in Russian Studies from the University of Washington, Seattle, USA, thus becoming the first International Relations Area Studies expert in Sri Lanka. He has served as Visiting Professor (1989) at the School of International Service of the American University and Research Scholar (1990) at the Department of International Relations, London School of Economics. In his 42-year service to the University of Colombo, Professor Jayawardane contributed to the faculty as Head, Department of History and Political Science (2001-2006), Head, Department of International Relations (2011-2012) and Dean, Arts (2006-2008). During his tenure as Dean, the faculty secured the Ministry of Higher Education QEF Grant. He also served as Senior Student Counsellor (1993-1995) and Warden of the Kittyakara Hostel (1998-2001). Professor Jayawardane made an enormous contribution to the development of International Relations (IR) as a separate academic discipline. He, along with Professors Shelton Kodikara and George Cooray, played a pioneering role in establishing IR degree programmes at the undergraduate and postgraduate level. The Master's degree programme in IR was established in 1985 in collaboration with the American University, the first one of its kind in Sri Lanka. At the national and international level, Professor Jayawardane has served as the Executive Director (2008-2011) of the Regional Centre for Strategic Studies (RCSS). Since 2013, he has been serving as the Sri Lankan government's representative to the ASEAN Regional Forum Experts and Eminent Persons (ARF-EEP) Group. He retired from the University of Colombo in 2012.



**Professor Siri Hettige**

**Professor Emeritus, Faculty of Arts**

Professor Siri Hettige had an illustrious academic career as an internationally acclaimed sociologist for over three decades. His academic journey began in 1972 at the University of Colombo as an undergraduate student of sociology. After completing a PhD in Social Anthropology at Monash University, Australia, he joined the University of Colombo in 1985 and served the Department of Sociology until his retirement in 2016. He was instrumental in elevating the department to its current status and was the Chair of the Department for 14 years (1992-2016). Professor Hettige has authored over 10 books, edited 9 volumes and published over 120 research papers which have explored an array of themes including youth, globalization, modernization, social policy, employment and sustainability. While leading research studies of national significance on youth, poverty alleviation, integrated rural development and labour migration, he also provided technical expertise for national development projects. Professor Hettige contributed to the internationalization of the University of Colombo as Adjunct Professor at RMIT University, Australia (2013-2018), Adjunct Research Associate of Monash University, Australia (2015-2019) and as a member of the International Sociological Association and the International Rural Sociology Association. Having held distinguished positions as Dean of the Faculty of Arts (1999-2002), Head of the Department of Sociology (1987-1988, 1992-1994 and 1995-1999) and Senior Student Counsellor of the university (1989 -1992), he established the Social Policy Analysis and Research Centre (2005) in an effort to develop the research and innovation capacities of the faculty and was its founding Director until 2009. Notable among the other positions held by Professor Hettige are Chairman of the National Police Commission, Commissioner of the Presidential Commission on Local Government Reform, founder and Chairman of the Sociological Association of Sri Lanka and Chairman of the Social Science Steering Committee of the National Science Foundation (1999 -2002).



**Professor Jayadeva Uyangoda**

**Professor Emeritus, Faculty of Arts**

Professor Jayadeva Uyangoda was the co-founder of the Department of Political Science and Public Policy and served as the first Head of the Department. He joined the Department of History and Political Science in 1981 and retired in May 2016 as a Senior Professor in Political Science. In 2016, he was appointed as an Emeritus Professor of the Department of Political Science and Public Policy. From August 2016 to July 2017, he held the position of Rajni Kothari Chair in Democracy at the Centre for the Study of Developing Societies (CSDS), New Delhi. In 2016, he was awarded the State Literary Award for the best scholarly work in English for the year 2015, for the book *Social Research: Philosophical and Methodological Foundations*. Over the past three decades, Professor Uyangoda has been part of the governing body of numerous national level academic organizations including the Sri Lanka Foundation Institute, the Centre for Policy Research and Analysis, University of Colombo (1993-2000), the Director, Graduate Foundation, University of Colombo (1998- 2000) and Director, Conflict, Power and Democracy Project at the Department of Political Science and Public Policy, University of Colombo (2008-2009). Between 2015 and 2019, he held honorary positions in public sector institutions. Professor Uyangoda served as a member of the Council, University of Jaffna; Council, National Institute of Education; Standing Committee on Humanities and Social Sciences, University Grants Commission; Board of Directors, National Library Board; Governing Council, National Council for Sustainable Development; Board of Regents, National Centre for Advanced Studies in Humanities and Social Sciences, the University Grants Commission and as Chairman, Academic Affairs Board, National Institute of Education. Professor Uyangoda is a world-renowned scholar on South Asian politics and a critical commentator on politics in Sri Lanka. He has authored more than twenty books, edited twenty volumes and written ninety journal articles and book chapters, many of which are used by students and fellow scholars as seminal reference material. He is a prolific writer in both Sinhala and English.



**Professor Lakshman Dissanayake**

**Professor Emeritus, Faculty of Arts**

Professor Lakshman Dissanayake is a former Vice Chancellor of the University of Colombo and former Chair Professor of Demography, University of Colombo. He has been honoured with various distinguished positions and has received awards both nationally and internationally. Professor Dissanayake was honoured by the United Nations Population Fund when Sri Lanka celebrated its 50<sup>th</sup> year anniversary of joining the fund in 1969 by allocating Professor Dissanayake a section in their main publication, “Perspectives: reflecting on five decades of sexual and reproductive health and rights in Sri Lanka”. He is a Fellow of the Royal Society of Arts (FRScA) of the United Kingdom. In 2019, he received the honorary title *Deshabandu* from the President of Sri Lanka for his meritorious service to the nation. He was an Independent Expert at the SAARC Secretariat and functioned as the Lead Consultant to the United Nations Population Fund and various international organizations on various projects. Professor Dissanayake served as a member of the ‘Irregular Migration Research International Reference Panel’ and Research Advisory Group of the Department of Immigration and Border Protection of the Australian Government. He is a Member of the Migration Research Leaders Syndicate of the International Organization of Migration, Geneva, Switzerland. Professor Dissanayake is an Honorary Professor of the Yunnan University of China, Visiting Professor of the Leeds Metropolitan University, United Kingdom and an Adjunct Member of the Hugo Centre for Population and Migration Research. Professor Lakshman Dissanayake’s expertise includes international and internal migration, population ageing, regional demography, and health demography. He has published widely in local and international journals. His research, as well as related community extension work, has provided significant benefits, especially to vulnerable communities in Sri Lanka and abroad.





**Professor Swarna Wijetunge**  
**Professor Emeritus, Faculty of Education**

Professor Emeritus Swarna Wijetunge was one of the most charismatic members of the Department of Educational Psychology who helped and moved freely with both academic and non-academic staff of the Faculty of Education winning their appreciation. She was a pioneering member of the Faculty of Education. As the Head, Department of Educational Psychology from 1995 to 1997, she brought about sustainable constructive changes to the academic programmes at a time when the department was much smaller. Professor Wijetunge held the office of the Dean of the Faculty of Education from 2000 to 2003. She was always ready to contribute to the academic and administrative needs of the university. Her contributions to other universities, the Ministry of Education, National Education Commission, the World Bank, the GTZ and many other organizations led to the upliftment of education and teacher education. As a well-recognized educationist, she was able to establish links with institutions of repute across the world. Professor Wijetunge was the founder Director of NEREC, the National Education Research and Evaluation Centre. Her eminence in the field of education brought recognition to the centre and laid a solid foundation for its continued development. Professor Wijetunge retired with an illustrious record of 36 years of service at the University of Colombo. The impression of colleagues who have worked with her is that she was a source of inspiration to all. Her motto as a teacher was to uplift students at all costs. Professor Wijetunge was a role model and an academic worthy of emulation.





**Professor Roland Abeypala**

**Professor Emeritus, Faculty of Education**

Professor Emeritus Roland Abeypala is one of the most distinguished and well-known humanists and educationists in Sri Lanka. He was conversant with many areas of education but his main area of focus was educational psychology. He held the Headship in the Department of Educational Psychology. He contributed immensely to strengthen the Department of Educational Psychology and the Faculty of Education promoting collegiality among all members of the faculty. He was fair and considerate in dealing with everyone. He coordinated many programmes and contributed to improve their quality through timely curriculum revisions and the introduction of innovative subject components. Professor Abeypala is a prolific writer and his writings in Sinhala have immensely facilitated the study of education, especially educational psychology, among students who are conversant only in Sinhala. He was instrumental in establishing the Alumni Association of the Postgraduate Diploma in Counselling and he launched a journal which has popularized the profession of counselling in Sri Lanka. Professor Abeypala has made noteworthy contributions to other universities, ministries, and institutions. He is also an Attorney-at-Law of the Supreme Court of Sri Lanka, a Justice of the Peace (whole island), a Notary Public and a Commissioner of Oaths. Professor Abeypala retired in 2016 as a Senior Professor in Educational Psychology with a 40 year long flawless record as a teacher who won the appreciation of all the students and staff of the Faculty of Education.



**Dr. Chanaka Talpahewa**  
**Faculty of Graduate Studies**

Dr. Chanaka Talpahewa obtained his PhD in Politics and International Studies (recipient of Cambridge Commonwealth Trust Scholarship, Developing World Education Fund Scholarship & Smuts Scholarship in Commonwealth Studies) and MPhil in Politics and International Studies (recipient of the British Chevening Scholarship) from the University of Cambridge (UK) and MBA, MDS, MA (IR) and BSc. degrees from the University of Colombo. An officer of the Sri Lanka Foreign Service, he came first in the country in the recruitment examination. He has served in the Sri Lanka Missions in New York, Maldives, Turkey and the UK and has also served in the United Nations (UN) as the Head of Agency of UN-Habitat for Sri Lanka and the Maldives. Currently he is a Director General of the Foreign Ministry. An outstanding sportsman, he was the first captain of the Sri Lanka rowing team to the Asian Games. He has represented Sri Lanka at the Asian Games, won medals at South Asian Games and currently holds two Sri Lanka records. He has been a visiting lecturer at the University of Colombo, University of Kelaniya, BCIS, BIDTI and Command and Staff College. He has also been a Member of the Board of Management of the Gampaha Wickramarachchi Ayurveda Institute and currently serves as a Member of the Council of the Open University. Dr. Talpahewa has presented papers at numerous research conferences and has contributed articles to many research journals. He has authored “Peaceful Intervention in Intra-State Conflicts: Norwegian Involvement in the Sri Lankan Peace Process” and co-authored “A Quick Guide to the Plants in the Maldives”.



**Mr. P.M.D. Ranga Nadeera Pallawala**

**Faculty of Graduate Studies**

Ranga Pallawala is a renowned Sri Lankan expert on climate change and a distinguished alumnus of the University of Colombo. He entered the Faculty of Agriculture of the University of Peradeniya in 1996 where he obtained a degree in Agriculture. He obtained a Master in Environment Management from the Faculty of Graduate Studies, University of Colombo. He has served in a number of Sri Lankan and international organizations including the World Bank, UNDP, UNEP and the World Agroforestry Centre as a climate change expert during his illustrious career spanning over 20 years. Currently, he is serving as a “Climate Finance Advisor” attached to the Commonwealth Climate Finance Access Hub (CCFAH) of the Commonwealth Secretariat. He is the founding Chief Executive Officer of Janathakshan GTE and the former Head of the Intermediate Technology Development Group (ITDG) South Asia office. Mr. Pallawala has actively contributed to the United Nations Framework Convention on Climate Change (UNFCCC) negotiation processes since 2008. He has been part of the official delegation of Sri Lanka to UNFCCC negotiations for many years as an expert on Climate Finance. He actively contributed in negotiating the historical Paris Agreement, representing the G77 and the China negotiation block. Mr. Pallawala has also been appointed as a member of the National Expert Committee on Climate Change Adaptation by the Ministry of Environment since 2009. Mr. Pallawala is regarded as one of the very few “Climate Finance Direct Access” experts and supported a number of agencies locally and internationally to obtain accreditation from leading climate funds including the Green Climate Fund and the Adaptation Fund.



**Mrs. Sashikala Premawardhane**

**Faculty of Graduate Studies**

High Commissioner Sashikala Premawardhane is a career diplomat with over 23 years of experience in the Sri Lanka Foreign Service. Prior to being appointed as High Commissioner to Singapore in June 2019, she served as Director General, Policy Planning and Research at the Ministry of Foreign Affairs, Sri Lanka. She also set up and served as the first Director General of the Ocean Affairs, Environment and Climate Change Division. High Commissioner Premawardhane's appointments include a secondment at the Ministry of Defence as Senior Assistant Secretary (Foreign Affairs) from 2012-2017. She has held several key appointments in the Foreign Ministry including Director/United Nations, Director/Technical Cooperation, and Deputy Director/Economic Affairs. Overseas, High Commissioner Premawardhane has served as Minister at the Sri Lanka High Commission in Canberra from 2009-2012 and as Acting High Commissioner for Sri Lanka in Australia from December 2010 to July 2011. She also served in the Sri Lanka Embassy in Tokyo as First Secretary from 2001-2004. High Commissioner Premawardhane has represented Sri Lanka at numerous international conferences, seminars and symposia. She holds a Bachelor of Arts degree in Economics from the University of Pune, India and a Master's degree in Conflict and Peace Studies from the University of Colombo. She was awarded the Career Achievement - Public Sector Award 2019 at the "Top 50 Professional & Career Women Awards – Ninth Edition" Sri Lanka & Maldives by Women in Management (WIM) in partnership with IFC, a member of the World Bank Group and the Government of Australia.



**Professor Savitri Goonesekere**

**Professor Emeritus, Faculty of Law**

As the first female Vice-Chancellor and Professor of Law in Sri Lanka, Professor Savitri Goonesekere illuminates the hall of fame of the country's legal academics. She has contributed greatly to diverse areas of law ranging from family law, delict and labour law to human rights and constitutional law. Sri Lankan Courts have cited her work in many seminal cases. Professor Goonesekere studied at Ladies' College, Colombo and read for her LL.B. at the Department of Law of the University of Peradeniya from which she graduated with First Class Honours. She read for her LL.M. at the Harvard Law School as a Smith-Mundt Fulbright scholar. Her first appointment as an academic was at the Department of Law of the then University of Ceylon where she made history as the first female lecturer in Law. She received an honorary Doctorate in Law and an honorary Doctorate of Letters, in recognition of her contribution, from the University of Colombo and the Open University of Sri Lanka, respectively. Prof. Goonesekere has served in multiple prestigious institutions at regional and international levels. She has done extensive work with many agencies of the United Nations including the Committee on the Elimination of Discrimination Against Women. She was awarded the Fukuoka Asian Academic Prize in 2008 for her contribution to the international understanding of Asia. She has indeed been a trailblazer in her career as an internationally acclaimed academic, researcher, lawmaker and policymaker. She will always remain one of our most revered luminaries.



**Hon. Professor G.L. Peiris**  
**Professor Emeritus, Faculty of Law**

Hon. Professor G. L. Peiris served as Professor of Law, Dean of the Faculty of Law and Vice-Chancellor of the University of Colombo. He is a Rhodes Scholar, Doctor of Philosophy and Quondam Visiting Fellow of the University of Oxford, Quondam Distinguished Visiting Fellow of Christ's College, Cambridge, Smuts Visiting Fellow in Commonwealth Studies at the University of Cambridge and Butterworths Visiting Fellow at the Institute of Advanced Legal Studies, University of London. He is the author of eleven books and seventy articles published in prestigious law journals in twelve countries. He has held a wide range of Cabinet portfolios across the whole range of government. He served as Minister of Justice, Constitutional Affairs, Ethnic Affairs and National Integration, Minister of External Trade, Minister of Investment Promotion and Industrial Policy, Minister of Education and Higher Education and Deputy Minister of Finance and Planning. He presented six consecutive budgets to the Parliament of Sri Lanka. He was Chairman of the Parliamentary Select Committee on Constitutional Reform. He was the Chief Negotiator of the Government of Sri Lanka in negotiations with the Liberation Tigers of Tamil Eelam. He is currently the Minister of Foreign Affairs. Professor Peiris is Chairman of the ruling Sri Lanka Podujana Peramuna. During his academic career, he was a member of the Presidential Commission on Youth, the National Education Commission, the Securities and Exchange Commission, the Law Commission and the Council of Legal Education of Sri Lanka. He was honoured by the conferment of the title of *Vidya Jyothi* in the National Honours List.



**Professor Sharya Scharenguivel**

**Professor Emeritus, Faculty of Law**

Sharya Scharenguivel - Emeritus Professor of Law, University of Colombo - served within the University System for almost forty years. Having schooled at Ladies' College Colombo, she obtained an LL.B. from the University of Colombo, LL.M. from Harvard University and M.Litt. from the University of Oxford. She was conferred an honorary MA by the University of Oxford. She is a life member of Clare Hall, Cambridge, was the Benians Fellow of St John's College Cambridge, Inns of Court Fellow and visiting Fellow of Balliol College, Oxford and Clare Hall, Cambridge. Professor Scharenguivel has held various positions at the University of Colombo including acting Vice Chancellor, Dean of the Faculty of Law, Head of the Department of Law, Head, Department of Private and Comparative Law and Director at the Centre for the Study of Human Rights. She served in many Faculty and University committees. She is the Editor-in-Chief of the Colombo Law Review and an Advisor to the Sri Lanka Journal of International Law. Professor Scharenguivel has published widely in family law, child rights, women's rights, labour law and legal systems. Her expertise has been recognized by policy makers, governmental working groups, ministerial law reform committees and various organizations. She was presented the Zonta Woman of Achievement Award. She has served as a Commissioner at the Law Commission of Sri Lanka and a member of the National Child Protection Authority and is currently serving as a member of the National Monitoring Committee on Child Rights and the National Group of Sri Lanka in the Permanent Court of Arbitration.





**Dr. W. M. Jayaratna**

**Faculty of Management and Finance**

Dr W. M. Jayaratna secured a Special Degree in Public Administration in 1968 at the then Vidyodaya University. On a scholarship from the University of New Hampshire, USA, he obtained his postgraduate degree in Management. Upon joining Vidyalankara University in 1977, he established the Bachelor of Commerce Degree program there. He briefly served the University of Ruhuna in its formative stages in the late 1970s. From 1993 to 1996, he was the Director of the Affiliated University College of Rajarata, which later became the Rajarata University. In 1980, as the first Head of the Department of Commerce and Management Studies of the University of Colombo, he upgraded the syllabus of the Bachelor of Commerce Degree programme and in 1985 established the Bachelor of Business Administration Degree programme. He pioneered the introduction of the first-ever fee levying extension course, the Executive Diploma in Business Administration (EDBA) in 1981 to meet the growing demands of liberalized economic policies. In 1983, he introduced the Master of Business Administration (MBA) programme, which continues uninterrupted to date as one of the most sought after career development programmes in the country. His vision, leadership, and untiring efforts laid the groundwork for the Faculty of Management and Finance to become a fully-fledged faculty in 1994.



**Dr. P. S. M. Gunaratne**

**Faculty of Management and Finance**

Dr P.S.M. Gunaratne has over forty years of experience as an eminent scholar, academic and administrator. He was the Dean of the Faculty of Management and Finance and the Vice-Chairman of the University Grant Commission. He joined the University as an Assistant Lecturer of the Department of Commerce and Management Studies in 1981. On a Japanese Government Postgraduate Research Scholarship, he obtained his MSc and PhD degrees from the University of Tsukuba in 1997. Upon his return, he became the Dean of the Faculty of Management and Finance and continued to serve the faculty for four terms. He was a brilliant academic and outstanding researcher in his chosen field of Finance. In 2006, he pioneered the restructuring of the faculty by expanding the number of academic departments from two to six with different areas of specialization. Further, he restructured the MBA programme by introducing four areas of specialization. He was responsible for fast-tracking a multitude of infrastructural development projects to meet the needs of the growing faculty. Upon becoming the Vice Chairman of the UGC, he introduced new postgraduate grant schemes for university academics and administrators. He also contributed to the Unicode admission system. He was involved in negotiations with funding agencies such as the World Bank ADB and UNESCO. He spearheaded the design and conduct of the UNESCO-sponsored tracer study of university graduates. He represented the UGC in negotiations with the World Bank to design funding programmes for the higher education sector, later becoming the project director of AHEAD. He did his maximum to uplift and raise the standards of the higher education system of the country through his expertise and dedication.



**Professor A. H. Sheriffdeen**

**Professor Emeritus, Faculty of Medicine**

Professor Abdul Haleem Sheriffdeen is a consultant surgeon and an academic. After passing the primary FRCS, he joined the Department of Surgery, University of Colombo. He trained in vascular surgery in addition to obtaining the fellowships of the Royal Colleges of Surgeons of England and Edinburgh. Upon his return, he pioneered vascular surgery in the country and was responsible for initiating the postgraduate training program in Vascular Surgery. He was a pioneer in renal transplantation and performed the first renal transplant in Sri Lanka in 1984 playing an integral role in its success. He is an avid researcher and identified a new clinical entity- transient emboligenic aortoarteritis, together with fellow researchers. He has been the Chairman of the Ministry of Health Trauma Protocols at the Trauma Secretariat, Chairman of the Board of Study in Surgery at Postgraduate Institute of Medicine, President, Sri Lanka Medical Association and the President, College of Surgeons of Sri Lanka. He has authored biographies of Sri Lankan surgeons. He is also a leading activist for planned parenthood and the prevention of HIV /AIDS, both nationally and internationally. He has been President and Vice President of the charity Colombo Friend in Need Society, which provides artificial limbs and other walking aids to the needy. He was awarded the title *Deshamanya* by the Government of Sri Lanka for his outstanding services to the nation and Honorary Fellowships by the Ceylon College of Physicians and the College of General Practitioners of Sri Lanka.



**Professor Colvin Goonaratna**  
**Professor Emeritus, Faculty of Medicine**

Professor Emeritus Deshamanya Colvin Goonaratna is a distinguished academic who has contributed to the advancement of science, medical education and national development in Sri Lanka. Professor Goonaratna was the Head and Chair Professor of Physiology at the Faculty of Medicine, University of Colombo. Among the many illustrious positions he has held are as President of the Physiological Society of Sri Lanka, President of the Sri Lanka Medical Association in 1996, General President of the Sri Lanka Association for the Advancement of Science in 2003, Chairman, Sri Lanka Medical Council and Chairman, State Pharmaceuticals Corporation. He is the founder Chairman of the Sri Lanka Clinical Trials Registry which has achieved primary registry status in the WHO Clinical Trials Registry Platform due to his dedicated leadership. In 1988, he was appointed the editor of the *Ceylon Medical Journal* and served in this position for 17 years during which time he transformed the journal to one of an international standard and is now Editor Emeritus of the journal. He is also co-editor of the “*The Sri Lanka Prescriber*” from 1993 when it recommenced publication. Professor Goonaratna continues to render a yeoman service to the field of medicine and allied health as the Registrar of Ceylon Medical College Council. Professor Goonaratna was honored with the Visvaprasadini award for his contributions to Science Education in 1996, received the national Vidyajyothi award for his contribution to research in 2005 and was bestowed with the Deshamanya award, the highest national recognition awarded to a citizen in Sri Lanka for distinguished service rendered to the nation, in 2017.



**Professor Lalitha Mendis**  
**Professor Emeritus, Faculty of Medicine**

Professor Emeritus, Vidyajyothi Lalitha Mendis was the Head of the Department of Microbiology from 1990 to 1996. She was appointed Chair Professor in 2006 till retirement. Her dedication and sense of responsibility was not confined to her Department as she took up the onerous task and grave responsibility of the Dean of the Faculty of Medicine, University of Colombo from 1996 to 2002 during which she implemented a student centered, system based integrated curriculum. She has also served as the Competent Authority of the University of Colombo. She raised the profile of Microbiology as a scientific discipline as President of Section A of the Sri Lanka Association for the Advancement of Science in 1989 and as the President of the Sri Lanka College of Microbiologists in 1996. She has served as the Chairperson or Member of innumerable expert committees, both locally and internationally, including those of the WHO such as the Scientific Working Group on the “Management of Health Research Information” WHO South East Asian Regional Office and the Scientific Advisory Group of Experts (SAGE) of WHO Geneva. In 2002, she was appointed Director, PGIM and during her period she initiated the first academic sessions of the PGIM and the first South Asian Conference on Postgraduate Medical Education. In 2008, Professor Mendis was inducted as the 114th President of the Sri Lanka Medical Association, the apex medical association in Sri Lanka. She was President of the Sri Lanka Medical Council from 2009 - 2011. She was awarded the National Honour of Vidyajyothi in 2005.



**Professor Sanath P. Lamabadusuriya**  
**Professor Emeritus, Faculty of Medicine**

Professor Sanath Lamabadusuriya is a distinguished academic who has contributed to uplift science, medical education and the national development of Sri Lanka, particularly in the fields of Paediatrics and Child Health. He is one of the finest clinicians in Paediatrics that this country has ever produced. In addition to his many other academic achievements, he was the first clinician in Sri Lanka to obtain a research degree (Ph.D.) after just two years of research. Professor Lamabadusuriya is the only Sri Lankan domiciled in Sri Lanka to receive a Royal Honour from Queen Elizabeth II after Royal Honours were abolished in this country in 1950, receiving a Member of the British Empire (MBE) in 1992, in recognition of his contribution to the Sri Lankan Cleft Lip and Palate Project which he co-directed with Dr. Michael Mars from the UK. Professor Lamabadusuriya has several fellowships to his honour including being an Honorary Member of the British Paediatric Association, an Elected Fellow of the New York Academy of Science and an elected Fellow of the Royal College of Paediatrics and Child Health. He has completed 52 years in academia, serving the Faculty of Medicine Colombo as the Dean from 2002-2005, Faculty of Medicine Ruhuna as Founder Professor, Rajarata Medical Faculty as Visiting Senior Professor and Sabaragamuwa Medical Faculty as Senior Professor and Consultant. He was President of the Sri Lanka Medical Association, Sri Lanka Pediatric Association and President-elect for the Asia Pacific Paediatric Association. He has served in many committees to improve childcare in the country including the Taskforce on Breastfeeding and Advisory Committee on Communicable Diseases.







**Professor Nalaka Mendis**

**Professor Emeritus, Faculty of Medicine**

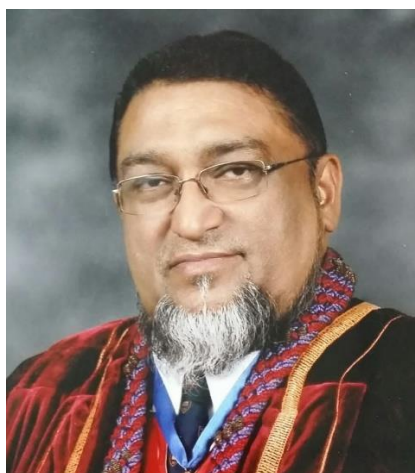
Professor Nalaka Mendis graduated from the University of Colombo, joined its Department of Psychiatry and was appointed to the Chair in 1988. He initiated or led many far-reaching reforms in medical education such as developing behavioural sciences and ethics and creating academic posts for Clinical Social Sciences and Ethics in the department. He promoted academic activities in Medical Ethics collaborating with Norway and established Psychiatry as a Final MBBS subject. He worked in prestigious international universities including the Harvard Medical School. During his tenure, the Department of Psychiatry was renamed the Department of Psychological Medicine, emphasizing mental health. As the Chairperson of the Curriculum Committee, he led reforms resulting in an integrated curriculum with a Behavioural Sciences Stream and the establishment of a Department of Medical Education. He established the Health Development and Research Programme and a Postgraduate Diploma in Health Development. The National Council for Mental Health and the first Community Mental Health Center – Sahanaya – in Sri Lanka were his ideas. He was instrumental in identifying cadre positions for Medical Officers of Mental Health, establishing the Diploma in Psychiatry and proposing amendments to the Mental Health Act. He was a member of the Presidential Task Force on Health, National Science and Technology Commission, National Disability Council, National Development Council and the Development Studies Institute and the Founder President of the South Asian Forum on Mental Health. He was appointed to the World Association for Psychosocial Rehabilitation. He has authored over a hundred scientific publications, presented research and written books on mental health and is currently compiling a book on the post-colonial development of mental health services in Sri Lanka.



**Professor Harshalal Seneviratne**

**Professor Emeritus, Faculty of Medicine**

Professor Harshalal Seneviratne graduated from the University of Ceylon in 1970 and joined the Department of Obstetrics & Gynecology, University of Colombo in 1978, rising to the rank of Chair Professor. He served as the Dean of the Faculty of Medicine from 2009 to 2011, a tenure marked by academic reform and service. As the secretary of the UNFPA Teaching Programme and the Chairperson of the Colombo Task Force of the WHO he collaborated with the National Coordinating Committee of Reproductive Health Research in Sri Lanka. He was also a local and international evaluator and supervisor for research projects and an examiner for research related degrees. He was awarded the Commonwealth Medical Fellowship (1986) to conduct research on prostaglandin synthesis and pregnancy at the University of Nottingham which led to formal training on biological techniques, benefitting generations to follow. He also collaborated with Sweden to research fetal ECG waveform using the STAN fetal monitor, advancing obstetrics in Sri Lanka. He was awarded the President's Award for Research Excellence five times between 2000-2009. In 2002, he led the Sri Lankan team that delivered the first baby conceived by Assisted Reproductive Technologies, winning the National Science and Technology Award of the Ministry of Science and Technology. Currently, Professor Seneviratne leads the Examination Unit of the Sri Lanka Medical Council and is also the Chairperson of 'Vindana', a private enterprise for advanced reproductive health.



**Professor Rezvi Sheriff**

**Professor Emeritus, Faculty of Medicine**

Professor Mohamed Hussain Rezvi Sheriff is a Consultant Physician and Nephrologist. He retired as a Senior Professor of Medicine and was a former Head of the Department of Clinical Medicine at the University of Colombo. He founded the National Institute for Nephrology, Dialysis and Transplantation in Colombo and served as the Director of the Postgraduate Institute of Medicine. He was the President of the Ceylon College of Physicians, President of the Sri Lanka Association of Nephrology and Transplantation, President of the Sri Lanka Medical Association, President of the Nephrology, Urology & Transplant Society of SAARC, Founder President of the Hypertension Society in Sri Lanka and the Founder President of the Health Informatics Society in Sri Lanka. From 2007-2013, he served on the Council of the prestigious International Society of Nephrology. He was awarded fellowships by the National Academy of Science of Sri Lanka, National Science Foundation and the Indian Medical Association. He has over 250 scientific publications and is an editor of regional nephrology journals and an international editor of and a contributor to Kumar & Clark's Clinical Medicine textbook and the Oxford Text book of Medicine. He is the chief editor of the CKDu Repository of the WHO on chronic kidney disease of unknown origin in Sri Lanka. On his retirement, the National Hospital of Sri Lanka named its Auditorium the "Vidya Jyothi Prof Rezvi Sheriff Auditorium". He has received the Abdul Kalam excellence Award, Nelson Mandela Peace Award and the Albert Einstein Peace Award. Currently, he serves as Senior Professor of Medicine at the Kotelawala Defense University.



**Professor Kamini Mendis**

**Professor Emeritus, Faculty of Medicine**

Professor Kamini Mendis is a medical scientist, researcher and a public health specialist. She worked extensively on malaria research in Sri Lanka from 1980 - 1997 at the Faculty of Medicine, University of Colombo and during this time, she established the Malaria Research Unit that trained numerous scientists and medical graduates. She has made several original scientific contributions to medical science in the fields of parasite biology, immunology, transmission dynamics, pathogenesis, epidemiology and disease control in malaria which have been widely published and she has been honoured with national and international awards such as the National Presidential Award, the Chalmers Medal of the Royal Society of Tropical Medicine and Hygiene, United Kingdom, and the Ashford Bailey Medal of the American Society of Tropical Medicine and Hygiene. She has delivered keynote addresses in prestigious international events, including delivering the celebrated Gorgas Memorial Lecture in USA. In 1997, she began diverting her efforts from research to policy and she helped establish the Global Forum for Health Research in Geneva. On an invitation by the then Director-General of the World Health Organization, she helped to launch WHO's Global Roll Back Malaria Initiative in 1998 and served as a co-ordinator of the Global Malaria Programme at the World Health Organization, thereafter. Her work at the WHO has contributed to successes in eliminating malaria from several endemic countries. She currently advises on malaria research and control globally and in the Southeast Asian region. She serves as a malaria adviser to international agencies and as a member of several international expert committees on health.



**Professor P. W. Epasinghe**

**Professor Emeritus, Faculty of Science**

Professor P.W. Epasinghe was born on December 09, 1935 and began his education at the Dodangoda Buddhist Mixed School. He joined Ananda College in Grade 3, where he was awarded the Mohotiwatta Gunananda Scholarship. He passed both the SSC Examination and the HSC Examination in the First Division. He entered the University of Colombo in 1954 and graduated with a First Class in the B.Sc. Special Degree in Mathematics programme in 1957. Immediately afterwards, he joined the academic staff of the Department of Mathematics. He obtained his PhD from the Imperial College of Science and Technology, London in 1965. In 1967, at the age of just 31 years, he was appointed Professor of Mathematics and Head of the Department of Mathematics of the Vidyodaya Campus of the University of Sri Lanka where he also served as the Dean of the Faculty of Science in 1977/78. In 1978 he returned to Colombo Campus and was appointed Head of the Department of Mathematics. He served as the Dean of the Faculty of Science in 1983, 1994, and 1995. Professor Epasinghe has a distinguished track record at the national level as well. He served as the Chairman of the Tertiary and Vocational Education Commission in 1994, Chairman of the National Aquatic Resource Research and Development Agency in 1997, Chairman of ICTA in 2010, Advisor to the Prime Minister in 2005 and an Advisor to HE the President during the period 2005-2014. He was conferred the title of Emeritus Professor by the University of Colombo.





**Professor K. Abeynayake**

**Professor Emeritus, Faculty of Science**

Professor K. Abeynayake enjoyed an illustrious career spanning 41 years. She commenced her academic journey by joining the then Department of Botany as a Temporary Lecturer in Botany. Having obtained her PhD in Plant Ecology from the University of Lancaster, she was promoted to Lecturer and subsequently, to Senior Lecturer, Associate Professor, Professor of Botany and Senior Professor of Botany. After retirement, she was awarded the title Professor Emeritus recognizing her dedicated and distinguished service. She was appointed as the Head of the Department and rendered an invaluable service to the department. Later, she served as the Dean of the Faculty of Science for two consecutive terms. She contributed to various research projects and published in numerous journals. She has secured several research grants. As an eminent researcher, she promoted collaborative research. She was actively involved in various committees and served on the Senate and Council of the university, contributing her expertise related to administrative aspects of the university. Her commendable service was extended to the national development of the country. She was engaged in various projects of national importance. She functioned as a member of the National Science Foundation Research Committee on the Environment and Biodiversity for two years. Even after her retirement, she continued to offer her expertise to the National Academy of Sciences of Sri Lanka promoting science and technology in the country.



**Professor W. D. Ratnasooriya**

**Professor Emeritus, Faculty of Science**

Professor Ratnasooriya's illustrious career at the Department of Zoology and Environment Sciences, devoted primarily to teaching and research, spanned over four decades. He has won an unparalleled array of national and international awards and accolades for his research. What is truly commendable is that his world-class research was mainly conducted within the department using simple apparatus. He focused on three major areas, namely, mammalian reproduction, bioactivity of Sri Lankan herbal extracts, including Sri Lankan black tea, and the biology of Sri Lankan elephants and bats. Professor Ratnasooriya has contributed immensely to capacity building of young scientists by supervising 15 PhDs, 15 MPhils and a number of MSc degrees. In recognition of his outstanding research work, Professor Ratnasooriya earned a DSc in Life Sciences from the University of Peradeniya (2008) and a DSc (honoris causa) from the University of Colombo (2016). His yeoman service to Biology Education in the country is well recognised. Professor Ratnasooriya has an H index of 33 and has 391 research papers and 276 scientific communications to his credit with 4992 citations as of October 2021. He also had the rare distinction of having the highest individual cumulative index for research publications in Sri Lanka for ten consecutive years (1991-2001). He is among the very few who have been elected as a Fellow of the Third World Academy of Sciences (TWAS). He recently (in 2020) brought fame to the University by being recognized as one of the top 2% of world-renowned scientists.



**Professor T. R. Ariyaratne**

**Professor Emeritus, Faculty of Science**

Professor T. R. Ariyaratne joined the Department of Physics as a probationary Assistant Lecturer in 1971 after earning a B.Sc. Honours Degree in Physics. He pursued a Ph.D. in Nuclear Instrumentation at the University of Durham, UK, sponsored by the prestigious Commonwealth Scholarship. Returning to Sri Lanka in 1979, he was promoted to Senior Lecturer and subsequently served as Head of Department, Dean of the Faculty of Science, Acting Vice Chancellor-University of Colombo for over 04 months and the Chair Professor of Physics from 2002 until his retirement in 2014. As a visionary, he transformed the Faculty of Science through the expansion of science degree programs to meet the needs of both the discipline and industry. The concept of service-based learning through a dedicated Career Guidance Unit was a novel initiative introduced during his tenure as the Dean, alongside the establishment of a Learning Management System, Student Information System, IT Service Center and the Colombo Science & Technology Cell. Professor Ariyaratne made remarkable scientific contributions to the field of plasma desorption mass-spectrometry and developed a state-of-the-art research facility at the Department of Physics through the patronage of Uppsala University, Sweden. He also served as the founder Director of the Centre for Instrumentation Development. He has supervised 09 PhDs. Other notable national services include his nearly three-decades-long commitment as the Controlling Chief Examiner in G.C.E.(A/L) Physics. He has received numerous national and international awards for his dedicated service to Physics and Higher Education in Sri Lanka.



**Dr. L. M. V. Tillekeratne**  
**Faculty of Science**

Dr. Tillekeratne completed his primary education at Dharmaloka Vidyalaya and secondary education at Ananda College. In 1969, he graduated from the University of Colombo with first class honours in Chemistry and was given the 'Best Performer in the Science Faculty' award. He was recruited to the academic staff immediately. He received a Commonwealth scholarship and obtained his PhD in Organic Synthesis from Oxford University. In 1975, Dr Tillekeratne returned to Sri Lanka and joined the Department of Chemistry. He was appointed as a Professor in Organic Chemistry at the Department of Chemistry in 1984 and was also the Chair of Organic Chemistry. He always tried to promote the importance of research and encouraged students to engage in more research. He believed that research was an indispensable supplement for a successful teaching career. He served as the Head of the Chemistry Department for a few years and in 1985 became the Dean of the Faculty of Science. He worked as the Chairman of the Sports Advisory Board of the University for many years and helped to promote various sports activities in the university. Currently, he is a faculty member of the Department of Medicinal and Biological Chemistry at the University of Toledo, USA. Although he lives abroad, he extends his support to the Faculty of Science through a well-known, non-profit organization called CUFSAA (Colombo University Faculty of Science Alumni Association of North America).



**Late Professor V. K. Samaranayake**

**Professor Emeritus, University of Colombo School of Computing**

Late Professor Emeritus, *Vidya Jyothi* V. K. Samaranayake is renowned internationally as the pioneer of modern IT policy formation in Sri Lanka. He was the founder Director of the University of Colombo School of Computing (UCSC) and its predecessor, the Institute of Computer Technology (ICT). He received his first degree, BSc Honours in Special Mathematics, from the University of Ceylon in 1961 and his PhD in Theoretical Physics from the University of London in 1966. He served the University of Colombo for 43 years holding different positions. He was awarded the titles “Vidya Jyothi” and “Viswa Prasadini” for his immense contribution to higher education in Sri Lanka. Outside the university, he served as the Chairman of ICTA, General President of SLAAS, President of the National Academy of Science and in many steering committees of the government. With the advent of the microcomputer, he utilised his expertise in computing and proven management skills to introduce computer education on a mass scale in Sri Lanka in universities and schools. He started a microcomputer laboratory at the University of Colombo with British Aid and mobilized resources from the Government of Sri Lanka and UNDP, JICA and other donor agencies to set up a Centre of Excellence in Computing in South Asia. He was a pioneer in organizing the annual International Information Technology Conference (IITC) and the Infotel Exhibition. He had over 80 publications to his credit.



**Late Dr. Gihan Wikramanayake**

**University of Colombo School of Computing**

The late Dr. Wikramanayake served as the Director of the University of Colombo School of Computing (UCSC) for two terms from May 2010 to May 2016. He received his first degree, a BSc in Statistics and Mathematics, from the University of Colombo with First Class Honours in 1984 and his PhD in Computer Science from the University of Wales, UK in 1996. He began his career by joining the Computer Centre of the University of Colombo in 1987 as a trainee programmer and by the time of his untimely demise in 2018, he was serving as a Senior Professor at the UCSC. He was the Head of the Department of Information Systems Engineering when UCSC was first established. He also represented the University of Colombo as the Director of LEARN and he served in the boards of the IBMBB and NILIS. He was appointed as the Chairman of BCS (2017 – 2015) and was the chief judge at APICTA (2015). He was a member of the Sri Lanka Informatics Olympiad since 1998 and was involved in organizing International Olympiad in Informatics (IOI) training since then. His contribution to the government includes serving as an active member of the Computing Standing Committee of the UGC. He was called to check the Z-Score calculations of the Department of Examinations. He served as a visiting scholar at the University of New Mexico, Stockholm University and Umeå University in the area of e-Learning. During his time as the Director of UCSC, he also served as the Chairman of the Theekshana Company from 2010 to 2016. He was awarded the UCSC Research Award in 2012.

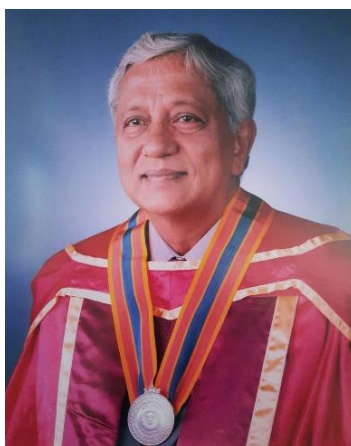




**Dr. N. D. Kodikara**

**University of Colombo School of Computing**

Dr N.D. Kodikara is the first person in Sri Lanka to complete a degree in computer science from the state university system and to complete a PhD in Computer Science. He received his PhD in 1989 from the University of Manchester in the UK. As the first academic who was qualified in Computer Science in the university, he played a major role in establishing the first ever M.Sc. in Computer Science programme in Sri Lanka and the first B.Sc. Special Degree in Computer Science in 1992. He started his career of 42 years at the University of Colombo as a temporary statistical officer at the Mathematics Department and went on to become Deputy Director of the UCSC when it was established. As a founding member of the UCSC, he played an important role in the first ever external degree program in IT (BIT) in Sri Lanka and in joint special degree programs of the Faculty of Science and UCSC. At UCSC, he also served as the Head of Department, Head of the QAC Cell, President of the Welfare Society, President of UCCTA and the Head of Research Degrees. At his retirement, he was serving as a Senior Professor at UCSC. He received the prestigious “Educator of the Year” award from the Computer Society of Sri Lanka (CSSL) in 2018. His main research interests are in visual computing and he headed the Visual Computing Research Group (VCRG) at UCSC. He has over 100 publications in international journals and conference proceedings to his credit.



**Professor Eric Hamilton Karunanayake**

**Professor Emeritus, Institute of Biochemistry, Molecular Biology and Biotechnology**

Professor Emeritus *Vidya Jyothi* Eric Hamilton Karunanayake, the Founder Director of the Institute of Biochemistry Molecular Biology and Biotechnology (IBMBB), is a scientist par excellence. During his career at the University of Colombo spanning 27 years, he was the Head of the Department of Biochemistry and Molecular Biology, Faculty of Medicine from 1987 to 2003 and the Senior Professor of Biochemistry, IBMBB, thereafter. He was the first to establish the discipline of Molecular Biology in Sri Lanka. He founded the IBMBB almost single handedly. This was the culmination of a very successful research program in molecular biology led by him and supported by Sweden, which provided much needed human resources in the field of microbiology to the University of Colombo, other universities and research institutes. It was the first time in the history of Sida that the construction of a building and the purchase of equipment for it were supported. The World Academy of Sciences honored him with an “Award for Building Science Institutions in Central and South Asia” in 2016. At the IBMBB, he was instrumental in developing MSc programs in molecular life sciences and cellular and molecular immunology and facilitating the MSc in Bioinformatics. PhD programs were established in diverse areas in health, life sciences and agriculture under his guidance. He continued to serve the IBMBB beyond his retirement, as a teacher, PhD supervisor and a member of many committees including the Board of Management, and still does so. His legacy stands tall in the university as the founder of the IBMBB and as a developer of human resources ranging from professors to research scientists at the University of Colombo and beyond.



**Professor Myrtle Iranganie Thabrew**

**Professor Emeritus, Institute of Biochemistry, Molecular Biology and Biotechnology**

Professor Emeritus Myrtle Iranganie Thabrew is an exceptional academic who has immensely contributed to teaching, research and development of the country. During her academic career spanning over 37 years, she held a number of key positions. She was the Head of the Department of Biochemistry at North Colombo Medical College, University of Ruhuna and University of Kelaniya. She was a visiting professor, Institute of Biochemistry, Molecular Biology, and Biotechnology (IBMBB), University of Colombo until her retirement. Her assignments as a visiting professor in Liver Biochemistry, King's College of Medicine and Dentistry, University of London and as the SAARC Chair Professor, University of Dhaka brought her recognition among the international scientific community. She has more than 200 research communications and publications in peer reviewed journals, was the recipient of a number of competitive grants and is an excellent postgraduate supervisor. She was instrumental in developing remedies based on natural and complementary medicine. She has authored a number of books in the fields of biochemistry, herbal medicine and complementary medicine. She is the recipient of a number of national and international awards including President's awards for scientific publications, Vice Chancellor's Gold Medal for research, Bernard Soysa memorial award, WHO award for enhancing medical education, Commonwealth Medical Fellowship, Woman of Achievement award by the Zonta International Club etc. During her stay at the IBMBB, she made a significant contribution to the development of the institute and currently serves as a member of Board of Management, as a UGC nominee.



**Dr. M.S.P. Cooray Vidyashekhara**

**Institute of Indigenous Medicine**

*Sahastra Abhisheka Vaidya Shoori, Vaidya Shiromani Panditha* M.S.P. Cooray Vidyashekhara obtained a Diploma in Indigenous Medicine & Surgery with first-class honours from the Institute of Indigenous Medicine (IIM), University of Colombo in 1961. He completed his postgraduate studies on panchakarma therapeutics (MSAM) from the Gujarat Ayurveda University, India and the postgraduate of High Proficiency in Ayurveda from the government Ayurveda College in Sri Lanka. Vaidya Cooray Vidyashekhara joined the IIM in 1966 as a Lecturer and was promoted to Senior Lecturer Grade I in 1977 and served for 39 years. He went on to serve as the Head of the Department of Ayurveda and Units of Kayachikitsa and as the Director of IIM. He was a member of the Ayurveda Medical Council, Pharmacopoeia Committee, Education and Hospital Board, Teaching and Hospital Committee and the Advisory Board for Indigenous Medicine. In addition, he served as a consultant to the WHO/UNDP and the Ministry of Indigenous Medicine. He founded the MPhil in Ayurveda and BAMS and equated the DIMS and DAMS Diplomas with BAMS and acupuncture courses. He was a Course Consultant for the Gampaha Wickramarachchi Ayurveda Institute and Ayurveda Shastri. Further, he was instrumental in establishing the postgraduate unit, hostel facilities, administration building and microfilming unit for preserving ola leaves at the IIM. He delivered lectures on Ayurveda at Exeter University, England and in Australia. Dr. Cooray conducted several research projects and published over 12 research articles and served in the editorial boards of Ayurveda journals including the Graduate Editorial Board, Gujarat, India. He was honoured with various special awards including an award of honour from the University of Colombo, Vaidyabhimani, Sahassrabhisheka Vaidyshoori, Vaidyashiromani Panditha etc.



**Dr. S.G. Ranasinghe**

**Institute of Indigenous Medicine**

Dr. S.G. Ranasinghe obtained a Diploma in Ayurveda Medicine and Surgery from the Institute of Indigenous Medicine (IIM), University of Colombo in 1971 and obtained MD and PhD in Ayurveda from Banaras Hindu University, India. He joined the IIM in 1974 as an Assistant Lecturer and was promoted to Senior Lecturer in 1990, Associate Professor in 2004 and Professor in 2006. He served the institute as the Head of the Department of Ayurveda and Units of Kayachikitsa and as the Director of the IIM. He was appointed a national consultant on Ayurveda medicine by the WHO. He chaired the Committee to amend the Ayurveda Act. He was a Director in the Ayurveda Drugs Corporation, consultant to the Health Sector Reforms Implantation Unit, the Ministry of Health and Indigenous Medicine and a resource person at the National Institute of Traditional Medicine. He was a member of the Presidential Task Force to formulate a national health policy for Sri Lanka, Health Policy Implementation Action Plan and Ayurveda Formulator Committee. He contributed to upgrading the Gampaha Wickramarachchi Siddha Ayurveda Institute to a university, establishing fully-fledged teaching hospitals for Ayurveda and served in curriculum development committees for Ayurveda. He has published more than 16 books, more than 19 research publications and several projects on Ayurveda Medicine and contributed to various Ayurveda medical journals. He has been awarded the Sahashraabhisheka Vaidyashuri Gold medal at the state award ceremony and has been conferred life membership of the Alumni Association, IIM, University of Colombo.



**Professor H. A. S. Ariyawansa**

**Professor Emeritus, Institute of Indigenous Medicine**

Professor Emeritus H.A.S. Ariyawansa obtained a Diploma in Ayurveda Medicine and Surgery from the Institute of Indigenous Medicine (IIM), University of Colombo and a MD and PhD in Ayurveda from Banaras Hindu University, India. He also holds a MA in Buddhist Philosophy from the University of Kelaniya. He joined the IIM in 1982 as an Assistant Lecturer and was promoted to Senior Lecturer in 1989 and to Professor in 2009. He served in the institute as an Acting Director, Additional Director (Postgraduate Education), Head of the Department of Ayurveda, Units of Kayachikitsa and in different academic units. In addition, he has also fulfilled various academic and administrative responsibilities in the IIM including the development of undergraduate and postgraduate curricula. Moreover, he actively contributed to convert the Borella Ayurveda hospital into a complete teaching hospital. Dr. H.A.S. Ariyawansa was a consultant in panchakarma at the South Asia office of WHO. He was also a visiting professor and an examiner at the Gampaha Wickramarachchi Ayurveda Institute and contributed as a resource person to upgrade higher degree programmes. He served in the Faculty Board of the Postgraduate Institute of Pali and Buddhist Studies, Ayurveda Medical Council, Advisory Board for the Ministry of Indigenous Medicine and the National Research Council. He has compiled several books on Ayurveda medicine and published over 60 research papers in national and international journals and has also attended several international conferences. Further, he has made a critical contribution to the development of Ayurveda.





**Professor Gunapala Amarasinghe**

**Professor Emeritus, Institute of Indigenous Medicine**

Professor Gunapala Amarasinghe is an Emeritus Professor in Ayurveda at the Institute of Indigenous Medicine (IIM), University of Colombo (UOC). He obtained DAMS from IIM and MDay and PhD from Banaras Hindu University (BHU), India and was a postdoctoral researcher at the University of Exeter (UOE), UK. He identified the immunomodulatory, anti-cancer, anti-inflammatory, anti-microbial, anti-pyretic, anti-diarrhoeal and anthelmintic effects of various Ayurvedic medical preparations. Developing an effective Ayurveda treatment regimen for children with cerebral palsy stands out as a critical success of his research career. Dr. Amarasinghe authored 30 research projects, 70 research publications, 04 books and a book chapter. He was the Director of the Bandaranaike Memorial Ayurveda Research Institute (2004-2005). The National Integrated Medical Association of India recognized his research contributions, awarding him a lifetime achievement award in 2005. Dr. Amarasinghe served as Acting Director, Additional Director Postgraduate and Head of the Department of Ayurveda and Prasutitantra-Kaumarabhritya Unit, IIM. He supervised undergraduate and postgraduate research projects in Ayurveda Paediatrics. He functioned as a visiting professor at the Gampaha Wickramarachchi Ayurveda Institute and the Sabaragamuwa University and as an examiner for PhD programs of BHU. He served in several statutory bodies of the Department of Ayurveda. He delivered guest lectures at Kyung Hee University South Korea, UOE UK and University of Mississippi, USA. He has served on the editorial boards of national and international journals. He is a committee member of SLAAS, overseas Member of the Ayurveda Medical Association, UK and an Honorary Member of the Association of Oriental Paediatrics South Korea. He chaired the Ethics Review, Curriculum Development and Evaluation, Student-Handbook and Senior Clinical Coordinator committees. In addition, he was a member of Research and Higher Degrees and Research Management and Institute Finance committees and an evaluator of the CVCD excellence awards. Further, he was a founder member of the Postgraduate Institute of Indigenous Medicine.



**Dr. B. M. Nageeb**

**Institute of Indigenous Medicine**

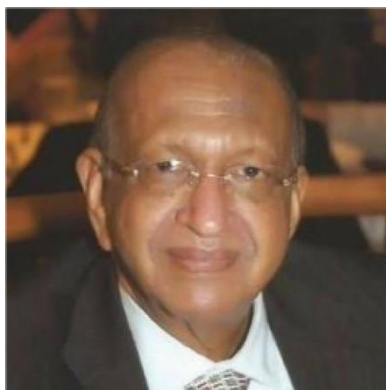
Dr. B.M. Nageeb was appointed as an Assistant Lecturer at the Institute of Indigenous Medicine (IIM), University of Colombo in 1990. He completed his Master of Philosophy in Unani at IIM in 1996 and Doctor of Philosophy in Microbiology at the University of Kelaniya in 2009. He became the first Professor of Unani in the history of the Institute of Indigenous Medicine in 2017. He served as the Head of the Department of Unani, Head of the Department of Pharmacology, Additional Director and Acting Director of IIM. He was a founder member of the Research and Higher Degrees committee, the Institutional Ethical Review Committee and the Syllabus Committee of Postgraduate Studies (MPhil). He was also the Chairman MD Unani Board of Study at the PGIIM. He was the President of the Alumni Association of the IIM and a member of various committees at the Institute and at national and international level. Dr. B.M. Nageeb supervised several MPhil and PhD students and his areas of research interest are pharmacy, pharmacology and microbiology. He has published three books and developed a mobile app related to Unani Medicine. He has published nearly 65 research papers and abstracts in national and international journals and conference proceedings. He has participated as a resource person in various national and international workshops, conferences and seminars. In 2013, he was the Chairman of the Organizing Committee of the first ever international conference in the history of the IIM. He has served as an editorial board member of SLJIIM, Ayurveda Sameeksha and news bulletins. He received the Hakim Ahamed Ashraf Global Award and the long service award in 2016 and retired in 2020 after successful completion of 30 years of service. He has made an immense contribution to the development of indigenous medicine throughout his career.



**Mrs. S. C. Jayasuriya**

**Library, University of Colombo**

Mrs. S. C. Jayasuriya joined as an Assistant Librarian in 1971 and obtained her Postgraduate Diploma in Library Science & Information Studies from the University of Kelaniya in 1975 and Master of Library Sciences from the University of Philippines in 1985. Mrs. Jayasuriya was appointed as the Librarian of the University of Colombo in 1989. She has made a lasting contribution to the University of Colombo by fulfilling a long-felt need for a custom-built library building. Mrs. Jayasuriya's contribution to the field of Librarianship is commendable. She was instrumental in introducing a Master's in Library & Information Sciences in 1993 and a Master of Information Systems Management in 2008 at the Faculty of Graduate Studies, University of Colombo. Mrs. Jayasuriya was responsible for establishing the National Institute of Library and Information Science. She served as the Project Leader in the SIDA/SAREC Library Support Project during 2003-2007. She was also instrumental in launching the project Sri Lanka Journals Online, which aimed to raise the visibility of Sri Lankan researchers and research publications. Mrs. Jayasuriya actively contributed to the Sri Lanka Library Association (SLLA) in different capacities. She was awarded an honorary fellowship of the SLLA in 2001 and was the recipient of the Golden Jubilee Award in recognition of her outstanding professional contribution to the SLLA. She is a pioneer member of the University Librarians' Association of Sri Lanka. Mrs. Jayasuriya was always a role model and a guiding star for young professionals. After rendering an extraordinary service to the Library of the University of Colombo and the entire Library and Information Science sector, Mrs. Jayasuriya retired in 2011.



**Dr. Adrian Senadhira**

**Library, University of Colombo**

Dr. Adrian Senadhira started his career as an Assistant Librarian at the University of Ceylon in 1961 and served 22 years mainly at the Library of the Faculty of Medicine, University of Colombo. He obtained his Postgraduate Diploma in Librarianship from the University of London. He was awarded the Fellowship of the Library Association, UK (FLA), in 1974. Dr. Senadhira served as a visiting lecturer of the Postgraduate Diploma course at the Department of Library Sciences, Vidyalankara Campus. Furthermore, he initiated a diploma course in library science for non-graduates at the Faculty of Science. Dr. Senadhira had the privilege of serving the SEARO sub-committee appointed by the WHO Global Advisory Committee on Medical Research to strengthen medical libraries. A significant outcome of his work was the establishment of the Health Literature Libraries and Information Services network (HELLIS) in 1979, which is a consortium of Health Libraries in the South-East Asian Region which was set up to fulfil a long-felt need for providing easy access to health information. During his tenure, the Library of the Faculty of Medicine, University of Colombo was designated the National Focal Point of HELLIS and the Medical Library developed into a regional network of national networks in the South-East Asian Region linked through the SEARO library. Dr. Adrian Senadhira was appointed as the Librarian in 1980 and was entrusted the responsibility of developing a new library building. Although the plan was completed, it was not put into action due to funding constraints. His tenure as the Librarian was short lived as he resigned to take up a position at the World Health Organization in Geneva.

**POLICY RECOMMENDATIONS FROM RESEARCH CONDUCTED  
AT THE UNIVERSITY OF COLOMBO**

## Policy Recommendations from the Faculty of Education

- Methodical planning and implementation procedures are required for the effective function of School Based Teacher Development (SBTD) programmes.
- SBTD programmes to equip teachers with self-development skills and computer literacy skills should be developed after establishing a collaborative network with experts in the field of education.
- Higher order thinking skills (HOTS) can be developed through group activities.
- The curriculum of the National Colleges of Education should be restructured to simultaneously develop the English language proficiency and Science content knowledge of English Medium prospective science teachers.
- Essential utilities and resources should be provided to the Student Guidance and Counselling Units at schools under a sound monitoring mechanism.
- More in-depth research should be carried out to determine the issues faced by students when learning Geometry in school in order to find remedial measures.
- Activity based learning could be effectively applied to promote sustainable development goals (SDGs) among school children.
- Changes in self-efficacy in student engagement in scientific inquiry compared to self-efficacy in classroom management and instructional strategies and the reasons underlying such changes need to be researched.
- Immediate interventions should be conducted through the School Based Teacher Development (SBTD) programmes to strengthen the efficacy beliefs of teachers in Type 3 schools in engaging students in scientific inquiry,
- The Ministry of Education should find ways to safeguard all schools practicing participatory management via School Development Executive Committees (SDEC) with devolved authority under School Based Management (SBM) by identifying and supporting schools with problems in adapting to SBM.
- A Federation of School Councils may be established at Zonal levels by combining the SDECs of schools of each Education Zone to assist member school boards to overcome problems in participatory management through SDEC. The federation can play a pivotal role by facilitating, advocating, mediating, counseling, evaluating and arbitrating in various issues to assist the school boards to attain a satisfactory level of school autonomy and accountability and achieve the expected school quality.



## **Policy Recommendations from the Faculty of Graduate Studies**

- Manage the pay and benefits systems that are currently in place and resource and focus on training and development so that employee engagement in the workplace can be increased and improved, thereby enhancing organizational performance.
- Encourage research on xenophobia experienced by migrant returnees of Sri Lankan origin and foreign nationals living and working in Sri Lanka. Make these research findings available to policymakers, civil society, advocacy groups, human rights institutions and the general public so that targeted interventions, such as awareness raising, can be undertaken to address issues stemming from xenophobia. Mainstream addressing xenophobia in ongoing development projects and programmes on migration and related aspects.
- Design and develop or improve a technology-based education system to enhance student satisfaction and in-class performance.
- During the initial teacher education process, novice teachers need to be guided to design their pedagogical practices at micro level which encapsulates a formative nature within them. Teachers' knowledge on the formative assessment practices that foster the deep learning strategies needed to create lifelong learning skills should be improved.
- A change of protocol in the practices of teachers in implementing classroom assessments to bring about desirable changes in the learning lives of students is recommended. The classroom assessment protocol needs to be a combination of efforts of the teacher, the school and departmental officials.
- Revise module design to facilitate online delivery.
- Enhance teacher-student and student-student interactions by incorporating suitable activities.
- Improve collaborative communications between the student and the teacher.
- Provide rewards for completing each session / stage of learning to encourage participation and successful completion.
- Small states like Sri Lanka need new and multidimensional approaches to old practices. Lacking a militarily adequate physical size and ability for flexible defense, a small state has to rely on strategic insights, skills and tactics to outwit the aggressor. A well-defined strategy for national security should receive the highest priority in the nation's political agenda without committing to a single strategy.

- The translated, adapted and validated Sinhala Language Newcastle Dysarthria Assessment Tool (SLN-DAT) can be used in the Sri Lankan clinical context. The data collection method adaptation, due to COVID 19 related measures, can be replicated safely in future research to minimize physical contact with the participants after validation for reliability and validity using clients with dysarthria.
- The effectiveness of different types of formative assessment practices in the examination-oriented, teaching learning environment in Sri Lanka should be studied in order to determine how these practices can be used.
- Upgrade the current Sino-Indian strategic, military and economic dialogue meetings to a higher level. Strengthen co-ordination, co-operation and communication in regional and global institutions and create a more positive image and attitude of each other, both in government and society. Work on non-traditional security issues, such as maritime security co-operation and make it a basis for better mutual understanding and carefully handle sensitive issues such as the Tibetan independence movement, the South China Sea and the so-called “String of Pearls” and promote open regionalism, rejecting the idea that East Asia and South Asia should be viewed as separate blocs.
- Inculcate norms, beliefs, and values pertaining to environmentally significant behaviour and a sense of individual responsibility by fostering pro-environmental attitudes from the elementary level. Conduct regular awareness programmes to remind the public about the expected behaviour and integrate community participation into local e-waste planning to create a sense of ownership.
- Increasing de facto economic integration and the absence of common economic institutions have led Asian countries to adopt pro-free trade agreement (FTA) commercial policies. The spread of FTAs is the result of several factors, from the economic to the political. East Asia participates without exception in the process and attends the establishment of FTAs at multiple levels. While the proliferation of FTAs in East Asia benefits regional trade and economic growth, questions have been raised about an “Asian noodle bowl” effect, pointing out that multi-layered FTAs in East Asia have created new trade barriers and raised the cost of commercial enterprise in the area. East Asia needs to shift from multi-level FTA proliferation to a region-wide FTA with greater participation and coverage.
- Policymakers and managers of the healthcare domain need to make informed decisions about the adoption and use of electronic medical records (EMRs) and identify barriers

and significant factors to be considered when implementing EMRs in the Ayurvedic medicine sector in Sri Lanka. EMRs should be developed considering the perceived usefulness (PU) and perceived ease of use (PEoU) factors and systems should be clear and user-friendly for Ayurvedic physicians. The Ministry of Health needs to allocate the necessary financial and non-financial resources for Ayurvedic hospitals and formulate rules and regulations to use new technologies in the hospital's context. Ayurvedic hospital's higher authorities should facilitate and organize awareness workshops and training to enhance the IT skills of Ayurvedic physicians.

- Module types, IT infrastructure issues and user training are the challenges of non-state universities. It is recommended to utilize interactive slideshows wherever possible, deploy specific tools for challenging modules and implement an interactive portal to develop academic relationships between academics and students. Conducting well-structured training, while enhancing IT infrastructure, would enable social interaction and better understanding of online tools. Steps need to be taken to enhance mental wellbeing to mitigate the negatives of the IT driven applications.
- The Ministry of Education should focus on the three major factors (information satisfaction, system satisfaction and service satisfaction) which affect user satisfaction of the National Education Management Information System (NEMIS). The Ministry should take into account the significant differences in the users' demographic background when introducing the information system and should be concerned with user satisfaction.
- Trade secret protection and the employment relationship should be recognized in a statute to overcome the difficulties encountered by skilled employees and the employers who hold trade secrets while recommending a similar law as enacted in the USA by way of 'Freedom to Create' statutes, with more coverage to skilled employees to embrace their skills freely.
- Actions such as incentives for female bankers, leadership skills development training for women managers and the implementation of stress reduction workshops, flexible working schedules and provision of facilities for childcare are recommended.
- Companies which adopt a traditional fixed budgeting system could benefit by shifting to rolling budgeting. This would help them to face the uncertainty of the environment due to the Covid-19 pandemic and facilitate in achieving targets and controlling costs in a more realistic manner.

- The contribution of family businesses to achieve SDGs could be enhanced through provision of policy support and basic infrastructure from the government and relevant authorities as well as providing access to finance through banks.
- Facebook should be promoted to disseminate COVID information to build community resilience through social networking and information management.
- Learners in the university should implement effective information technology knowledge for efficient management of the university learning management system (LMS). Further evaluation of other dimensions of the LMS such as objectivity, completeness, and consistency and the relationship between system quality and information quality is needed.
- A clinical trial to study the potential antioxidant activities of the traditional herbal lincture, *Kaluduru Tippili Leha*, in treating neurodegenerative disease is recommended.
- Introduction of a controlled rubber price, increased social recognition for growers, knowledge enhancement and skill development on technically effective and efficient tapping, drying and latex processing techniques, an incentive system for maintaining productive lands and imposing a ban for the use of rubber lands for any other developmental purposes.
- IT based communication system between officers of the rubber advisory services and growers.
- Revisit the existing 'Thurusaviya society chain' and establish a coordinating mechanism with the assistance of the Rubber Development Department and the Rubber Research Institute of Sri Lanka.
- Ban the use of rubber lands for any other developmental purposes.

## **Policy Recommendations from the Faculty of Law**

### **1. The Return of Colonial Cultural Property: Questions of Provenance and Prescription – The case of Sri Lanka**

- The local legislation (Cultural Property Act) should be amended to include a definition on Colonial Cultural Property (CCP) and a statement that all CCP taken without appropriate compensation and in a manner detrimental to the interests of Sri Lanka should be considered the property of Sri Lanka.
- A fresh request to be made to the Host States of CCP to acknowledge such CCP as property of Sri Lanka.
- Sri Lanka should take the initiative with like-minded countries to arrange for a South-South consultation on restitution of CCP. SAARC can be a useful starting point.

### **2. Controlling Cybercrimes, Challenges and Legal Responses in Sri Lanka: the Way Forward**

- Sri Lanka should establish a robust domestic legal regime capable of implementing effective cybercrime legislation and enforcement strategies, drawing on best practices adopted by the European Union in implementing the Budapest Convention, in order to keep pace with rapid changes in cyber and information technology.
- Creating a comprehensive universal cybercrime protection legal framework to ensure proper use and protection of the cyber world, as well as international cooperation to combat cybercrime.
- Promoting cyber security knowledge and competence among a variety of stakeholders.

### **3. Mitigating Agency Issues in Corporates: The potential of Artificial Intelligence**

- The existing corporate principles of Sri Lanka are to be amended with a new set of principles and laws for the use of the intra-firm AI to mitigate agency issues. Such principles shall comply with the best standard, for instance as the best practices for AI recommended in recent European Parliament resolution. It is recommended that the use of intra-firm AI is, under Sri Lankan corporate law, must be subject to the corporate governance rules and principles.

#### **4. Protecting ‘Ceylon Golden Pineapple’ as a Geographical Indication: Prospects, Challenges and way Forward**

- Sri Lankan policymakers should foresee an introduction of a Geographical Indication (GI) registration system in the country by amending the existing Intellectual Property Act, No.36 of 2003
- The Sri Lankan Government should consider adopting the Geneva Act of Lisbon Treaty (2015) to become a member of the global GI protection mechanism.
- Establish a two tier GI control system in Sri Lanka. Create a National GI logo for Sri Lankan GIs to protect local value at a global level.

#### **5. Intellectual Property Rights and Global Pandemic: A Patent Law Perspective**

- Sri Lanka IP Office should take actions issuing regulations on licensing of patented products and transfer of technology mechanism in line with facilitating expansion of access to new medicine and medicinal and related products.
- Universities should take firm and productive actions introducing and strengthening their transfer of technology activities with industries prioritising pandemic related inventions.

#### **6. Traditional Taxation Principles and E-commerce Taxation: Challenges and Developments**

- The current study aims to review the challenges and developments of e-commerce taxation with regard to traditional tax principles.
- The involvement of e-commerce taxation in the Sri Lankan tax law regime and how the current legal regime should be strengthened with new dimensions.

#### **7. Overcoming consumer grievances through consumer advocacy during pandemic: a socio-legal analysis of consumer protection laws in Sri Lanka**

- It suggests that the CCA should establish and strengthen consumer advocacy and empowerment in times of crisis to monitor unfair trade practices, guarantee access to necessities, protect marginalized groups in the most vulnerable communities, and ensure that people receive adequate compensation and relief. Also, recommend some suggestions for improving the existing CCA Act.

## **8. “Right to Internet” in preserving equal access to education. Prospects and Challenges**

- Recognize “Right to Internet as a fundamental right in Sri Lanka. This can be done in two different ways (i) Can be recognized under Article 14 (Freedom of Expression), or (ii) Can be introduced as an independent right by way of a constitutional amendment.
- Ensure equal access to the internet through development of digital infrastructure.
- Need to regulate the quality of the service provided by different service providers by way of issuing guidelines.

## **9. Defending A Wife Who Killed Her Husband: Gender Justice in Defence of Provocation in Sri Lanka**

- Broadening the scope of the defence of provocation via judicial interpretation. Developing the concept of ‘Prevention of Domestic Violence’ in light of prescribed international standards.
- Considering the bio-social perspectives before deciding a guilty mind of a woman. Incorporating rights-based reform systems and gender sensitive penalties for the female accused.

## **10. Strengthening Environmental Rule of Law in Sri Lanka**

- As a response to the lacunas identified in the research, the research proposes two primary recommendations. One addresses the need for constitutional provisions embracing environmental rights and extending Constitutionalism into the environmental domain, which will confirm the legitimate and accountable government, judicial review, democracy, and respect for human rights. The other proposes further recommendations based on key indicators for the Environmental Rule of Law.

## **11. Masking Face at Workplace: Unmasking the Law relating to Termination of Services in Sri Lanka**

- It is recommended to enact legislation with regard to occupational health and safety, and include a clause obligating the employees to safeguard their health and safety and also the health and safety of others.

## **12. Reforming the law relating to adoption of children - for whose interests?**

- Reformulate the objectives of adoption law to align with the Sri Lankan requirements and international standards
- Identify the principles that should guide the judiciary and other law enforcement authorities



- Enhance the position and responsibilities of guardian ad litem
- Streamline procedures (in and out of court) to align with recognized international standards

### **13. The time for data protection is nigh: A robust data protection framework to assist in legitimately curbing the Covid-19 pandemic**

- It is recommended that the Data Protection Bill of Sri Lanka be enacted. As this is largely in line with the General Data Protection Regulations of the European Union, it could ensure the lawful gathering of data without violating the privacy of individuals, especially in emergency situations such as the Covid pandemic.

### **14. A comparative analysis on the relevance of intent based statutory interpretation**

- It is recommended that using purposivism theory in interpreting the laws enacted before independence will empower judicial activism to meet the changing needs of the society rather than following the intentionalism theory.

### **15. Quest for legalizing same-sex marriage: A natural law analysis**

- It is recommended to give due legal recognition for same-sex marriages against all odds. Hence, it is a matter of justice and is in the interest of the public good.

### **16. Adoption leave: time for an equal motherhood**

- Introduce proper legal provisions to grant adoption leave which is equally important as maternity leave, especially when the adopted child is under a certain age.
- Identify the restrictions and the guidelines to adhere when providing adoption leave.
- Protect the rights of adoptive mothers and adopted children by adhering to the international standards. (eg: as ILO conventions, CEDAW, and UNCRC.)

### **17. Conundrums of the extremes expounded in Bolam and Bolitho tests; unlawfulness in Delict as a way forward**

- Considering the complexities posed by the extremes expounded in Bolam and Bolitho, it is suggested that the element of Wrongfulness/Unlawfulness in Aquilian Action to be used when deciding medical negligence litigation. Given that the element focuses not only whether there existed a duty but also whether there should have been one, judges could be more circumspect in deciding medical negligence litigation.

**18. Ownership and commodification of human biological materials; ethical and legal dilemmas**

- Due to the rapid development of the field of medicine, science, and technology, lawmakers should adopt an ethical framework with universal binding authority to address issues related to the commodification of human biomaterials, rather than the existing law of the Universal Declaration on the Human Genome and Human Rights and the Universal Declaration on Bioethics and Human Rights.

**19. Patient care and medical responsibility in Telemedicine during the Pandemic: A comparative study**

- It is recommended that a Bill on practice of Telemedicine must be enacted giving special emphasis on its application during the pandemics.

**20. Delict Law's Response to Police Negligence: The Sri Lankan Experience**

- The study proposes a legislative amendment to the Police Ordinance No 16 of 1865 to incorporate clauses on common duty of care and the avenue to seek redress when it is breached.

**21. The Property Right to Exclude: A Right in Need of Reinforcement?**

- Impact on property owners of policy measures should be made when measures restricting ownership attributes are proposed.

**22. The extended Continental Shelf: a legal perspective of the implementation of Article 76 of the United Nations Convention on the Law of the Sea of 1982 (UNCLOS)**

- Considering the number of countries making their submissions for extended continental shelf prior to Sri Lanka with the Continental Shelf Commission under Art 76 of the UNCLOS, it is unlikely that our claim will be taken up for hearing before 2025. Therefore, the time until the case is taken up, may be utilized for preparing a policy framework on Maritime Zones of Sri Lanka and effect necessary changes, revision and updating in order to face the situation and emerging challenges.
- There shall be a national committee - on Maritime Policy - of competent Sri Lankan scientists and legal experts ready by that time to defend our claim in 2025.
- There should be a comprehensive programme to transfer this knowledge to a younger generation who can successfully defend the claim in 2025 and beyond; by making funding available for studies related to the geology and geophysics of the Indian Ocean

around Sri Lanka and also focusing on the legal issues related to delimitation of continental margins.

**23. Filling the gaps and addressing the deficiencies concerning the rights of purchasers of provisional condominium property: Prospectus and challenges from a Sri Lankan context**

- It is recommended that the Apartment Ownership Act shall be amended uplifting the rights of purchasers of provisional condominium property and one of the best solutions can be found in introducing an insurance system to safeguard the rights of the investor.

**24. The impact of trade secrecy on COVID 19 vaccines: an analysis through a human flourishing lens**

- This research proposes to introduce a concept of ‘compulsion in the public interest’ as an exception to trade secrets protection. Accordingly, when there is a global health crisis which challenges human existence and flourishing, a government should be able to force a trade secrets holder to reveal the secret in exchange for a royalty in order to reproduce the secret product or process. This proposal may be implemented in line with the compulsory licensing system of the patent regime.

## **Policy Recommendations from the Faculty of Management and Finance**

- Regulators and the government should develop and promote accounting practices and standards. Simplify the existing financial reporting standard (SME specific). Organise awareness sessions and training programs and provide technical support and guidance on using standards for preparation of accounting records and financial reporting for SMEs.
- Other services of microfinance (MF) be made compulsory and regional development projects (creation of economic opportunities) implemented in line with MF projects.
- The reflections through five case studies discussed in this paper contribute to the wider discourse of active teaching and learning strategies in technologically enhanced online learning environments based on self-regulated learning theory. The paper encourages teachers of online education to design course content, assignments and activities to stimulate student participation rather than trusting that active engagement occurs spontaneously
- Support from border keepers (e.g., spouse) and other domain members (e.g., sibling) and coping strategies enhance the work life balance of women entrepreneurs by assisting their domain responsibilities. Segmentation would create synergy in domain responsibilities of women entrepreneurs and blurring of borders would create more work-life balance issues.
- Transformational leadership supports grievance handling. Practitioners should shape their leadership approach to serve the demands of employees.

## Policy Recommendations from the Faculty of Medicine

### 1. COVID-19 pandemic

- Vaccination prevents direct and indirect deaths from COVID-19. Widespread vaccination is recommended to improve the country profile in the context of excess mortality from COVID-19.
- Reluctance to seek healthcare during the COVID-19 pandemic has drastically increased mortality from cardiovascular diseases and infections in 2021. Measures to increase healthcare seeking behavior are recommended to decrease mortality from these causes.
- A mask utilization study revealed that satisfactory practices were followed. However, interventions to optimise mask literacy and practices are needed. Reinforcing education on the value and use of facemasks and developing methods for disposal should be considered as immediate necessities.
- The rapid deployment of mechanical chest compression devices during the COVID-19 pandemic is feasible with low-cost alternatives like “Dilshan’s MCPR”. Although there are substantial technical challenges, the results revealed a more controlled resuscitation experience, better compression quality and need for fewer individuals in the resuscitation room. Additional staff training may be necessary to achieve optimal results.
- During the COVID-19 pandemic, physiotherapists had elevated levels of anxiety, depression and stress, highlighting the importance of systematically monitoring physiotherapists’ mental health and implementing supportive measures to improve their well-being during the crisis.
- During the COVID-19 pandemic, a majority of the medical students at the UOC used food delivery applications and a majority consumed fast foods via such purchases. This draws attention to the importance of health education to maintain a healthy lifestyle during the pandemic.

### 2. Meditation, mindfulness and mental health

- Meditation may have the potential to positively alter concentrations of stress hormones. Further studies on the effect of meditation on stress hormones and other external stressors are recommended.
- Buddhist meditation may have potential benefits in decreasing anxiety and improving executive functions in individuals. Further studies on meditation and its effects on the neurotransmitters responsible for anxiety are recommended.

- Long-term meditation enhances cognitive functions and produces measurable changes in EEG frequencies, VEP and NCS. Further studies to assess the therapeutic benefits of meditation are recommended.
- Long-term meditation (LTM) is associated with better respiratory function in healthy individuals, with improvement in some respiratory function parameters with greater practice. Further studies are recommended to determine the effect of LTM on respiratory function, specifically the effect of the type of meditation, frequency, practice experience etc.
- Buddhist-based meditation may alleviate psychological distress, in terms of anxiety and stress, while enhancing mindfulness skills in regular practitioners. Further studies will be conducted to examine if these findings are replicated in a larger sample. We believe these findings are promising in an era of mass psychological distress due to the global pandemic.
- Regular practice of mindfulness meditation has the potential to help teachers to respond to workplace stressors in ways that would benefit their psychological well-being.
- Despite the majority seeking help from allopathic practitioners, there is a substantial delay in presenting to psychiatric services. These delays and non-attendance to follow-up needs further study to determine the underlying factors and identify strategies to minimize them.
- Implement measures to highlight the Public Health midwife's (PHM) role in autism management, especially targeting senior PHMs, in order to generate more positive attitudes and interest.

### **3. Child health**

- The multitude of challenges in Differences in Sex Development (DSD) care requires highly specialized and dedicated expertise in paediatric and adult endocrinological, surgical, genetic, psychiatric/psychological, transitional, obstetrics/gynecological and legal/social support services. This multi-disciplinary care would be ideally provided through a single centre to optimize the care and wellbeing of the affected individuals.
- Achondroplasia and osteogenesis imperfecta were the commonest conditions encountered in a study on short stature in the Sri Lankan population. A larger national study is required to determine the true burden of skeletal dysplasia in Sri Lanka.
- Awareness and compliance among patients' parents was high with regard to the Ponseti method for treating club foot. Health education, for further improvements in awareness, is recommended particularly at the initial stages of treatment.

- Developing infrastructure and human resources and increasing public awareness about child and adolescent psychiatry are important steps in developing mental health services for children and adolescents in Sri Lanka.
- The study demonstrated high screen overuse in the sample and showed significant associations with parental screen overuse, restriction of screen use and child's age. Implementing methods to reduce parental and children's screen time is recommended.

#### **4. School health**

- Self-esteem studies on G.C.E. Ordinary Level students in the Colombo District revealed that the majority of the participants had average self-esteem. The mean self-esteem of the present study population was considerably low. It is recommended to take measures to improve self-esteem and to carry out further research to explore how individual and contextual factors affect self-esteem in this age group.
- A study amongst senior school children revealed that stress and long-term illnesses significantly influenced happiness rather than academic performance. Family support, parental income and marital status were also significant factors. Therefore, creating a supportive environment for students, teaching coping techniques and managing the psychological aspects of long-term illnesses is recommended.
- Visually disabled teenagers had gaps in knowledge, concerns, preferences regarding physical fitness and exercise. However, they had positive attitudes in this regard. Programmes, at school level, to improve knowledge on physical fitness, demonstrate suitable exercises and address issues should be developed and implemented while improving accessibility to exercise and removing barriers.

#### **5. Non-communicable diseases**

- The prevalence of computer vision syndrome (CVS) was high among medical undergraduates. This can be a hindrance to virtual learning, given the duration of time that students are exposed to the digital screen during their learning activities. It is timely to raise awareness of CVS and the factors associated with it among medical undergraduates, their teachers and policy makers so that steps can be taken to maintain optimum eye health among students.
- A significant correlation between alcohol dependence and lower educational status was observed amongst in-ward alcoholic patients demonstrating significantly high dependency rates. Further research is recommended, focusing on complications of harmful alcohol use in this population.



- Shift workers were associated with a higher risk of developing increased blood glucose parameters compared to day workers. Future larger scale studies are recommended to gather stronger evidence regarding this association.
- Assessment of nutrition related knowledge, attitudes and practices among primary school teachers in the Colombo educational zone revealed that teachers had average nutrition related knowledge and most had positive attitudes. Programmes via mass media and seminars to improve their knowledge are recommended.
- Anaemia studies on garment factory workers revealed that their consumption of several nutritious food items was below the recommended level. It is recommended to promote foods which are cheap and high in iron content to reduce the high prevalence of anaemia seen among this group of workers
- A study on epilepsy patients revealed that, while their knowledge on osteoporosis prevention was low, the majority did engage in preventive practices. The low level of knowledge may result in non-compliance in the long run. It is recommended to take measures to increase health education and health promotion regarding osteoporosis among epilepsy patients.

#### **6. Other recommendations**

- A majority of students reported positive views on using blended learning in Family Medicine. This method of blended learning should be incorporated into the clinical training programs in Family Medicine and its feasibility tested through pilot projects in other specialties.
- Objective determination of the cause of death of women in the reproductive age at the level of data origin is crucial for comparability and preventive action. Coordinated mortality preventive strategies and targeted capacity-building on ICD-classification for data originators should be contemplated.
- A generally good knowledge about genetics, including genetic testing and cancer genetics, was seen. Although attitudes towards testing were mostly mixed, the desirable levels of knowledge may be transformed positively with proper education from expert sources.
- A high prevalence of medication errors and high rates of factors that could lead to medication errors were identified. These results could be used to develop indicators for medication safety and to design a national action plan on medication safety for Sri Lanka.

- Patients' knowledge on medicines was inadequate. There is a need for appropriate patient education and counselling on the safe use of medicines.
- Community based research on the level of knowledge and attitudes regarding leptospirosis revealed satisfactory knowledge in the majority while the level of practices was unsatisfactory. Further studies exploring the reasons for poor practices are recommended.
- Patients with CKD have the worst outcome in angioplasty for occlusive arterial disease. It is recommended that this should be informed to the patient when planning complex interventions.
- Although overall knowledge and practices on solid waste management (SWM) were satisfactory in approximately half of the population studied, knowledge on food-related plastic usage and attitudes related to 'reduce and re-use' were inadequate among 2/3 of the population. Attention is needed to promote correct attitudes and increase education on SWM.
- The Western Province has a gastro-oesophageal reflux disease (GORD) symptom prevalence rate of 25.8% which is higher than that reported in many Asian countries and is comparable to that reported in the West, probably attributable to a westernised lifestyle, habits and diet. Lifestyle modification recommendations can be made.
- Major aloe vera compounds have been found to intersect with genes associated with chronic gastritis. There is a rationale for researchers to explore molecular mechanisms implicated in aloe vera gel compounds to study chronic gastritis in-vitro and in-vivo.

## Policy Recommendations from the Faculty of Nursing

- Clinicians should focus on more precise methods of taking blood pressure measurements in the diagnosis and management of hypertension. Government of Sri Lanka and health care providers in the private sector should establish new prognostic and diagnostic strategies related to hypertension
- University authorities should try to increase the academic performance of undergraduates to pave the way for academic satisfaction and development of self-esteem.
- Skill practice at the undergraduate level is crucial in producing a more confident, skillful future nurse. Therefore, more clinical exposure for undergraduate nurses is recommended.
- The scope of nursing is rapidly changing in the world. The role of bedside caregiver has transformed into many complex forms such as the identification of nurse practitioners. Similar opportunities should be provided to Sri Lankan nurses to develop the dynamic nature of the nursing profession in line with global trends.
- Health authorities and the university administration should implement measures to assess the stress level and coping abilities of nursing students and add a repertoire of versatile coping strategies to the nursing curriculum.
- Training programs in e-learning are recommended for students to improve technological adequacy.
- University administration should establish a stable education foundation to address future crises.
- Health authorities should organize preoperative educational programs for women undergoing hysterectomy which will promote better self-care behavior and reduce anxiety and the negative influence of sexually related side effects.
- Develop a standardized curriculum on mental health for police officers. Appoint a dedicated role within each police station to address the issue of reducing the time spent dealing with individuals with psychological problems. Develop a standard protocol on code of conduct and record keeping for encounters with individuals with psychological problems.

- Revise the curriculum of the psychiatric nursing training programme at the College of Nursing, Mulleriyawa to reflect community needs and social changes. The physical resources (library facilities) and human resources (nursing lecturers) of the College should be improved. The duration of the program should be extended.
- Develop an administrative strategy for early detection, reduction and prevention of nursing burnout. Implement nation-wide interventions to reduce emotional exhaustion and promote employee mental health and well-being and improve the quality of life of nurses.
- Control social media usage limits and access by implementing age limits for children when they are trying to log in or create social media profiles.
- Establish psychological support professionals in schools to identify mental health issues.
- Since nursing is a skill-based profession, physical sessions are essential to develop skills that are required in performing nursing duties. But online learning sessions are also helpful to delivering theory components related to modules as it saves students' time. Develop hybrid courses, with interactive sessions, to increase nursing students' engagement and allow students to engage in learning at their own pace.

## Policy Recommendations from the Faculty of Science

- Conduct annual hearing check-ups and take necessary measures to reduce exposure to noise in the dental setup. Further studies with a cohort study design, recruiting a larger stratified sample of dental personnel from different specialties and other work settings such as government hospitals and the private sector could be considered for more conclusive results.
- The findings of this study can be considered for making decisions on improving quality of the study programs. This study can be extended for other study programs offered in different disciplines and levels, in both distance and conventional types of education.
- Research with different multidisciplinary applications related to medical studies, social science, engineering etc. is recommended when the event response has different destinations.
- In Sri Lanka, bioinformatics research is mostly limited to undergraduate research. Therefore, more research funding is required to promote bioinformatics and attract postgraduate students for more impactful and long-term research. If this field is recognized, the advantages are numerous for the development of biology, medicine and agriculture in Sri Lanka.
- Novel computational techniques can be adapted to solving plant biological questions, which are important in improving Sri Lankan agriculture. Researchers can expand multidisciplinary work involving computer science, biology, agriculture and medicine.
- Further research in reciprocal cost allocation with relaxed assumptions for manufacturing firms and reciprocal cost allocation for firms with only service departments
- Fund student exchange/placement programs with reputed international universities. While this will allow our students to gain valuable research experience working at state of the art laboratories and engaging with an international team of peers, it will also encourage skilled students to remain in the country thus positively contributing to research capacity building.
- Take appropriate policy decisions directed towards reducing global warming and enforcing existing policies as biodiversity, once lost, cannot be recovered.

- The study indicated the lack of natural resistance of chillie cultivars against anthracnose. Therefore, methods to introduce resistance need to be sought using novel biotechnological tools.
- Selected microflora from the milk microbiome have the potential to be used in a variety of industries as starter cultures and sources of industrially important materials.
- A joint model to predict the number of dengue incidences and survival time (instead of using two separate models) using multilevel modeling and a semi-parametric model to model survival data is recommended. Further research on a non-parametric model to model survival data, considering two random effects for the joint model is recommended.
- More investigations on ecosystem services, specially focusing on community wellbeing in the backdrop of urbanization and climate change.
- Address the policy gaps, including the need for mainstreaming management of natural ecosystems to maximize the ecosystem services they provide.
- Critical scientific issues or innovative technologies should be addressed by teams of researchers from different backgrounds. Collaborative research, involving coordination from different institutions, can give rise to breakthrough research outcomes. Different fields of science, with no clear boundaries, can achieve remarkable solutions when collaboration among different sectors is encouraged. Making advanced and modern technology accessible to different disciplines of science will allow problems from different aspects to be addressed more innovatively and easily.
- As a country under the prevention of re-establishment phase of malaria, this study used malaria surveillance techniques of pooled PCR, and ELISA to report the first large-scale cross-sectional malaria survey in Sri Lanka. It was evident that the prevalence of infection and recent exposure to malaria is non-existent. The findings of this study would supplement strategic planning for the sustenance of the POR phase in the island.
- The study provides insight into a possible mechanism of action of the studied genetic polymorphism which might be of use as a molecular marker for predicting the risk of iron deficiency in pregnant mothers. The risk implied by the studied polymorphism needs to be further verified by a properly designed and adequately powered case control study using Sri Lankans
- Given the inadequate research on raptors in Sri Lanka, some key areas ripe for further investigations including ecology, behavior as well as population data. Results of the

present study calls for attention of wildlife policymakers for improved conservation strategies for these magnificent avifauna.

- Further research into isolation and purification of antimicrobial compounds is recommended
- Associations between QoL, connectedness to nature and per capita GHG emission can be considered in policy implementation in relation to promoting climate mitigation and connectedness to nature. This research highlights the importance of considering the perceived quality of life as a determinant of connectedness to nature and GHG emission at the individual level.
- Conduct a national dose survey to optimize radiation and image quality. Each hospital should be encouraged to establish a local DRL and participate in a national survey to optimize patient dose and image quality. The dose reduction and image quality analysis can be done with a multidisciplinary approach involving statistics, computing, modeling etc.
- Make policy recommendations (and create awareness among farmers) on best management practices (BMPs) for mitigating the impact of salinity intrusion in coastal paddy lands. This identified the BMPs for coastal salinity affected paddy areas and levels of salinity in the Mannar and Jaffna districts.
- Use an independent dose verification method in high dose rate (HDR) brachytherapy procedures prior to the actual dose delivery to the patient.
- Further research into arbuscular mycorrhizal fungi (AM) inoculations of field crops for better nutrient management is recommended.
- Maintain the habitat heterogeneity within protected wetlands
- A fast approach to solve linear systems which can be used to optimize computer algebra packages is recommended.



## Policy Recommendations from the Faculty of Technology

### 1. Department of Agricultural Technology

- Studies on precision energy management for black-tea manufacturing are an obligatory requirement for long-term energy saving and to implement relevant management strategies in the tea industry of Sri Lanka.
- Two polymorphic DNA markers can be used for direct selection of blast resistant genes; Pita and Pi20(t) when they are transferring from Bg 357 rice variety to another during breeding programs in the future.
- Fatty acid profiles varied among the selected new improved rice varieties of Sri Lanka and Bg 450 showed the best fatty acid profile among the studied rice varieties. Consumption of Sri Lankan rice varieties having healthy fatty acid profiles may play an important role in the prevention and management of diseases associated with bad lipid profiles.
- Antagonistic efficacy under in vivo conditions and formulating technology to identify most appropriate substrate, concentration and combinations for industrial applications must be investigated further.

### 2. Department of Environmental Technology

- The Bolgoda River basin has been identified as a highly vulnerable area for flash floods. Few studies have been done on the basin and no systematic studies have been conducted on the impact of land use and land cover changes on flood occurrence and the flood hazard level in Bolgoda. The present study is useful for decision-makers to plan sustainable land use and management and to predict future inundation effects.
- Overcome urban food insecurity by implementing urban home gardening combined with novel agricultural techniques as a sustainable strategy.
- Land cover and land-use patterns on Earth reflect the interaction of human activities and the natural environment. Degradation or loss of forest cover was visible as a result of agricultural land escalation over the last three decades in the Waikkala area which might create negative impacts on soil quality. This problem can be minimized by sustainable use of land for agriculture and policies for this should be adopted while raising public awareness on the topic.
- Surface water bodies were highly polluted by used plastic, personal protective equipment and wastewater discharge during the COVID-19 pandemic. This problem

can be minimized by sustainable plastic waste management technologies and policies for this should be adopted while raising public awareness on the topic.

### **3. Department of ICT**

- The “SmartCovidAssist” is a low-cost, remote monitoring system, which has been developed using available technologies and devices, for continuously monitoring COVID-19 quarantined patients in quarantine centres and in their homes. The system consists of two components, a mobile app with predefined symptoms and other required information for sending the symptoms of the patients to the back-end and a back-end system for doctors, administrative staff and PHIs to monitor the patients remotely. It is recommended to encourage the Ministry of Health to use this system so that the COVID-19 prevention centres can get real time information GN division wise, district wise, province wise and island wide to facilitate prompt decision making to control the pandemic.
- Protecting user privacy is vital owing to the increasing cyber threats that come through the internet. Whenever a user connects an IoT device to the internet, it makes a perfect gap for cybercriminals to access if the device is not safe or if the user is unaware of security and privacy. Security software developers and relevant stakeholders should take appropriate actions towards protecting internet users’ privacy even if the user is not aware about these issues.
- We propose a generic conceptual framework that will provide generic integration of IoT technologies and can be adopted by relevant stakeholders such as the World Health Organisation (WHO), individual nations and their responsible bodies (e.g. Ministry of Health, Sri Lanka) to manage the COVID-19 pandemic. We believe this technology could be customized to manage other pandemics with only minor changes.

## Policy Recommendations from the Institute for Agro Technology and Rural Sciences

- An aquatic weed, water hyacinth, incorporated with coir dust can be used for the production of biodegradable pots, in place of plastic or polyethylene pots, for raising nursery plants. This technique helps to control an invasive weed, water hyacinth, and also utilizes it in a productive manner.
- Grow bags are preferable to grow vegetables, in either vertical or horizontal orientation, in urban agriculture which needs structures light in weight. Hence bags filled with water hyacinth mixed with coir dust are perfect growth structures, specifically for such limited spaces.
- Grow bags made from banana pseudo stems, an agricultural waste, are more profitable and environmentally friendly than commercial coconut fibre bags presently used in urban farming. Therefore, this product could be recommended as an ideal container for growers. It is recommended to start this production as a cottage level industry in major banana growing areas.
- In the bio food wrapper production industry, banana leaves should be soaked in soap water for 24 hours to remove the ash adhering to the lower surface of the leaves.
- Application of organic manure along with inorganic fertilizer can be recommended for obtaining a higher yield in the Ampara District.
- Cinnamon cultivation should be done from seed derived plants rather than from clonal plants for growers who wish to follow the traditional peeling technique for processing of cinnamon.
- Seed treatment with gibberelic acids and coir dust medium for planting should be used to achieve a better germination percentage in Vara (*Calotropis gigantea*) seeds.
- Split system application of BAP 5mg/l and 6mg/l can be used to speed up proliferation in *in vitro* propagation of sour banana.
- Application of 1% cinnamon powder water filtrate can be used as a biopesticide to control pests of radish.
- The designed cart is useful for loading and unloading of pineapples to minimize postharvest damage.
- Capacity development of women through enhancing digital literacy has a great potential in the development of the rural sector.

- Aloe vera can be used in the formulation of smooth and low cost hand sanitizer following an easy technique.
- Farmers should be educated on the judicious use of agro chemicals to ensure environment health, optimum crop yield and minimal cost of production.
- The acceptance and mental attitudes of consumers towards cultured meat should be improved by appropriate awareness programmes.

## **Policy Recommendations from the Institute of Human Resource Advancement**

- Focusing on using information communication technology for human resource management is financially advantageous as well as significantly increases the efficiency of human resources.
- Provide training to employees regarding software and other tools.
- Focus on introducing a system that can be easily accessed from anywhere, such as offices, workplaces, power plants, etc. with computer equipment/ tools or software.
- Increase information and communication technology education in school education.
- Redesign office systems, since some government-used office systems date back to British colonial times and were created during the civil service.
- The COVID-19 epidemic, which is currently a major crisis in the country, has prompted government officials to order work from home several times. That methodology has failed to achieve the expected results. The main reason was that a majority of officers did not have personal information and communication technology infrastructure. Therefore, the government should create ways and means to provide facilities for government officials to acquire information and communication technology infrastructure.
- Develop a legal framework based on the eight principles of data protection as advanced in the United Kingdom, inclusive of fairness, specificity, adequacy, accuracy, time limitation, consideration of other rights, security and non-sharing with unprotected countries to protect the data subjects in Sri Lanka.

## Policy Recommendations from the Institute of Indigenous Medicine

- A novel herbal ergogenic-aid formula can be developed as a nutritional supplement and performance-enhancing supplement for athletes on regular endurance workouts.
- Collect and preserve all the traditional and cultural practices carried out by ancient Sri Lankans orally and virtually. Anthropologically analyze them initially and conduct scientific research according to different categories such as medicine, technology, agriculture etc. and re-establish them in the current world in phases.
- *Ithrifal e Muqil* and *Roghan e Khas*, an effective compound Unani preparation for treatment of haemorrhoids, should be made available for hospitals island-wide.
- Product standardization is necessary to determine the quality and purity of Unani herbo-mineral preparations. An applicable correlation can be established between the traditional and modern information on characterization of Unani herbo-mineral preparations using advanced analytical techniques. The analytical data obtained in this study could be used as a standard reference for Unani herbo-mineral formulation.
- Access the mother texts and interpret the relevant statements mentioned by various Unani philosophers to provide a clear theoretical framework for the humoral theory according to Unani Medicine. Determine the various essential and non-essential factors influencing the humours of the human body that help to preserve health and lead to diseases, both in the light of Unani and modern medicine. Ensure that the humoral theory is considered as the basis for causing any diseases, including emerging diseases, and that it is considered in the diagnosis of all diseases by including it in national policies.
- Policy makers need to give more weightage to the availability of drugs which are effective, cheap and locally available for the treatment of non-communicable diseases (NCDs) when preparing policies. A polyherbal extract, Darchini, Khulanjan and Asgand could be made available for the general public for the rheumatological conditions as it is comparatively cheaper and easily available after clinical trials.
- Herbal medicines should be standardized scientifically. "Palathrayadi kwatha", used for treatment of diabetes in Sri Lankan indigenous medicine, is suitable for human consumption.

- Interdisciplinary experts should work as a team to develop sustainable solutions to the current health problems in Sri Lanka using reliable sources of information and experiences of Ayurveda.
- Increase awareness among the public to increase the consumption of moringa leaves as one of the culinary health care measures to protect the community from the COVID-19 pandemic.
- Introduce the simple, safe and less costly diet and dietary therapy in traditional in Unani when making health policy.
- Implement traditional medical knowledge for the management of COVID-19.
- The use of traditional and Ayurveda medicinal products continues to grow rapidly across the globe but safety concerns have been raised due to lack of standardization and quality control. Implement effective policies and procedures for herbal drug standardization and quality control.
- *Arq e Ajeeb* is a simple Unani formula that can be prepared easily and economically. Therefore *Arq e Ajeeb* could be used in COVID and post COVID management and primary health as indicated.
- Improve standards and quality control parameters for the traditional medical system of Sri Lanka
- The Unani medicine Roghan e Khas is an effective, cost effective, freely available drug and has minimal side-effects. Therefore it can be used for the treatment of Bartholin's cyst in hospitals island-wide.
- Treatment modalities and procedures recorded in Unani classical texts were effective in the management of the COVID 19 impact on mental health.
- Increase students' motivation on online learning through various strategies while planning and implementing teaching and learning activities.
- Cultivate and propagate *Leucas zeylanica* for medicinal use. As *Leucas zeylanica* is a valuable medicinal plant, it can be introduced in the global market as an export species from Sri Lanka.
- Explore the action of Habbe Mudir and its efficacy in the management of polycystic ovarian syndrome.
- Explore Pathyadi Choorna and its constituents to isolate and identify active molecules for detailed evaluation of *in vivo* biological activities of such isolated compounds.



## **Policy Recommendations from the Library**

- Consider digital readiness, the attitude of students and policies and academic and humanistic standards of LIS professionals, when adopting blended learning
- Develop a centralized repository to store and retrieve geospatial data
- Develop a data management plan to manage geospatial data generated by universities
- More research should be carried out in areas such as urban planning, soil contamination, life cycle assessments, environmental management, ecological footprint and carbon storage.
- More international collaboration for research in environmental sciences.
- Incorporate the library resource location identification system based on GIS to the existing library management system.
- Based on the GIS model, readers can search for books and find book positions.
- Service quality should be enhanced by devising a strategy to identify the gaps and provide training to library staff of universities.
- Subscribe to more journals and databases for the Faculty of Education.
- Continue the subscription to JSTOR.
- Frequent training for academic staff.
- Update the Library website frequently.
- Library support to the academic staff of the Faculty of Education should be enhanced.
- Both bibliometric and qualitative analysis must be used to get a more comprehensive idea on author collaboration in Sri Lankan health research.
- The physical/working condition should be arranged in a place with adequate space to sit and read, lighting and ventilation.

## **Faculty of Arts**



***100 Years of Humanities and Social Sciences in  
Higher Education in Sri Lanka: Innovation and  
Adaptation in a Time of Crisis***

1<sup>st</sup> – 3<sup>rd</sup> December 2021

## MESSAGE FROM THE DEAN

### Senior Professor Lasantha Manawadu

Dean  
Faculty of Arts  
University of Colombo



It gives me great pleasure to write this message for the Annual International Research Conference of the Faculty of Arts (IConArts 2021), which is the flagship event in the academic calendar of the Faculty. This year's conference coincides with the centenary celebrations of teaching Humanities and Social Sciences in Higher Education in Sri Lanka.

The uncertainty and disruption that has impacted on the world following the outbreak of the COVID-19 pandemic has been felt intensely in numerous spheres including academia. The theme of this year's conference, "100 Years of Humanities and Social Sciences in Higher Education in Sri Lanka: Innovation and Adaptation in a Time of Crisis," is a timely as it underscores the challenges faced by the humanities and social sciences in a time of crisis and social change and also explores the ways in which the discipline could contribute to overcome pandemic-related crises. By deploying a critical lens on social behaviour, culture, politics and hegemonic discourses, the disciplines of humanities and social sciences can provide effective and sustainable policies to maximize human safety and ensure social development. In this context, it is heartening to see the participation of numerous local and international scholars at this year's conference. I hope that the knowledge generated out of the conference will offer new vistas and opportunities for our society which will guide us in the times to come. This conference is the result of the contribution and commitment of numerous individuals. First of all, I would like to thank the Vice Chancellor of the University of Colombo, Senior Professor Chandrika N. Wijeyaratne for her constant support and guidance to make this event a success. I would also like to express my sincere gratitude to the organising committee and the sub committees of IConArts 2021 competently led by the co-chairs of the conference. I take this opportunity to thank the keynote speakers for graciously accepting our invitation. Administrative, technical and support staff of the Faculty of Arts are thanked for their assistance in numerous ways. I also appreciate the support extended by the event production company and all those who submitted abstracts for the conference without which this event would not have been possible. I would like to extend my best wishes to the organising committee members, presenters and participants. I wish IConArts 2021 all success.

## MESSAGE FROM THE CO-CHAIRS

### **Professor Nishara Fernando**

Department of Sociology

University of Colombo, Sri Lanka



### **Dr. Pradeep Peiris**

Department of Political Science and Public Policy

University of Colombo, Sri Lanka



Since its inception in 2014, the International Conference on Humanities and Social Sciences of the Faculty of Arts has evolved into a unique platform that brings together celebrated researchers from the region and beyond. While being an annual assembly point for veterans, the conference has also welcomed and recognized the work of promising young scholars. This year's conference coincides with the centenary celebrations of University of Colombo. Thus, the theme "100 Years of Humanities and Social Sciences in Higher Education in Sri Lanka: Innovation and Adaptation in a Time of Crisis" was chosen to commemorate this historical landmark.

As co-chairs, we are delighted by the overwhelming response to the call for proposals by academics, both local and foreign. Following a rigorous peer review process, *crème de la crème* of the submissions were selected to appear in the conference proceedings. These submissions were organized under diverse themes reflecting the discipline of humanities and social sciences. The conference will also showcase a panel of keynote speakers with an unparalleled track record and a plethora of academic work in their respective academic fields that will set the frame and tone for the event. We take this opportunity to convey our sincere gratitude to the speakers for their contribution. We would also like to extend our appreciation to the Vice Chancellor of the University of Colombo, Senior Professor Chandrika N. Wijeyaratne and the Dean of the Faculty of Arts, Senior Professor Lasantha Manawadu for the support and guidance extended. We also thank the session chairs, abstract reviewers, and numerous volunteers for making this event a success. Last but not least, we acknowledge the excellent support we received from the secretary, Dr. Darshi Thoradeniya, Dr. Bihimini Abeywickrama, Ms. Anuradha Senanyake, the chairpersons and members of committees and non-academic staff members in organizing this conference.

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## **PROGRAMME**

### **1<sup>st</sup> December 2021: Inauguration Ceremony**

- 4.00 pm**      **National Anthem**
- 4.05 pm**      **Welcome Address by Professor Nishara Fernando**  
Co-Chair, IConArts 2021
- 4.10 pm**      **Address by Senior Professor Lasantha Manawadu**  
Dean, Faculty of Arts, University of Colombo
- 4.15 pm**      **Address by the Chief Guest, Senior Professor Chandrika N. Wijeyaratne**  
Vice Chancellor, University of Colombo
- 4.20 pm**      **Keynote Address by Professor Dilanthi Amaratunga**  
University of Huddersfield, UK
- 4.50 pm**      **Keynote Address by Professor Neil DeVotta**  
Wake Forest University, USA
- 5.20 pm**      **Keynote Address by Emeritus Professor Saroj Jayasinghe**  
University of Colombo, Sri Lanka
- 5.50 pm**      **Vote of Thanks by Dr. Pradeep Peiris**  
Co-Chair, IConArts 2021

### **2<sup>nd</sup> December 2021: Parallel Technical Sessions**

**9.00 am – 4.30 pm**

### **3<sup>rd</sup> December 2021: Parallel Technical Sessions**

**9.00 am – 4.30 pm**

## INTRODUCTION TO KEYNOTE SPEAKER

### **Professor Dilanthi Amaratunga**

Professor of Disaster Risk Reduction and Management  
Head, Global Disaster Resilience Centre  
School of Applied Sciences  
University of Huddersfield, UK



Professor Dilanthi Amaratunga holds the chair in Disaster Risk Management at the University of Huddersfield, UK, where she leads the Global Disaster Resilience Centre, responsible for supporting research on disaster management portfolios. She is a leading international expert in disaster resilience with an extensive academic career that has a strong commitment to encouraging colleagues and students to fulfil their full potential. Dilanthi's vision has always been to be an international leader in disaster risk reduction and management with specific emphasis on the built environment, and to champion the underrepresentation of women in this key research area.

She has project managed to successful completion a large number of international research projects (over £20 million) generating significant research outputs and outcomes. She provides expert advice on disaster resilience to national and local governments and international agencies including the United Nations Office for Disaster Risk Reduction (UNDRR). She is engaged in many significant research collaborations around the world, in partnership with key academic and other organisational stakeholders. To date, she has produced over 400 publications, refereed papers, and reports, and has made over 100 keynote speeches in around 30 countries. Among many leadership roles, she is the joint chief editor of the International Journal of Disaster Resilience in the Built Environment and the Chair of the International Conference on Building Resilience (ICBR) series, which she co-created. In 2019, she won the prestigious Newton Prize which recognises the best research and innovation projects which create an impact socially and economically, between Indonesia and the United Kingdom from 2016 to 2019. Newton Prize is supported by the UK's Department for Business, Energy, and Industrial Strategy (BEIS). She is a member of the European Commission and UNDRR's European Science and Technology Advisory Group representing the UK, a Steering Committee

member of the Frontiers of Development programme, a Collaborative Programme of The Royal Academy of Engineering, The Academy of Medical Sciences, The British Academy and The Royal Society, and a Steering Committee member of the UK Alliance for Disaster Research, motivation of which is to bring together the UK's rich and diverse disaster research community to facilitate collaboration and partnership in order to aid representation of the research community at government level in the UK and to facilitate the implementation of the Sendai Framework for Disaster Risk Reduction. She is a Fellow of the Royal Institution of Chartered Surveyors (RICS), a Fellow of The Royal Geographical Society, and a Fellow and a Chartered Manager of the Chartered Management Institute, UK.

## KEYNOTE ADDRESS

**Professor Dilanthi Amaratunga**

**Risk is systemic, crises are cascading contributions of the scientific community in addressing the dual challenges to enhance comprehensive disaster risk management**

Disasters continue to undermine sustainable development so reducing its impacts and identifying pathways towards resilient societies is a global goal. Negative consequences of natural hazards, such as earthquakes, tsunamis, volcanic eruptions, landslides, avalanches, windstorms, heavy rains, floods, heat and cold waves, prolonged droughts and subsequent water shortage have increased in recent years and resulted in major disasters around the globe. Understanding and assessing the drivers and patterns of risk is necessary to identify, plan and implement any measure to reduce risk. Risk assessments serve to create a common understanding of the potential losses and damages. Science is vital for efficiently implementing strategies for mitigating the most of these serious consequences.

The current COVID-19 health crisis stress-tests our ability to cooperate, learn and adapt in the face of deep uncertainties and rising risks. It calls for an important reflection on the necessary contributions of the scientific community and the technological developments to enhance comprehensive risk management. It demonstrates that risk is systemic, and crises are cascading. Disasters are rapidly producing further disaster to become more complex and deadly. There is a need for improved understanding of systemic and cascading disaster risks in all its dimensions of exposure, vulnerability and hazard characteristics as well as the strengthening of disaster risk governance. Emerging systemic risks demand a systemic response. There need to be urgent action to address the dual challenge of the COVID-19 pandemic and other hazards. Countries need to take strategically calculated and measurable actions to develop multi-hazard disaster risk reduction (DRR) strategies. Twin emergencies, the amalgamation of a global pandemic with another emergency, such as due to a natural hazard, was, until recently, an inconceivable scenario. Yet this is the reality currently being faced by a number of countries around the world in light of the COVID-19 crisis. Over the last several months, the world has witnessed a number of devastating natural disasters, from the earthquake which struck the city of Zagreb in Croatia, and the Tropical Cyclone Harold which

caused extensive damage in the Solomon Islands, Vanuatu, Fiji, and Tonga. Responding and coping measures are limited during a pandemic. The global science community must come to terms with the need for a new understanding of the dynamic nature of these systemic risks, new structures to govern complex risks, and develop new adaptive systems and tools for risk-informed decision-making that allows human societies to live in and with uncertainty. Despite the disruption and suffering, it nevertheless provides governments and communities an opportunity to revisit much that underpins our modern world – from fundamental aspects of governance, investment and consumption, to our relationship with nature, and to place risk reduction at the heart of a policy reboot.

This will require improving links between science and decision-making on systemic risks. Addressing the complexity and non-linear nature of systemic risks entails a holistic approach to hazard identification, risk assessment and risk management. Successful risk management depends on scientific understanding of risk factors and drivers, and on their behaviour, as well as on the ways in which disasters are expressed and materialise in society. Social and natural sciences, alongside technology and innovation, will provide verifiable knowledge and evidence-based answers to help understand causal factors underlying risk. Additionally, observation and experimentation, explanation of principles and causes, the formulation and verification of hypotheses, the use of adapted methodologies for this purpose and the systematisation of knowledge, will help create efficient disaster risk management policies.

Science, technology and research into issues relating to DRR have progressed significantly on all fronts and across all sectors. Scientists and researchers have brought a deeper understanding of the hazards, vulnerabilities, disaster risks and their linkages to the development processes. Science and technology have shown that impact from disasters can be reduced or prevented and is an opportunity for governments to work together with national and international policy and science and technology communities in an effort to reduce disaster risk and prevent disasters where possible. Given the different levels at which disasters can affect the society, it is essential that how the physical and social sciences can be fully deployed in an integrated way is considered, with technology, to reduce both disaster risks and their impacts. While political leadership and community partnerships are required for the successful implementation of effective, science-informed initiatives, the research community has a responsibility to formulate applicable methodologies and tools that respond to real-world challenges.

However, there are many ongoing challenges and gaps in translating this scientific information into policy so that DRR policies are based on science and evidence. All hazards need integrating, a multi-sectoral approach to integrate public health and disaster risk management is needed, and to take strategically calculated and measurable actions to develop multi-hazard DRR strategies. Researchers, educators, policymakers and practice-based actors must interact and collaborate with, at the local, national, regional and global levels. There is also a need for an inter-disciplinary approach, where a number of separate disciplines surrender their own concepts and goals, and collectively define themselves by reference to a common set of strategic concepts and goals. What do we do to tackle these challenges? Scientists and researchers must work with policymakers and practitioners, including community and civil society, as well as governmental actors to co-design and co-produce research that can be used effectively. Users must be included in the earliest stages of developing research and technology, including through improved dialogues with citizen groups, involvement of local and national universities and institutions, young scientists, and the use of indigenous knowledge. There need to be scientific advice to decision makers through close collaboration and dialogue with more focused attention on interlinkages between DRR, sustainable development, and climate change mitigation and adaptation. There is a need to use a holistic, all-hazard, risk-based and problem-solving approach to address the multifactorial and interdependent nature of the disaster risk chain and to achieve improved DRR. There have been several initiatives that have been launched in supporting this cause. Within this broader context, this keynote will discuss the:

- current trends of disasters, and the drivers of disaster risk
- concept of systemic risks and their cascading impacts
- role of Science and Technology in Disaster Risk Reduction and the outlook of a new agenda for the science and policy community
- challenges associated with S&T integration

## INTRODUCTION TO KEYNOTE SPEAKER

### Professor Neil DeVotta

Professor of Politics and International Affairs

Wake Forest University, USA



Professor Neil DeVotta received his doctorate in Political Science from the University of Texas at Austin in 2001 and was awarded the University of Texas Outstanding Doctoral Dissertation Award in Social Science, Education, and Business for 2000-01. Prior to joining Wake Forest University in 2009, he taught at Michigan State University, Hartwick College, and the University of Texas at Austin.

His research and teaching focus on South Asian security and politics, ethnicity and nationalism, ethnic conflict resolution, and democratic transition and consolidation. He is the author of *Blowback: Linguistic Nationalism, Institutional Decay, and Ethnic Conflict in Sri Lanka* (Stanford: Stanford University Press, 2004) and *Sinhalese Buddhist Nationalist Ideology: Implications for Politics and Conflict Resolution in Sri Lanka*, Policy Studies 40 (Washington D. C.: East-West Center, 2007) and also editor of *Understanding Contemporary India*, 2<sup>nd</sup> edition (2010)—with the 3<sup>rd</sup> edition (2021) co-edited with Sumit Ganguly (Boulder: Lynne Rienner Publishers)—and *An Introduction to South Asian Politics* (2016). His publications have appeared in numerous journals, including *Nations and Nationalism*, *Journal of Democracy*, *Commonwealth and Comparative Politics*, *Pacific Affairs*, *Asian Survey*, *Asian Security*, *Civil Wars*, *Journal of International Affairs*, and *Contemporary South Asia*. His current research examines democratic erosion due to the rise of soft-authoritarian regimes. He has been consulted for various sources, including the United States Agency for International Development, Freedom House, Bertelsmann Stiftung, and Global Center for Pluralism.



## KEYNOTE ADDRESS

Professor Neil DeVotta

### **The Populist Peril: Whither Sri Lanka and South Asia?**

Where democracy exists, so does populism. Indeed, politicians in a democratic society subscribe to populism to various degrees. Depending on the constituency to be accommodated or privileged, populist movements can be left-wing or right-wing. Left-wing populism is rooted in minimizing, if not eradicating, income inequality and promoting the welfare of groups that have been marginalized. Right-wing populism, on the other hand, tends to be rooted in ethno-religious criteria and embraces “sons-of-the-soil” notions to demarcate who can and cannot belong to the nation. While both left-wing and right-wing populism tend to be anti-elitist, pillory globalization, and undermine socioeconomic stability thanks to extremist policies, right-wing populism promotes ethnonationalism, eschews pluralism, embraces majoritarianism and is therefore especially detrimental to democracy. Populist movements need not be perilous, if the goal is to provide for marginalized citizens by strengthening institutions. In this regard, Franklin Roosevelt’s New Deal is viewed as a successful instance of left-wing populism. But more often populism is reposed in personalism, a cultish leader who projects himself as defender of the real people and protector of the nation. In this context, if Donald Trump—who loved to claim that he alone could solve America’s problems—was a classic example of right-wing populism, Hugo Chavez—who soon after being elected president said: “I demand absolutely loyalty . . . I am not an individual, I am the people”—is a classic example of left-wing populism. In South Asia, India has experienced both left-wing and right-wing populism. The former took place under Indira Gandhi, and the latter takes place under Prime Minister Narendra Modi and his Bharatiya Janata Party thanks to their Hindutva politics—although an argument could be made that Modi combines both right-wing and left-wing populism. While Sirimavo Bandaranaike’s second government (1970-77) tried to minimize economic disparities and could be said to have pursued left-wing populism, its actions were laced with hyper-majoritarianism that smacked of racism against the island’s Tamils. And given the extent to which Sinhalese Buddhist nationalism dominated politics since the 1950s, much of what has transpired in Sri Lanka—and this especially so under both Mahinda Rajapaksa and Gotabaya Rajapaksa—is related to right-wing politics—although an argument can be made that Sri Lankan leaders also combine left-wing and right-wing politics. Most populist projects end in disaster, and this is especially so with right-wing populism that gets built around a savior figure. That history heralds danger for both India and Sri Lanka.

## INTRODUCTION TO KEYNOTE SPEAKER

### **Professor Saroj Jayasinghe**

Emeritus Professor of Medicine, University of Colombo  
Founder Head, Department of Medical Humanities  
University of Colombo, Sri Lanka



Professor Saroj Jayasinghe is an alumnus of the Faculty of Medicine Colombo who qualified with MBBS (Hons) in 1979. He has a MD in General Medicine, from the University of Colombo, MD by research from the University of Bristol, and a PhD from the Faculty of Graduate Studies, University of Colombo. He passed the MRCP (UK) and was awarded Fellowships by Royal College of Physicians (London), the Ceylon College of Physicians and the National Academy of Sciences of Sri Lanka. In 2021, he was appointed to the Advisory Board of the International Medical University Centre for Bioethics and Humanities, Malaysia.

He played a key role in the curriculum reforms of the Faculty of Medicine in 1995. This included the introduction of ethics, communication skills and professionalism through establishment of the Behavioral Sciences Stream (BSS) to medical curricula. He chaired the Behavioral Sciences Stream for several years and was the founder head of the Department of Medical Humanities the first such department in Sri Lanka and perhaps in the south Asian region in 2016. He led more recent reforms in the Faculty that led to the transformation of the BSS to become the Humanities, Society and Professionalism Stream. He conceptualized and helped to develop an innovative and unique curriculum to introduce topics on humanities, compassion and empathy by using narratives and the arts. In July 2018, he organized the Inaugural International Conference on Medical Humanities, held in Colombo. He had conducted guest lectures and workshops on Medical Humanities in Colombo and Bhutan. He was the orator in the inaugural Professor Carlo Fonseka Oration in March 2021 on Medical Humanities. His research interests include kindness in healthcare, empathy in medical education and systems science.

## KEYNOTE ADDRESS

**Professor Saroj Jayasinghe**

### **COVID-19 and Humanities: An opportunity amidst a crisis?**

COVID-19 has awakened human civilization to an unprecedented reality. What began as a health issue in early 2000 has rapidly snow balled to cause socio economic devastation and massive changes to the way people behave and function, globally. Within a period of less than 20 months, COVID-19 has affected about 220 million, killed approximately 4.6 million and is predicted to affect millions more. Human mobility is severely restricted mobilities, institutions have been forced to reimagine their practices, people and organizations have chosen to rely more on working remotely and fresh norms of behaviours are being set across a range of situations. The changes in human behaviour were so extensive resulting in a significant reduction in the global carbon dioxide emissions.

The COVID-19 pandemic offers a unique opportunity for academics, scientists, policymakers and ordinary civilians to be living witnesses to who experience a pandemic of historic proportions. Unlike other global crises, this pandemic is unfolding in real-time under the full glare of a social media driven interconnected world. Those brave enough should surf the wave of knowledge creation. This wave is heading to uncharted waters. It has led to a sea full of scientific collaborations without any borders. Examples include sharing of the virus genome data by China in January 2020 and the global initiatives for control of the pandemic by organizations such as the WHO. Wider availability of knowledge through open access platforms has ensued (e.g. almost all medical journals have allowed research papers related to COVID-19 to be free and open-access)

In this panoramic setting, the opportunities for creativity, innovations and research in relation to humanities are limitless. The presentation will explore how humanities adapted to COVID-19 and describe some of the novel activities that have emerged during the past two years and attempt to weave a common thread. The pandemic has triggered a generation of new themes in paintings, sketches, photography and poems exploring novel topics such as those that capture painful experiences: loneliness amidst isolation, letting loved ones die alone in ICUs and tearing up families apart. Designers and media groups are vying for attention to provide health information to the public in very creative ways. This begs whether we are seeing the emergence of a new “art of a pandemic”?

The infomedia (i.e. too much information including those that are false or misleading, in digital and physical environments) has triggered collaborations across experts in mass communication sociology and data sciences to track changes in behaviors and values of people, and the role of information and misinformation. Are we observing new developments in studying science of mass communication and hyperconnectivity in the digital generation? Another area of interest is how the pandemic has led to an infodemic. The dumping of trillions of information to the web has shaped belief systems and affected behaviors, globally. For example, did the social media campaigns by anti-vaccine groups in the West influence many to avoid vaccination programs in Sri Lanka?

The arts have seen an explosion of interests in on-line music, plays, and films. More and more artists are switching to on-line concerts, exhibitions and forums. Was the success of our own Yohani with her song “Manike Mage Hithe” partly due to the new configurations in the world of entertainment? Does the song’s simplicity and her clear and fluid delivery that has transcended language and culture denote the unification of humanity under these trying times?

Questions in ethics and values have been raised on the mandatory requirements for vaccinations, quarantine laws that restrict movements and censorship of materials in the social media (e.g. attempts by Facebook to limit sites promoting ivermectin as a cure). How do these impact on personal freedom and community safety?

Historians have compared this pandemic to previous epidemics of influenza and smallpox. What are the commonalities and the lessons we could learn from them? How does the COVID-19 vaccination program relate to the smallpox vaccination in ancient times?

The COVID-19 pandemic has overwhelmed many health services globally. This led to immense physical and psychological pressures on healthcare workers who faced intense moral injuries (i.e. the emotional pain when making decisions that affect the survival of others) and empathic distress (i.e. the repeated distress in response to the suffering of others that is accompanied by a desire to avoid such situations by withdrawing from them). Should health professional education impart compassion training and health systems develop processes to make their staff more resilient?

The above description outlines a series of apparently diverse set of activities by human societies across the globe as a response to an infection caused by a few micrograms of RNA virus

particles. The common thread seems to be that they are all attempts by humans and societies to survive, adapt, or react to disruptions created by a micro-organism. It highlights our weaknesses, our vulnerabilities and mortality. Reflecting on the factors that led to the pandemic and the responses by humans help in identifying linkages of the across these threads. It may offer humans an opportunity to weave a new future for civilization, a future built on more sharing, more kindness and based on humaneness.

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- 88. A review of climate change impact on the built environment in coastal regions: The case of the UK**  
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- 89. Fostering economic resilience through corporate governance determinants: Evidence from manufacturing sector companies in Sri Lanka**  
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- 90. Learning Japanese through online classes: A study on Kanji education**  
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- 91. Using the SaTScan method to model local Dengue clusters in the Kolonnawa divisional secretariat for guiding Dengue control programmes**  
*U.T.G. Perera*
- 92. Screens and clouds: Methodological dilemmas in researching digital literacy during a pandemic**  
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93. **Assessment methods of practical components in music as a subject at the University of Visual and Performing Arts and the challenges to them during the global pandemic**  
*K.A.D.R. Perera*
94. **A study on environmental dimensions of national security**  
*K.T.V. Perera*
95. **A needs analysis on the English language skills required in the 13 years guaranteed education programme for trainee tea factory officers and trainee tea field officers at NIPM**  
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96. **In animal conflict: Richard de Zoysa as shapeshifting witness**  
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97. **Open-book vs. closed-book examination in higher education sector during COVID-19: A case study of a state university**  
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99. **Productivity, creativity, and lexical innovation in Sinhalese slanguage: A special reference to slang words for illicit liquor**  
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100. **Nativising the violin: An attempt to introduce Sinhalese technical terms for the parts of the violin**  
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101. **කඳුරට වැවිලි කෙණ්ණියේ ඉන්දියානු දෙමළ ප්‍රජාවගේ (නිර්)දේශපාලන සම්බන්ධතා**  
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102. **An analysis of the relationship between health care facilities and fatality rate during the COVID-19 pandemic**  
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- 111. Changing dynamics: The impact of COVID-19 on new marital relationships in Sri Lanka**  
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- 112. Furthering Sri Lanka's foreign policy goal of becoming a global maritime hub: Foresight analysis on the Colombo Port City**  
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- 113. Factors affecting little or no access to healthcare of trafficking victims at the destination: A case of Sri Lanka**  
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- 114. Accommodating accountability into disaster governance**  
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- 115. The impact and new trends of pandemics on society and global politics**  
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- 116. The relationship between perceived stress, caregiver burden and coping styles among the caregivers of children with Down Syndrome**  
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- 117. A cinematic study of how Mani Ratnam's *Bombay* film portrays the Hindu-Muslim ethnic conflict of India**  
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- 118. Empirical testing on Islamophobia and anti-Muslim feelings: Evidence from two-split sample experiment**  
*C. Silva*
- 119. A study on the media portrayal of unsubstantiated COVID-19 cures in Sri Lanka**  
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- 120. Impact of celebrity personality on brand personality: Five selected cases from the Sri Lankan advertising context**  
*W.S.N. Siriwardhana*
- 121. The COVID-19 pandemic and health wellbeing: Understanding obesity as a major health issue**  
*W.S.N. Siriwardhana*
- 122. Sex differentials in adult mortality in Sri Lanka**  
*W.P.N.L. Sumathipala*
- 123. The impact of the digital transformation process on traditional television consumption patterns in the Sri Lankan context**  
*S.A.N.P. Suraweera*
- 124. An analysis of Sri Lankan migration policies**  
*L.A. Thrishali, P. Jayawardena*
- 125. Infodemic over pandemic: A sociological study on the influence of COVID-19 misinformation in propagating counter-health behaviours among young adults in Sri Lanka**  
*S. Udayanga, A.M.A.S. Gunasekara, H.L.S. de Zoysa*
- 126. Impact of foreign training on sustainable development in the provincial education sector in Sri Lanka**  
*E.B. Vindyani*

- 127. Empirical study on the internet data usage behaviour among employees in government and private sectors during COVID-19 pandemic**  
*A. Waidyaratna, M.A.T. Fernando, B.R. Yapa*
- 128. External role in liberal reforms: The case of post-war peacebuilding in Sri Lanka (2009-2019)**  
*M.R. Wakkumbura*
- 129. Sri Lanka's symbolic soft power: An exploration of the public diplomatic power of tree-planting**  
*M.S. Wanasinghe-Pasqual, L.A. Thrishali*
- 130. Inter-temporal dynamic relationship between exchange rates and stock prices: Empirical evidence from Sri Lanka**  
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- 131. The impact of governance on Foreign Direct Investment in South Asian countries**  
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- 132. Establishing the much needed interfaith dialogue in an ESL classroom of a government university**  
*S. Wanniarachchi, W. Egodage*
- 133. Impact of distorted development among rural people in Sri Lanka**  
*T.M.F. Wazeema*
- 134. Social exclusion and vulnerability encountered by women in Sri Lankan gypsy community**  
*T.M.F. Wazeema*
- 135. Facing the faceless authorities: A comparative study of Gustave Flaubert's *Madame Bovary* and Franz Kafka's *The Trial***  
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- 137. Optimizing the impact of digitalization on education**  
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139. **The double edged sword of the body positivity movement: A fourth digital wave of #feminism**  
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140. **Identifying the issues in planning green cities in Sri Lanka: A case study of the Gampaha Municipal Council area**  
*W.A.W.P. Wijayalath*
141. **A study on the use of Sri Lankan English(es) in selected news bulletins aired on the English Service of the State Radio in Sri Lanka**  
*R.M. Wijayawardhana*
142. **Socio-demographic characteristics of permanently celibate women**  
*M.G.D.I.D. Wijerathne*
143. **Conscription as a means of enhancing national security and nation-building in Sri Lanka**  
*H. Wijesinghe, M.A.S. Mohamed Ajward*
144. **British and French colonialism: Is it a mere act of dominance?**  
*N.D. Wijesinghe*
145. **සන්නද්ශවලින් හෙළිවන කෝට්ටේ යුගයේ ආචරණ භාවිතය පිළිබඳ විමර්ශනයක්**  
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147. **A paradigm shift in preserving intangible cultural heritage: A framework for culture-mapping of the *Dalada Thevava***  
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148. **Conversion of womanism and lesbianism into Sri Lankan culture: A comparative study on Alice Walker's *The Colour Purple* and its Sinhalese translation by Amali Boralugoda**  
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149. **Endogenous peacebuilding approach in Sri Lanka: An analysis of contributions of major international development partners, 2009-2020**  
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# Faculty of Education



*Interdisciplinary Research in Education*

**26<sup>th</sup> November, 2021**

## MESSAGE FROM THE DEAN

**Dr. L.M. Kapila Bandara**

**Faculty of Education, University of Colombo**



It is with great pleasure that I write this message to the Annual Research Symposium - 2021 of the Faculty of Education, University of Colombo. Although the Faculty has been holding Symposia annually to showcase the research of the academics and students during the past years, the Faculty has taken a step forward to hold an International Research Symposium this year in keeping with the theme ‘Interdisciplinary Research in Education’.

Keynote addresses by two eminent scholars well-versed on Inter Disciplinary Education from University of Graze, Austria and National University of Singapore are another highlight in the Symposium of 2021. Interdisciplinary research approach that integrates two or more disciplines in the creation of new knowledge and practices is a highly recommended approach to conduct research in the field of education because Education is multi-disciplinary. Thus an interdisciplinary approach to research would be effective in identifying the unresolved issues in Education by uncovering the unidentified realities in order to uplift the present system of education in Sri Lanka.

Research findings related to various disciplines in Education by 60 to 70 researchers around the world including Sri Lanka will be disseminated at this Symposium. I strongly believe that this Symposium will provide a useful forum for novel discourse on educational research. Further it would contribute to bridge the gap of knowledge in the field of educational research by increasing the enthusiasm of the young researchers in Sri Lanka to be engaged in Education related research.

I take this opportunity to thank the Senior Professor Chandrika N. Wijerathne, the Vice Chancellor of the University of Colombo for her relentless support in the development of research capacity of the academics and the students. I also extend my sincere gratitude to the Chair, Co-Chair and the Organizing Committee of the International Research Symposium of Faculty of Education for their tireless effort in making the event a success amidst the challenging epidemiological situation. On behalf of the Faculty of Education I congratulate all the researchers and presenters whose research work will be disseminated at the Symposium. Finally, I convey my best wishes for a successful Annual Research Symposium – 2021.



## MESSAGE FROM THE CHAIRPERSON

**Dr. Lalitha Kumari**

**Faculty of Education, University of Colombo**



It is my great privilege and pleasure to write this message on the occasion of the First International Research Symposium of the Faculty of Education, 26<sup>th</sup> November 2021 via Zoom Conferencing. The symposium of this year has provided a new arena for both local and international academic community to disseminate and discuss research findings and contribute to enhance the quality of education and thereby achieve the society well-being.

The theme of the International Research Symposium, “Interdisciplinary Research in Education” is obviously timely as it has become an increasingly popular approach in research across the world. In an interdisciplinary research expertise of two or more disciplines are combined, to jointly address an area of common concern. The symposium themes are, Educational Leadership and Management, Lifelong Education, Blended and Online Learning, Language Education, Gender Education, STEM Education, Educational Psychology, General and Higher Education, Aesthetic Education and Educational Assessment.

The first International Research Symposium is a collaborative endeavor of all members of the Faculty of Education and my task as the Conference Chair was made easy because of my committed and enthusiastic colleagues. I take this opportunity to thank the Vice-Chancellor, University of Colombo, Senior Professor, Chandrika N. Wijeyaratne for encouraging me to initiate and make the first International Research Symposium of the Faculty a great success. I extend my sincere gratitude to Professor Rudolf Egger, Dean, Faculty of Environmental, Regional and Educational Sciences, Competence Centre for Higher Education, University of Graz, Austria and Dr. Dujeepa Samarasekera, Senior Director, Centre for Development of Teaching & Learning (CDTL), Centre for Medical Education (CenMED), National University of Singapore, (NUS) for accepting our invitation to the Keynote addresses. I am thankful to Dr. Kapila Bandara, Dean, Faculty of Education for the guidance and support extended in making the event a reality. I am also very much grateful to Professor Manjula Vithanapathirana, the former Dean of the Faculty of Education and Dr. Sulochana Neranjani, the Co-Chair of the symposium for their consistent support and valuable guidance. I am indebted to all the academics, administrative and support staff who worked enthusiastically in

various committees to ensure success of the Faculty of Education International Research Symposium 2021.

Finally, I thank you for your participation and wish you all a very productive and fruitful academic session in which every participant would benefit from the deliberations that are lined up in the conference program.



**ORGANIZING COMMITTEE**

Dr. Lalitha Kumari (Symposium Chair, Faculty of Education)

Dr. E. Sulochana Neranjani (Symposium Co-Chair Faculty of Education)

Dr. Kapila Bandara (Advisor)

Ms. Jeevani Herath (Symposium Secretary)

Prof. Manjula Vithanapathirana

Prof. W. Chandradasa

Dr. Samudra Senerath

Dr. Kumudu Senevirathne

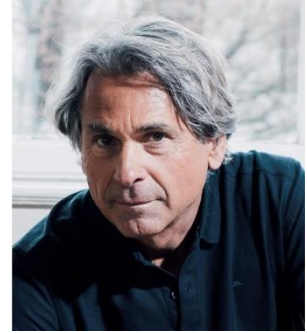
Ms. R.D.C. Niroshini

Mr. S. Dahanake

## Programme

9.20 am	Arrival of the Guest
9.30 am	Lighting of the Traditional Oil Lamp & National Anthem
9.40am	Puja Dance
9.45 am	Welcome Address Dr. Kapila Bandara Dean, Faculty of Education, University of Colombo
9.55 am	Introduction to the Chief Guest
10.00am	Address by the Chief Guest Senior Professor Chandrika N. Wijeyaratne Vice Chancellor, University of Colombo
10.10 am	Introduction to the Key Note Speaker 1
10.15 am	Keynote Address 1 prof. Rudolf Egger Dean, Faculty of Environmental, Regional and Educational Sciences, Competence Centre for Higher Education, University of Graz, Austria
10.55 am	Introduction to the Key Note Speaker 2
11.00 am	Keynote Address 2 Dr. Dujeepa Samarasekara Senior Director, Centre for Development to Teaching & Learning, Centre for Medical Education, National University of Singapore
11.40 am	Vote of Thanks Dr. Lalitha Kumari Chairperson, International Research Symposium
11.50 am	Break
12.30 pm	Virtual Panel Sessions
3.30 pm	Felicitation of Retired Academics
4.30 pm	Conclusion

## INTRODUCTION TO THE KEYNOTE SPEAKER



Professor Rudolf Egger is a Professor of Empirical Learning World Research and Higher Education Didactics in the University of Graz, Austria. He is also the Dean of the Faculty of Environmental, Regional and Educational Competence Centre for Higher Education, in the University of Graz. He has served as visiting professor at Stockholm University and University of Pristina. He is the Chief-editor of the Weiterbildung.

## KEYNOTE ABSTRACT

**Professor Rudolf Egger**

**Learning our way out: About the necessary connection between research, knowledge and communication**

Interdisciplinary research is the order of the day. The reason for this is quickly explained: A way out of today's pandemic political, economic, cultural, social and ecological crises can only be found by learning. The dominant social and environmental developments cannot be managed without increasing the individual capacity of social actors. Learning and educational processes play a crucial role here, that's why science must necessarily strengthen the connection between knowledge and communication. For this reason, all scientific disciplines must review their tasks to see whether and how they can be perceived in a supportive way in the diverse everyday world-based behaviors of people. Science must therefore be more strongly oriented towards developing common research, communication and development tasks. The following questions are central to this: How can research and science help people learn to deal with cumulative risks? What kind of scientifically oriented "storytelling" is necessary for this? How does research support people to read technical and scientific risk expertise in a participatory way, and how do they translate global hazards into regional and life world contexts? How can scientific expertise strengthen democratic achievements and liberality?

## INTRODUCTION TO THE KEYNOTE SPEAKER



Dr. Dujeepa D. Samarasekera is the Senior Director, Centre for Medical Education (CenMED), Yong Loo Lin School of Medicine, National University of Singapore and the Director of the Centre for Development of Teaching & Learning (CDTL), National University of Singapore. He is the Senior Consultant (Health Profession Education) at the Ministry of Health, Singapore. He also is the Course Director of the Masters in Health Professions Education, Singapore and is the Chair Faculty Teaching Excellence Committee (FTEC) for Yong Loo Lin School of Medicine and Saw Swee Hock School of Public Health. He serves as an honorary professor and visiting Faculty at the Maastricht University, Netherlands; Tzu Chi University of Science and Technology, Taiwan and Semey State Medical University, Kazakhstan. He serves on the editorial advisory boards of many peer reviewed journals and has authored academic book chapters related to Medical Education.

## KEYNOTE ABSTRACT

**Dr. Dujeepa D. Samarasekera**

### **Scholarship of Teaching and Learning (SOTL): Focussing on Interdisciplinary learning to practice**

Interdisciplinary learning focusses on learning a subject or content area from multiple different angles or perspectives. This allows the student to critically evaluate the learning, identify one's own knowledge gaps and apply their learning in contextually relevant situations or synthesise new understanding about the subject leading to deep learning. (Jones,2009). These are some of the main reasons why interdisciplinary education is embraced in higher education presently. The institutions as well as funding agencies such as governments are increasingly encouraging universities and other institutions of higher learning to develop interdisciplinary courses to effectively educate the future workforce.

However, there are several barriers to implementing interdisciplinary education in higher education institutions. The biggest challenges are the need for closer collaboration of educators from different disciplines and the resources required to implement conducive interdisciplinary learning environments. Paucity of research and evidence of best practices are other concerns for educators designing or planning interdisciplinary education. Informed decision making is crucial for successful design and deployment hence the need to systematically engage in interdisciplinary Scholarship of Teaching and Learning.

The presentation will focus on the above areas as well as the presenter's recent experience at National University of Singapore creating interdisciplinary colleges and the process of Scholarship of Teaching Learning to obtain information to create a learner conducive interdisciplinary environment at the university.

Jones, Casey (2010) "Interdisciplinary Approach - Advantages, Disadvantages, and the Future Benefits of Interdisciplinary Studies," ESSAI: Vol. 7 , Article 26.

## School based teacher development programmes; readiness to face challenges

S. Abeynayake<sup>1</sup>, E.S. Neranjani<sup>2</sup>

<sup>1</sup> *Faculty of Education, University of Colombo*

<sup>2</sup> *Department of Humanities Education, University of Colombo*

School Based Teacher Development (SBTD) programmes were introduced to schools in Sri Lanka in 2009 with the aim of the continuous development of the professional skills of the teachers in the classroom setting. However few studies have been conducted to this date to investigate the outcome of this programme. Thus the objectives of this study were to investigate the suitability of the existing SBTD programme to address the needs of the teachers in the dynamic society by identifying the strengths and drawbacks of the existing SBTD programme in-order to propose effective practices to produce a competent teacher, equipped with knowledge, skills and attitudes for continued professional development amidst challenges. The study was conducted as a survey on a sample of 100 Teachers, 25 Principals and five Education officers in the Uva Province. Data were collected using documentary survey, questionnaires and interviews and analyzed using both quantitative and qualitative methods. Key findings of the study were; SBTD programme has been identified as an effective teacher development tool by teachers and the principals; existing SBTD programme focused on the development of knowledge but not practice; Teachers were not equipped to adapt to unforeseen situations; majority of the teachers did not have computer literacy and this was not addressed in the SBTD programmes. Collaboration between teachers and professionals had not been established although it was an aim of the SBTD; Teachers did not have positive attitudes towards professional development; Support received by the teachers from the Education authorities was inadequate. Therefore the existing SBTD programmes should be re-visited and updated to equip teachers with skills for self-development and computer literacy. A sound mechanism should be introduced to establish and strengthen collaboration between teachers and professionals in the field of Education who could support in the continuous development of individual teachers within and outside the school.

**Keywords:** *School Based Teacher Development, computer literacy, effective practices*

- ❖ The extended abstract will be published in the International Research Symposium 2021 Proceedings of the Faculty of Education.

## Enhancing Students' Higher Order Cognitive Skills (HOCS)

J.P.R. Malkanthi<sup>1</sup>, H.M.L. Kumari<sup>2</sup>

<sup>1</sup> Faculty of Education, University of Colombo.

<sup>2</sup> Department of Social Science Education, Faculty of Education, University of Colombo.

Higher Order Cognitive Skills (HOCS) have made a positive contribution to the qualitative development of foreign education systems but the need for HOCS, to enhance the quality of education in Sri Lanka remains the same. This collaborative action research, therefore, aims at planning and implementing an intervention programme, to enhance the cognitive skills of sixth grade students, who are at different levels of cognitive skills in the subject of Sinhala language and literature. The study relies on scores of a pre-test conducted on 294 students in Grade 6 from a national School in Galle District. 35 students, who obtained the lowest (0-35 marks) from the said test, were selected for the intervention programme conducted by the researcher and two teachers, who teach Sinhala language & literature. A 30-day intervention programme was administered through thirteen lessons. The lessons were devised to reinforce new ideas, creative thinking, using own words in writing, learning grammar, teamwork, writing poems, writing sentences, writing letters, examining characters, learning special characters in the Sinhala alphabet, expressing ideas, and building up stories. The lessons were redesigned, based on the reflections, and intervened to increase the student dynamics. A dependent hypothetical test confirmed a difference in scores of pre-test and post-test, with a 99% increased confidence level, considering the student development after the intervention program. The majority of the 35 students, subjected to the study, scored between 50-31, while few scored 70-51 marks. The results of the study entailed that the students have a lower preference for writing activities such as sentence writing, essay writing, and writing in their own words, and that such activities could be made more compelling by combining different activities. Further, the group activities proved to be successful, as they contributed eminently to the enhancing of HOCS.

**Keywords:** HOCS, collaborative action research, intervention program

- ❖ The extended abstract will be published in the International Research Symposium 2021 Proceedings of the Faculty of Education.



**English Medium Science Teacher Education in the National Colleges of  
Education; Theory and Practice**

K.A.M. Peiris<sup>1</sup>, E.S. Neranjan<sup>2</sup>

<sup>1</sup>*Faculty of Education, University of Colombo*

<sup>2</sup>*Department of Humanities Education, University of Colombo*

English Medium Education (EME) was introduced to the general Education in Sri Lanka in 2003 to develop the English Language Proficiency (ELP) of the students with the aim of preparing them for gainful employment and higher education. However, to this date EME has been introduced only in a few selected schools due to the shortage of teachers who could teach in English. Thus, a gap was created between a majority of the students who did not have this opportunity and the minority who had the opportunity. In 2005, National Colleges of Education (NCoE) in Sri Lanka produced English Medium (EM) Science and Mathematics teachers who could contribute to minimize the above gap. Although the NCoEs produced an average of sixty EM Science teachers every year, few studies have been conducted to evaluate their performance in the schools. This study aimed to examine whether the existing Science curriculum in the NCoEs was adequate to prepare the teacher for EME in the schools by identifying the challenges and issues the Prospective Science Teachers (PSTs) faced in the actual classroom setting. Data were collected from a purposive sample of twenty two PSTs from an NCoE in the Western Province by using documentary analysis, questionnaire, interviews and classroom observations and analyzed applying the Qualitative dominant descriptive design. Key findings of the study were; there was mismatch between the practice of the NCoE and the requirements of the EME in the schools; more weight was placed on developing the theoretical subject knowledge than the ELP and practical skills; Subject lecturers did not give attention to the ELP development of the PSTs. English Language course units were not designed to address the actual learning needs of the PSTs. Majority of the PSTs have not developed essential ELP skills to teach in the EM. Therefore it is important to revisit the EM Science curriculum in the NCoEs in-order to propose an effective curriculum for the simultaneous development of ELP and content knowledge of the PSTs.

**Keywords:** *English Medium, National Colleges of Education, Prospective Science Teachers, English Language Proficiency*

- ❖ The extended abstract will be published in the International Research Symposium 2021 Proceedings of the Faculty of Education.

## Student Perspectives On the Guidance and Counselling Units in the School System

R.A.B.U.I.Perera

*Department of Educational Psychology, Faculty of Education, University of Colombo*

This study aims to investigate the student's perspectives towards the School Guidance and Counselling Unit. School Guidance and Counselling Units were established in all government schools with the assistance of the Ministry of Education through the applications recommended by circulars no 16/2011 and 6/2013. Due to the students' emerging psychological and behavioural problems, there was a growing interest in enhancing the School Guidance and Counselling Service. The research objectives were to investigate the student's awareness about the School Guidance and Counselling Unit, student's attitudes towards the School Guidance and Counselling Unit, perception of the students towards the School Guidance and Counselling Unit, and identify the steps to increase the function of the unit. A questionnaire survey was administered under the mixed- method research design,, and semi-structured interviews were conducted with ten purposively selected students. Data analysis was done by using quantitative and qualitative methods. Findings indicated that most of the students were unaware of the services provided by the School Guidance and Counselling Unit. Students positively perceive that seeking help from the unit was beneficial. However, most students believed that seeking guidance and counselling services consumed much time, and the unit did not encourage one to seek counselling services. It was evident that although the schools have implemented the recommendations addressed via circulars, the function of the school guidance and counselling service was not up to the desired level. Therefore, it is essential to circulate a proper monitoring system towards the school guidance and the counselling centre. Needed utilities and resources should be provided for the proper function of the Student Guidance and Counselling Unit within the school level with the assistance of the ministry of education.

**Keywords:** *School Guidance and Counselling, School Guidance and Counselling Unit, Students Perspective*

## Status of students' performance in Geometry in the secondary schools in Sri Lanka

N.Prashanthan<sup>1</sup> and P.K.J.E.Nonis<sup>2</sup>

<sup>1</sup>*Faculty of Education University of Colombo, Colombo*

<sup>2</sup>*Department of Science and Technology Education, University of Colombo, Colombo*

Geometry is a key component of mathematics and geometrical thinking is a fundamental way to engage with mathematics. Even though geometry is an important area from the mathematical point of view, it is considered as a difficult subject by the secondary school students in Sri Lanka. As a result, the purpose of this study was to analyze the performance of geometry of senior secondary students. This study was also attempted to encompass a deep analysis on the current status of geometry in schools situated in Jaffna district. A mixed methods design was used in this study. A sample of students and teachers was drawn from different types of schools situated in Jaffna district Educational zones using stratified sampling technique. The sample also consisted of in-service advisors of mathematics, additional directors of mathematics and subject coordinators of mathematics. Data for the study were collected through questionnaire, interviews, documents and a geometry achievement test. In the analyzing process, quantitative data were analyzed using the descriptive survey methods and qualitative data were analyzed using thematic analyzing techniques. By utilizing both analyzing techniques and literature, the current status of geometry in secondary schools was revealed. Furthermore, results indicated that the status of students' performance in geometry is poor among the senior secondary students in Sri Lanka.

**Keywords:** *Geometry, achievement, performance, concepts, knowledge*

- ❖ The extended abstract will be published in the International Research Symposium 2021 Proceedings of the Faculty of Education.

**Activity Based Learning to Promote Sustainable Development Goals among G.C.E.  
Advanced Level Students**

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University of Colombo*

Sri Lanka is challenged by open economic system with economic prosperity, industrialization, urbanization and population growth in the 21<sup>st</sup> century. Education is emphasized as key enabler for achieving SDGs. In line with the SD, Ministry of Education in Sri Lanka has taken an effort to implement various types of educational programmes since 1992 to strengthen the sustainable society according to the process of economic development. However, many Sri Lankan and foreign researchers have emphasized that the level of awareness, knowledge, and attitude towards the SDGs is not satisfactory not only among school children but also in the society. The main objectives of this study are to investigate the impact of activity based learning on advanced level students' knowledge and perception towards the selected SDGs. Under quantitative research methodology nonrandomized Control-Group Pretest–Posttest Design of quasi experimental design was employed. A sample of 90 out of 178 students following physical science stream in grade 12 from 1 AB school was selected using non-probability purposive sampling, where experimental and control group consisted 45 each. An intervention with an activity based- learning on selected SDGs was the proposed treatment for a period of twenty-four weeks once in a week with the experimental group. Pretest and posttest were also used to measure the knowledge and perception and data was analyzed using independent samples t test. Fact findings revealed no significant difference between the two groups before the intervention with regard to student's knowledge ( $t=.626$ ,  $p>0.05$ ) and perception ( $t=.565$ ,  $p>0.05$ ) towards SDGs. However, it found an improvement of knowledge ( $t=-24.840$ ,  $p<0.05$ ) and perception ( $t =-11.074$ ,  $p<0.05$ ) towards SDGs of experimental group compared to that of control group. It further discusses how activity based learning approach could be effectively applied in promoting SDGs among school children.

**Key words:** *Sustainable Development Goals, Activity Based Learning*

- ❖ The extended abstract will be published in the International Research Symposium 2021 Proceedings of the Faculty of Education.

**Principal's instructional leadership: Effect on teacher's self-efficacy in student engagement in scientific inquiry activities**

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Transition of a classroom into an inquiry oriented one in science is an evolutionary process that greatly depends on the teacher receptivity. In recent years, self-efficacy has been long reported in the western professional literature as a key predictor of teacher performance which is also closely related to school factors. In order to fill the gap this correlational study examined how science teachers (n=350) in Colombo district in Sri Lanka perceived principal's instructional leadership behaviors towards their self- efficacy beliefs in student engagement. Under the quantitative paradigm, data gathered administering a survey questionnaire was analyzed using General Linear Model (GLM) Univariate analysis of SPSS 21.00 programme. The fact findings revealed a fairly high perceived overall Teacher Self-efficacy (TSE) in teaching scientific inquiry ( $7.24 \pm 0.44$ ). Out of subscales, TSE in Student Engagement in scientific inquiry activities ( $6.91 \pm 0.50$ ) reported comparatively low than that of Classroom Management when students engage in scientific inquiry activities ( $7.56 \pm 0.56$ ) and of Instructional Strategies ( $7.34 \pm 0.50$ ). Prevalence of mastery experiences and vicarious experiences related behaviors were prominent, yet with less verbal support in principal's instructional leadership based on teachers' perceptions. GLM results showed school type ( $p=.031$ ) and principal instructional leadership ( $r^2 = 0.083$ ,  $p=.007$ ) as significant predictors of teacher self-efficacy in student engagement. Furthermore, self-reported mean self-efficacy in student engagement for scientific inquiry differed across different school types, where it found statistically significant difference between Type 1AB and Type 3 ( $r^2 = 0.187$ ,  $p=.036$ ). Mixed findings of changes in TSE in student engagement need to be empirically supported with further research. Remedial measures have been discussed based on the issuing areas in principal's instructional leadership.

**Key words:** *Self-efficacy, scientific inquiry, Student engagement, Principal's instructional leadership*

- ❖ The extended abstract will be published in the International Research Symposium 2021 Proceedings of the Faculty of Education.

**Effectiveness of family functioning on emotional intelligence in young children**

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The present study aims to access the relationship between family functioning and its effect on developing emotional intelligence of the school children who were in the age group of fifteen and sixteen years. Emotional intelligence (EI) is a relatively new and growing area of behavioral investigation. The study was carried out as a survey; under the descriptive research design and sample included 52 students of both male and female studying in grade 10 and grade 11. Selection of the sample was based on purposive sampling technique. Inclusion and exclusion criteria were considered during the sample selection. All subjects informed consent. Questionnaires for students and interview schedules for parents were administered to gather data which were analyzed quantitatively as well as qualitatively. Quantitative data were analyzed by the SPSS programme. Socio demographic data sheet was used to collect participant's details. Family Functioning Questionnaire (FFQ) and Mangal Emotional Intelligence Inventory (MEII) were used as tools to assess family functioning and emotional intelligence respectively. The main objective of the study was to determine the effectiveness of family functioning and parent child relationship on emotional intelligence in children of fifteen and sixteen years of age. There was a significant and positive effectiveness between family functioning and emotional intelligence of the school going children who were in the age of fifteen and sixteen years. Healthy and positive family functioning plays a vital role in developing high and better emotional intelligence of the school going children. The poor family functioning led to the low emotional intelligence of the children and it caused maladaptive behavioral and emotional problems of the children and affected their academic achievement.

**Key words:** *Family functioning, Emotional Intelligence*

**Study on involvement of online gaming of secondary school students in Sri Lanka**

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Online gaming is defined as playing any type of single or multiplayer commercial digital game via any internet-connected device, including dedicated consoles, desktop computers, laptops, tablets and mobile phones. If a student has access to the internet, he/she can play games over the internet. The opportunities of playing games are higher to students in their homes due to increased internet users in Sri Lanka. Many researchers revealed that online gaming made positive and negative impacts on players and especially affected the performance of students in the schools. The study investigated the availability of devices to play online game among the students, their interest in playing games according to the gender, time spent on online games and types of online games played by students. A total of 100 students in the secondary education at government schools of Sri Lanka were selected as population of the study, using purposive sampling technique. The online questionnaire was used to collect the data. Google form software application was used to create this tool. The findings revealed that 80% of students were familiar with online games and these students used smartphones as playing devices; male students were more involved in online games than female students; 90% of students spent less than an hour per day on playing online games although 10% of students spent two hours or more hours on online games per day. The war games, driving games and puzzle games were popular among the students. These games were played by students for entertainment only and not for educational development. 16% of male students and 27% of female students played online educational games. It can be observed that even though online games are played by Sri Lankan secondary school students, their involvement in the game is less compared to the time they played.

**Keywords:** *online gaming, internet user, school performance, educational field*

**Meeting competency requirements for school leadership through school based management in Sri Lanka: a case study on schools in Jaffna district of Sri Lanka.**

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An efficient education administrative system is a key factor for quality education outcomes. Ministry of Education of Sri Lanka introduced two initiatives recently to ensure efficiency in the school management: Enhanced Programme for School Improvement (EPSI) an updated version of Programme for School Improvement (PSI) that led to the establishment of “balanced control model” of school-based management (SBM) in schools, The latter is National Competency Framework for School Leadership and Management (NCFSLM) which provides structured tools for evaluating the leadership and management competency of the principals. This multiple case study explores into the efficacy of SBM by identifying the impact and implications of its two strategies; devolution of authority for institutional autonomy and, participatory decision making, on the empowerment of school leadership in executing the managerial functions, in terms of their relevance to meet the requirements of the NCFSLM. Two schools from Jaffna district, were purposively selected as maximum variation cases on the basis of School Educational Quality Index (SEQI) of the past three years. The interview data were thematically analyzed and corroborated with documentary survey. The school with high value of SEQI was found to be following SBM practices more formally where the principal, School Development Executive Committee (SDEC) and School Management Team (SMT) members were well informed about the administrative provisions of the EPSI and facilitating managerial functions to improve school outcomes. Participatory decision-making practices in SDEC and self-governance were more formal in the high performing school while the school with low SEQI was found to have these strategies at minimal level in SBM. Participatory decision-making and authority for self-governance were positively linked to the school managerial functions and the school quality outcomes. When managerial functions of the schools were facilitated by the SBM strategies, principals demonstrated high competency in their leadership and management to meet the requirements of NCFSLM.

**Key words:** *School Based Management, National Competency Framework for School Leadership and Management, participatory decision making, education decentralization*

- ❖ The extended abstract will be published in the International Research Symposium 2021 Proceedings of the Faculty of Education.



**Examining the Teachers' Perception of the School-Based Professional Teacher  
Development Programs (SBPTD)**

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As a participatory management process, Enhanced Program for School Improvement (EPSI) facilitates schools with a higher degree of independence in decision making. This program focuses on updating school staff regarding certain functions of the school by providing opportunity for personal development, and improving their skills to meet challenges by facilitating in their professional progress. This study examines the teacher perception of the contribution of School-Based Professional Teacher Development Programs (SBPTD) to the professional development of teachers. The study is based on a sequential explanatory mixed research method. The study was designed using the survey method and case study method and the sample was selected from the Matara Education zone. Twenty-five schools were selected according to the school classification using stratified random sampling for the survey. Four schools of 1AB, 1C, Type 2, and Type 3, were selected for the case study using purposive sampling. Quantitative data were collected using a questionnaire with 250 teachers and qualitative data were collected through interviews and focused group discussions. Key findings of the study were; SBPTD programs have made minimal contribution to the development of the teaching profession. Teachers revealed the outdated nature and inefficiency of the program, negative attitudes of teachers, not using modern technical methods, lack of awareness regarding the programs and the management weaknesses of SBPTD programs. Further, the failure of the programs to function continuously, systematically and uninterruptedly, the scarcity of resources and lack of sufficient financial aids, weaknesses in resource contribution, negative attitudes of principals and ignoring teachers' needs too were identified. Therefore, awareness programmes should be implemented with national-level planning to monitor the programme.

**Keywords:** *SBPTD, Teacher, Professional Development, Perception*

- ❖ The extended abstract will be published in the International Research Symposium 2021 Proceedings of the Faculty of Education.77

**Faculty of Graduate Studies  
University of Colombo**



***Global Cooperation: Reimagining Multilateralism***

**20<sup>th</sup> August 2021**

## MESSAGE FROM THE DEAN

&

## CONFERENCE CHAIR

**Senior Professor Nayani Melegoda**

Dean

Faculty of Graduate Studies

University of Colombo, Sri Lanka



Today, the Faculty of Graduate studies (FGS) of the University of Colombo will hold its Annual Research session on the theme “*Global Cooperation: Reimagining Multilateralism.*” The United Nations (UN) which is mainly instrumental in global cooperation celebrated its 75 years of successful existence amidst great upheaval and peril last year. The agencies of the UN, mainly the World Health Organization has done tremendous work of facilitating vaccination, continuously giving updated health information and guidelines. The conference tracks reflect the profile of FGS as a leading Postgraduate Faculty addressing global solidarity, our planet, the 2030 agenda, multilateralism, and global cooperation in the context of Sri Lanka and country’s way forward in its development work and friends with all policy.

I thank His Excellency Tareq Md Ariful Islam, the High Commissioner for Bangladesh; the keynote speaker, the Secretary, Ministry of Foreign Affairs, Sri Lanka Professor Admiral Jayanath Colombage; Chief Guest and Vice Chancellor of the University of Colombo, Senior Professor Chandrika Wijeyaratne; the guest of honour.

I take this opportunity to place on record, my sincere appreciation to the Vice Chancellor, Registrar, all teaching faculty and postgraduate students and staff of FGS for your wonderful support, love, and friendship extended to me in the past few years.

Thank you.

20<sup>th</sup> August 2021

# FGS ANNUAL RESEARCH CONFERENCE 2021

## REVIEW COMMITTEE

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## **Annual Research Conference 2021**

### **Faculty of Graduate Studies**

### **University of Colombo**

**20<sup>th</sup> August 2021 from 11.00 a.m. to 4.00 p.m.**

#### **Programme**

- 11.00 am:** Commencement of the inauguration by lighting the digital oil lamp
- 11.05 am:** National Anthem
- 11.10 am:** Welcome Speech by  
Senior Professor Nayani Melegoda,  
Dean Faculty of Graduate Studies
- 11.15 am:** Address by Vice Chancellor University of Colombo  
Senior Professor Chandrika N. Wijeyaratne,
- 11.25 am:** Introduction of Chief Guest by  
University of Colombo Symposium Chair  
Senior Professor Priyadarshani Galappathy,  
Head Dept. of Medical Humanities, Faculty of Medicine, University of Colombo
- 11.30 am:** Address by the Chief Guest  
Admiral (Prof.) Jayanath Colombage, Secretary, Foreign Ministry
- 11.45 am:** Introduction of Guest of Honour and Keynote Speaker by  
Dr. Maneesha S. Wanasinghe-Pasqual, Head of Dept. of IR, Faculty of Arts,  
University of Colombo
- 11.50 am:** Address by the Guest of Honour and Keynote Speaker  
His Excellency Tareq Md Ariful Islam, High Commissioner of Bangladesh to  
Sri Lanka
- 12.10 pm:** Vote of Thanks by  
Dr. S. C. Padmakumara, Director of Studies, Faculty of Graduate Studies
- 01.00 pm:**  
to  
**04.00 pm:** Technical Sessions



## INTRODUCTION TO THE KEYNOTE SPEAKER

### **H. E. Mr. Tareq Md Ariful Islam**

High Commissioner of Bangladesh to Sri Lanka

Mr. Tareq Md Ariful Islam joined this position on 28 November 2020.

Prior to taking up the current post, he was the Deputy Permanent Representative in the Permanent Mission of Bangladesh to the United Nations in New York from 2016 to 2020.



Mr. Islam is a career diplomat and joined the Bangladesh Foreign Service in 1998. As for his other assignments abroad, he had another stint (2005-2009) in the Permanent Mission of Bangladesh to the United Nations in New York as First Secretary/Counsellor. He then served in the Bangladesh Deputy High Commission in Kolkata, India (2009-2012) as Counsellor.

He also served in the Ministry of Foreign Affairs of Bangladesh as Director-General (South Asia) and before that in various other capacities, including as Director (South Asia), Director (Foreign Minister's Office) and in the Personnel Wing and the Foreign Secretary's Office.

Mr. Islam takes special interest in the areas of international peace and security, regional cooperation, human rights and migration.

Mr. Islam holds a Master of Diplomacy and Trade from the Monash University, Australia and a Bachelor of Science in Civil Engineering from the Bangladesh University of Engineering and Technology (BUET).

## MESSAGE FROM THE KEYNOTE SPEAKER

I am glad that the Faculty of Graduate Studies, University of Colombo is holding its Annual Research Conference under the theme “Global Cooperation: Reimagining Multilateralism”.

The plethora of global challenges--both traditional and newly emerging ones, exacerbated by the ongoing Covid-19 pandemic, has put multilateralism under tremendous stress. Yet the pandemic is a grim reminder that global cooperation underpinned by a recalibrated multilateralism is still the only way out. This is more relevant for our region, South Asia. The challenges can be better addressed by synthesizing the faculty of researchers, scientists and professionals of our region. So, we need to develop our human resources in the field of research and innovation to attain our shared aspirations. The University of Colombo has been playing an important role in this regard.

The theme of the Conference and its tracks capture the contemporary world’s pressing issues. Bangladesh and Sri Lanka have always been working closely in international and regional fora to promote multilateralism for upholding our common causes particularly those covered under the Conference tracks. In this backdrop, Bangladesh’s Golden Jubilee of Independence and Birth Centenary of the Father of the Nation of Bangladesh, Bangabandhu Sheikh Mujibur Rahman, also come into perspective. I am therefore, delighted to be associated with this event.

I hope that the Conference would stimulate critical thinking and help assimilate research findings in vital areas to the benefit of our countries and region.

I wish the Annual Research Conference 2021 a great success!

## **Xenophobia in the context of COVID-19: An analysis of digital English media reporting in Sri Lanka**

D. U. Dampella

Faculty of Graduate Studies, University of Colombo, Sri Lanka

In Sri Lanka, migration has been a principal solution for poverty, and displacement caused by natural disasters and internal conflict. At the same time, due to recent infrastructure programmes and projects, Sri Lanka is witnessing an increasing number of inbound migrant workers. As a result of movement of persons away from their place of usual residence, xenophobia has come to exist. COVID-19 pandemic has posed itself as a health, socioeconomic and protection crises, particularly exacerbating the already vulnerable situation of migrants. Against this background, this research is undertaken to analyse whether there is a change in the attitudes, prejudices and behavior that exclude and often vilify persons based on the perception that they are foreigners or outsiders with the spread of the COVID-19 pandemic. The research methodology involves data collection by monitoring English digital media, i.e., online news sites, social media, and websites, from 1 January to 30 June 2020. A content analysis of this data is undertaken during which attention is paid to the repeated words and phrases, and metaphors and analogues that imply xenophobia. Preliminary findings of the research suggest that there is an increase in xenophobic attitudes directed at returnee migrants of Sri Lankan origin, in particular those who have been repatriated due to the COVID-19 pandemic. The primary reason for the prevalence of this manifestation of xenophobia is the increasing number of returning migrants testing positive for COVID-19. As there is a general lack of research on xenophobia in Sri Lanka, it is recommended to invest in research which will enable relevant stakeholders to take necessary measures to address the issue.

**Keywords:** *Xenophobia, migration, COVID-19*



**Exploring student engagement in online teaching Initiatives during Covid-19 pandemic: A case study on a private higher education institute**

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Student 'engagement' is critical in higher education as it leads to positive outcomes such as success and development, satisfaction, retention, academic achievement and social engagement of students. In online teaching and learning a variety of computer-mediated options are utilized to deliver the content. Physically separated lecturer and student are linked through technology making student engagement a challenge. The role of online learning in higher education has gained recognition, especially during the Covid-19 pandemic which caused sudden closure of higher educational institutes. Most opted for online teaching during this period. This study aimed at investigating the effectiveness and factors which affect the student engagement during online learning sessions. Based on behaviorism theory of stimulus and response, this research was conducted on two batches of school leavers following fulltime studies at a private higher education institute. One batch has completed their studies through face-to-face learning in a class room while the other batch has completed one semester learning in class room and the second semester through online learning. Pass rates, time spent on Learning Management System (LMS) and Customer Satisfaction Index (CSI) were compared for both batches and faculty members were interviewed to find out their views on effectiveness of online teaching and student engagement. Findings indicate that the students were engaged more with academic work when they are given the opportunity to gain new experiences and perform well in the examinations with better pass rates. A significant difference was not observed between the two sample batches. Lecturers had concerns on lack of experience in online teaching, skills in developing materials and the technological issues. These findings highlight the key focal points to be concerned when designing and developing online study programmes.

**Key Words:** *Student Engagement, Online Teaching / Learning, Higher Education, Covid 19 Pandemic, Teaching Effectiveness*

**Role of Facebook as a tool for Information Dissemination during the COVID-19  
outbreak in  
Sri Lanka**

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<sup>1</sup> Faculty of Graduate Studies, University of Colombo, Sri Lanka

<sup>2</sup> School of Computing, University of Colombo, Sri Lanka

The paper provides empirical evidence, particularly regarding the use of Facebook in the Sri Lankan Epidemic Disaster. This study is undertaken for undergraduates (internet usage is highest in the age bracket 20-24) at state universities in Sri Lanka. The primary goal is to determine the role of Facebook as a tool for information dissemination during the first wave of the COVID-19 outbreak in Sri Lanka. The three particular objectives were to examine the utilization level, determine perceptions and attitudes toward exchanging COVID-19 information, and identify problems. It is a Quantitative study using simple random sampling procedures and a sampling frame (list of students for online learning) 370 students were selected from a total of 9430 students at ABC state university. The data was gathered through an online self-administered survey. The methods employed were descriptive analysis, inferential analysis, and qualitative analysis. Findings revealed that the average intention to use level of Facebook is not different according to gender. ( $P>0.05$ ). Facebook visits per week are different concerning the year of the study of the respondent. ( $P<0.05$ ) However, stay hours per week are not different concerning the respondent's year of study ( $P>0.05$ ). Pearson Correlation Matrix for significant relationships between variables shows that the dependent variable was more moderately positively related to independent variables. According to factor analysis, six variables were linked, and one variable is not linked to COVID-19 information on Facebook. Distributing misleading information, confirming the validity of information, and Accuracy of information were challenges discovered. Also, respondents are unaware of credible sources. The following suggestions were made to increase approved and topic experts' awareness of reputable sources. Because there was a strong link between respondents' socio-demographic characteristics/ attitudes and their desire to use during the COVID-19 outbreak, Facebook should be promoted to disseminate COVID information to build community resilience through social networking and information management.

**Key words:** *Role of Facebook, information dissemination, COVID-19, Resilience*

## Management control response in Covid-19 global pandemic through a change to rolling budgeting

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The covid-19 pandemic has brought in widespread social and economic disruption to countries, organizations, and individuals, and has led to changes in organizational practices across the world. This study examines how management control could support an organization's response to the covid-19 pandemic. While the use of appropriate management control techniques, such as rolling budgets could enable organizations in responding to and managing organizational performance in such a scenario, most companies and managers do not have a clear understanding of how rolling budgeting could be used. As a result, this research attempts to explore how rolling budgeting ideas have been used by companies amid the covid-19 pandemic. The aims of this research are to 1) Identify how companies have moved into rolling budgets and the problems encountered with their existing traditional budgeting system when the environment is uncertain 2) Explore how the selected case study organization adopts rolling budgets within a pandemic situation 3) Identify the benefits of using rolling budgeting, as well as the problems encountered in implementing the rolling budgeting techniques *Methodologically, this research adopts the qualitative methodology and a case study approach, and data are collected* mainly through interviews with organizational members. It uses institutional theory as the theoretical lens. This study would be an important addition to existing management accounting literature in the area of rolling budgets. It provides insights on how management controls could be used in the context of an unexpected emergency and an uncertain environment which is an under-researched area in the accounting literature. Further, the findings would be useful to practicing managers regarding the implementation of rolling budgeting practices when faced with limitations of traditional budgeting during a Covid -19 pandemic.

**Key Words:** *Traditional budgeting, rolling budgeting, Environmental uncertainty, COVID-19, Global pandemic*

## Translation and adaptation of a Dysarthria assessment tool to be used in the Sri Lankan clinical context

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Dysarthria is one of the commonest communication disorder that arise due to neuromuscular damage. Diagnosing dysarthria required careful assessments. In the absence of formal dysarthria assessment in Sri Lankan (SL) clinical context, translated and adapted Sinhala Language Newcastle Dysarthria Assessment Tool (SLN-DAT) was validated using a normative sample. The study was conducted according to 3 objectives using mixed methodology: (I) Identification of the relevant tool using views of 20 Speech and Language Therapists (SLTs) and 20 final year students (II) Initial translation and adaptation into Sinhala language based on WHO tool translation guidelines (III) Face, content and concurrent validity of the tool using 10 experts and 50 normative. Concurrent validity was assessed comparing the scores of Dysarthria Profile (DP) and SLN-DAT. N-DAT was selected as the relevant dysarthria assessment and at the end of the phase II, assessment tool contained all related section of the original N-DAT in Sinhala and adapted its section to suite to SL context. SLN-DAT has the same conceptual meaning, semantics, idiomatic and score equivalences as the original version yet and one additional section related to ICF model. Statistical analyzes showed higher agreement among graders (missing data 0%), including high internal consistency for tool items (Cronbach's  $\alpha = 0.8$ ) including the new sections. Normative performances exhibited a predicted variation among age and tool performance with negative correlation for articulation  $r = -.32$ , respiration  $r = -.70$ , voice  $r = -.33$ , pitch  $r = -.40$  and DDK rates  $r = -.33$ . The concurrent validity of the SLN-DAT was very high for all subsystems. Each subsystem had higher ICC value ranging between  $r = 1.0 - 0.7$ . SLN-DAT had higher face validity, higher internal consistency with items and satisfactory concurrent validity. Therefore, SLN-DAT could be recommended to the SL after it was validated among dysarthria population to identify dysarthria reliability in Sri Lanka.

**Key words:** *Dysarthria, Formal assessment tool, Impairment and Functioning assessing, Sri Lanka, Validity and reliability.*

## Factors Associated with Readiness to Adopt Electronic Medical Records (EMRs) by Ayurvedic Physicians

K.K.P.R.K. Kohombakanda<sup>1</sup>, D. Herath<sup>2</sup>

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<sup>2</sup>ESOFT Metro Campus, Sri Lanka

The advances of Information Communication Technology are contributing to the modern electronic healthcare systems that enhance the well-being and make healthcare systems efficient. EMRs system is an emerging technology that can be exploited to improve the quality of healthcare sector in Sri Lanka. A mixed method was applied in this study and focused on identifying the factors associated with readiness to adopt EMRs by Ayurvedic physicians based on TAM and TOE models. The population and sample sizes are 187 and 127 physicians respectively, who are working in the three main Ayurvedic hospitals located in the Colombo district. Quantitative data was collected through distributing questionnaires and qualitative data was collected through interviews. Before the main study, a pilot study was conducted with the participation of ten Ayurvedic physicians and it helped to validate the research questionnaire. Quantitative data was analyzed using SPSS 23 software package and the T-test, ANOVA test, and Correlation tests were used to analyze the data. More than 99% of Ayurvedic physicians are willing to use EMRs if they have access to EMRs. All the correlations were significant ( $p < 0.05$  in all cases), confirmed all hypotheses to be true and indicated a positive relationship between PU ( $r = 0.663$ ,  $p < 0.05$ ), PEOU ( $r = 0.491$ ,  $p < 0.05$ ), Technological factor ( $r = 0.407$ ,  $p < 0.05$ ), Organizational factor ( $r = 0.240$ ,  $p < 0.05$ ), Environmental factor ( $r = 0.422$ ,  $p < 0.05$ ) with EMRs adoption. Further Ayurvedic physicians believe that PU, PEOU, Technological, Organizational and Environmental factors are very important for EMRs adoption among Ayurvedic physicians. The findings of this study indicate, defined factors are significant and influencing EMRs adoption among Ayurvedic physicians and the study provide valuable insights for researchers, policymakers, and managers of healthcare domain to make more effective decisions about adoption and use of EMRs in the Ayurvedic healthcare sector.

**Keywords:** *Electronic Medical Records (EMRs), Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Technology Acceptance Model (TAM), Technological, Organizational, Environmental (TOE)*

## Response to Covid 19- A Global perspective

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The object of this paper is to create a greater awareness among the participants such as; students and academics on Covid 19 and the steps the global medical community has taken so far to contain the spread of the disease. COVID-19 is an infectious disease caused by a newly discovered coronavirus in China, towards the latter part of 2019. The cumulative number of Covid 19 cases reported globally is now over 192 million and the number of deaths globally exceeds 4 million, as at May, 2021. It has been observed that pandemics in history came in multiple waves like, the first wave of the bubonic plague overwhelmed Europe in the 1300s, killing between 35% and 65% of the population. The second wave more virulent strain than the first devastated Europe in the 1500s and then a third in the 1800s. It has now been established that the 1st, 2nd, 3rd and the 4th Corona 19 waves are evident in many parts of the world. For example, Sri Lanka is said to be experiencing the 3rd Corona 19 wave, currently. The World Health Organization (WHO) has been perusing mutations and variants since the COVID-19 outbreak. It also operates a global SARS-CoV-2 laboratory network, manned by senior scientists, virologists and Virus Evolution Working Group and has set-up a fund, supported by many other organizations. The WHO is also a certifying body for Covid-19 vaccines and so far, it has approved Astra Zeneca, Modena and Pfizer brands for extensive use and Sinopharm and Covax for emergency use. Therapeutic approaches include Antivirals, Protease inhibitors, Lopinavir, Ritonavir, Nucleotide Analogs, Remdesivir and Favipiravir. This paper is solely based on secondary data, sourced primarily from the Internet.

**Key words:** *Coronavirus, Pandemic, Covid-19, Laboratory-grown and paradigmatic*

## Experiences of Public Health Inspectors of Sri Lanka as front liners battling COVID-19 Pandemic

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COVID-19 Pandemic has negatively impacted on healthcare systems worldwide and created enormous negative level experiences to frontline healthcare workers. The aim of this study is to explore the experiences of the Public Health Care Inspectors (PHIs) engaged in COVID-19 job duties, in Sri Lanka. Extant research conducted around the experiences of the frontline healthcare workers during the COVID-19 pandemic is largely focused on western hospital-based healthcare personnel. This study also aims to contribute to the scant body of research on community-based healthcare workers battling COVID-19 pandemic. Following a qualitative approach and using the theoretical lens of Job Demand-Resources theory (JDRT), preliminary investigations were conducted with 10 PHIs through in-depth semi structured interviews. Interviews which were conducted in Sinhala were transcribed verbatim and translated to English subsequently. Data analysis was done using thematic analysis. PHI's experiences included, work pressures, unclear authority and legal provisions, limited rewards and recognition, and workload. Work pressures included issues in support systems, lack of training, resource constraints and perceived risks of direct exposure to the virus as well as confronting emotionally charged public. Unclear authority and legal provisions included contradicting orders from multiple sources, delays in updating circulars and limited communication of the changed guidelines. Limited rewards and recognition included inadequacy of pay compared to their contribution and workload, cuts in overtime pay, non-payment of a risk allowance, non-reimbursement of expenses and lack of recognition by the authorities. Workload included multiplied job duties within the scope of their job such as working extended hours, and out of the scope duties such as fulfilling the daily needs to public under quarantine. Overall, discussions with the respondents revealed that although they understand the importance of their job during the pandemic, their experiences mostly represented hindrances according to the JDRT which impacted on their job performance and goal attainment.

**Keywords:** Covid-19 pandemic, Community healthcare workers, Job demand-resources

## **Vocabulary and reading skills development: clinical implication for treatment of children**

### **With dyslexia.**

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To systematically review the currently available literature to identify the importance of vocabulary for the improvement of reading skills in children with dyslexia. This systematic review utilized the Preferred Reporting Items for Systematic Reviews and Meta-Analysis protocol (PRISMA-P, 2015). Relevant studies were identified in the electronic data bases of published peer-reviewed scientific journals. The search strings created with the key words were used to complete the search which yielded 119 articles. After screening the titles and abstracts of articles according to inclusion and exclusion criteria, 48 articles relevant to the research objective were identified. A quality assessment of the 48 articles was independently conducted by two researchers. Fourteen articles identified as very satisfactory were include in the study. Extraction and synthesis of data was completed by summarizing the information from selected 14 articles. Data analysis was completed through a qualitative cross-case data analysis approach. Both theoretical and empirical research suggest that children with dyslexia who have strong vocabulary compensate for inadequate decoding skills associated with weak phonological skills. Therefore, literature strongly suggests that vocabulary needs to be a key component in an early reading intervention programme for children with dyslexia. Overall, our findings show that the vocabulary skills are a reliable predictor of reading development in both alphabetic and non-alphabetic languages and that good vocabulary skills help to compensate for weaknesses in the decoding skills of children at risk of manifesting dyslexia. Therefore, it can be concluded that vocabulary skills can make a vital contribution to clinically implemented reading intervention programmes for children at risk of manifesting dyslexia.

**Key words:** *Vocabulary, reading development, dyslexia, alphabetic languages, non-alphabetic languages.*



**In vitro antioxidant capacity of Sri Lankan traditional herbal lincture for neurodegenerative disease**

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*Kaluduru Tippili Leha* is a compound herbal lincture from Sri Lankan traditional medicine comprised of *Nigella sativa* L. seeds and *Piper longum* L. fruits (main ingredients), Bees honey, and fresh juice of *Punicagranatum* L. seeds (minor ingredients). It has been using more than fifteen decades due to its safety profiles to combating speech problems due to disturbances in neuromuscular control by stroke. In the present study, an attempt was done to evaluate *in vitro* antioxidant activities of cold water and cold ethanol extract of test drug were assessed using six *in vitro* assays [DPPH (1,1-diphenyl-2-picrylhydrazyl), ABTS (2,2-azino-bis-3-ethylbenzothiazoline-6-sulfonic acid), FRAP (ferric reducing antioxidant power), ORAC (oxygen radical absorption capacity), Total polyphenol content and total flavonoid content. It was observed that IC<sub>50</sub> of DPPH was 2416±33 and 2168±41 µg/mL for cold water and cold ethanolic extract respectively and IC<sub>50</sub> of ABTS was 575.22±8.3 and 445.5±2.4 µg/ml for cold water and cold ethanolic extract respectively. It was noticed that the scavenging ability of the drug was weak. In FRAP assay, high antioxidant activity was observed in cold water extract (130.05±4.48 mg Trolox equivalents/ g of extract) of the drug compared to that of cold ethanolic extract (11.089 ±1.346 mg Trolox equivalents/ g of extract). Moreover, peroxy radicals scavenging ability of the cold water extract and the cold ethanol extract were 2.821±0.215 and 1.044 ±0.041 mg trolox equivalent/g extract respectively. TPC of cold water and cold ethanolic extracts of the drug were 2.929 ±0.017 and 2.007±0.041 mg gallic acid equivalent/g of extract respectively while TFC of cold water and cold ethanolic extracts of the drug were 37.40±0.82 and 11.67±1.64 mg quercetin equivalent/g of extract respectively. In conclusion, traditional herbal lincture is shown moderate antioxidant properties. However, DPPH and ABTS scavenging abilities were low in cold extracts of the drug.

**Keywords:** *Phyto-medicine, Neurogenesis, Dysarthria, Antioxidant, Traditional medicine*

## Why the decrease in rubber smallholders: A case study in the Gampaha District

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Rubber trees (*Hevea brasiliensis*) primarily serve for the natural rubber industry. In addition, they provide many ecosystem services while mitigating climate change effects through carbon storage. In Sri Lanka, small holders contribute to two thirds of the natural rubber production, hence their continuous engagement in rubber industry is vital. It is evident that the country's rubber production is declining at present, hence this study was conducted to identify key reasons for the decreasing interest of smallholders in maintaining their rubber lands. Hundred and fifty smallholders from twelve divisional secretarial divisions in the Gampaha district were interviewed using a structured questionnaire. Data were analysed descriptively, through Spearman's correlation coefficient and multiple regression analysis using Statistical Package of Social Science (SPSS) at  $P < 0.05$ . The uncertainty in the rubber price was a major cause for smallholder's engagement with rubber lands. Shortage of skilled tappers, fluctuation of yield due to weather, less exposure to training programs on land productivity management, low income during the first five years after planting, insufficient benefits form community-based rubber societies and least support from young generation have been the common reasons. Regression analysis identified that socio-economics factors ( $X_1$ ), rubber productivity in the land ( $X_2$ ), skill labour availability ( $X_3$ ) and rubber price ( $X_4$ ) show strong positive relationships with the latex yield ( $Y$ ) and the following equation was derived using unstandardized coefficient values,  $Y = 0.031 + (0.088) X_1 + (0.385) X_2 + (0.499) X_3 + (0.044) X_4$ . Introduction of a controlled rubber price, increase social recognition for growers through performance appraisal rewards system, engagement of youth, development of IT based communication network, knowledge enhancement and skill development in tapping, farm management and land productivity, and imposing a ban for the use of rubber lands for any other developmental purposes are suggested to strengthen the bond between the smallholders and their rubber lands.

**Key words:** Rubber, smallholders, Gampaha District, Sri Lanka

## **Eco-centric approach to design Landscapes: A theoretical framework for ensuring sustainability in Landscape Architecture**

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Human lifestyles have increasingly impacted negatively on surrounding landscapes and environment elsewhere. As a result, human-modified landscapes have been continually deteriorated in spite of the large amount of money dumped on designed landscapes and maintenance. But the goals of landscaping to improve the functions and ecosystem services have not been achieved. The key underlying cause has been the fact that landscape planning and designing processes have failed to understand that humanity is only a part of the 'nature' which is governed by ecological theories. Integration of ecological theories into landscape and architectural designs provides creative solutions to mitigate environmental problems. Although ecology and landscape architecture subjects have been considered as two different disciplines in teaching and learning processes in the past, their synchrony in achieving sustainability has put them together in the recent years. Identification, analysis and synthesis of ecological theories and impact to the design process become prominent in design pedagogy. The two questions that need to be addressed in formulation of theoretical framework are (i) what is the theoretical extent of ecological approach that can be incorporated with the landscape architecture design (ii) how to evaluate significant impacts of the ecological approach in various levels of the landscape architecture designs. The framework matrix of eco-centric landscape design is based on an ecological understanding of landscape which ensures a **holistic, dynamic, responsive and intuitive** approach. Ecological landscape design is guided by three fundamental, mutually inclusive objectives: the maintenance of landscape integrity; promoting landscape sustainability; and reinforcing the natural and cultural spirit of place. Ecological landscape design engages the designer's rational, intellectual, emotional and creative capabilities. The following are the steps required, When developing a framework i) to examine and identify key ecological principles related with the design concept, ii) to consider key variables in the design process, iii) to list the constraints and variables of ecosystems that might be relevant to the study, iv) review related ecological applications to find the design solutions in the given context, v) to identify the potentials and possibilities to further improvements to ensure the sustainability. This paper reviews eco-centric approach theories and principles with other emerging implications and matured ecosystem-based theories and principles. The purpose of this analysis is to formulate a theoretical framework for Ensuring Sustainability in Landscape Architecture Designs (ES-LAND).

**Key words:** *eco-centric approach, ensuring sustainability, landscape architecture, theoretical framework*

**Towards sustainable electronic waste management: theoretical relevance of the  
Environmentally Significant Behaviour.**

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Electronic waste (e-waste) generation is currently on the rise having serious negative effects on human health and the environment. Despite the international treaties and national level programmes, the recycling efforts of people are still at unsatisfactory levels. In 2019, 80% of the global generation of e-waste was not recycled -owing to human behaviour as one of the determinants of the participation in recycling efforts. Therefore, this research aimed to identify the common behavioural factors of people that are necessary to ensure participation in e-waste management to assist in creating sustainable e-waste management programmes. A qualitative approach was undertaken, and the Theory of Environmentally Significant Behaviour (ESB) was applied to analyse the human behaviour on e-waste management. Secondary data for the study were obtained from the scholarly articles and selected country reports. To identify common behavioural factors among countries with heterogeneous development levels, Brazil, China, India, Indonesia, Nigeria, South Africa, Vietnam, and the United States of America were selected for analysis. Considering the causal factors (attitudes, personal capabilities, contextual factors and habit/routine) of ESB, attitude is a factor within the individual locus of control, absence of which appeared in 6 out of the 8 countries under analysis. People are believed to engage in the appropriate behaviour if they have a positive attitude (values, beliefs, and norms) towards it. Even within attitudes, personal norms are found to be better predictors of pro-environmental behaviour. Strengthening the attitudes through personal norms increases the sense of individual responsibility governing the overall behaviour in e-waste management. Therefore, governments and relevant authorities are encouraged to prioritize and integrate the proper attitude-building initiatives in local e-waste management policies. Furthermore, creating an enabling environment for community participation in local e-waste management is encouraged.

**Keywords:** *E-waste Management, Environmentally Significant Behaviour, Attitude, Personal norms.*

**Neo-Multilateralism through Regional Organizations: European Union's protagonist role in Climate multilateralism**

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The Multilateral agenda of post-World War II created a new episode, strengthening global governance and international cooperation among States in an unstable world. Multilateralism is a game of power relations, where powerful nations have a stronger voice in common concerns of the world. The European Union (EU) has influenced the global-governance for decades, gaining position as key player on the international stage. With climate change entering the international political agenda as a crucial area for multilateral intervention, the EU strived to become protagonist in international climate governance, achieving its status within the global multilateral framework through its climate interventions. Adopting a qualitative methodology, and through a wide range of secondary data sources, the study examines the importance of EU's protagonist role as a Regional Organization, in creating neo-multilateralism through climate multilateralism, in the current multiplex world order. Today's multiplex nature of the international system challenges multilateralism; its malfunctioning neglects urgent global issues such as climate action. Lack of intergovernmental cooperation indicates that traditional multilateralism among States has become obsolete. Environmental protection and climate action are at the heart of the EU's multilateral cooperation (EU, 2012). The EU's institutional foundation and position among great powers, explain its natural capacity to be a pivotal player in the multilateral order. The European Commission President stated 'multilateralism is in Europe's DNA' (European Parliament, 2021), emphasizing the EU's surging role to establish a neo-multilateral order. The study revealed that the EU, could play a protagonist role in climate multilateralism; and Regional Organizations who are non-state actors could become prominent actors and key decision-making partners in a multilateral system to strengthen global governance when states fail to act. The study emphasizes that Regional Organization's leadership role is crucial for the reviving of the contemporary multilateral order and the creation of a neo-multilateralism.

**Keywords:** *Multilateralism, European Union, Climate-Multilateralism, Neo-Multilateralism.*

**Food safety and Sustainable Development Goals.**Malavige K.G. Jeewanthi<sup>1</sup>, M.D Kumudunie Kaneshika<sup>2</sup><sup>1</sup>Department of Legal Studies, Faculty of Humanities & Social Science,  
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The United Nations adopted the Sustainable Development Goals (SDGs) in 2015, with the goal of ending poverty, protecting the environment, and ensuring peace and prosperity for all by 2030 and these SDGs includes 17 core goals and 169 specific targets. The consumption of safe food is a primary determinant of human health and this requirement has been recognized as a human right in major international human rights instruments. Despite the fact that the Food Borne Diseases (FBD) are identified as a serious problem to human health, SDGs do not include a specific target or focus on food safety. An indirect relationship between the food safety and SDGs can be identified under three SDGs namely Zero Hunger (SDG 2), Good health and wellbeing (SDG 3) and clean water and sanitation (SDG 6). Literature suggests that, this could be due to the lack of a worldwide assessment of the FBD when crafting the SDGs or a lack of law understanding of the FBD among development stakeholders. In this context, main goal of this research paper is to identify global trends in addressing the issue of food safety and the progress made thus far in meeting the SDGs for this issue by 2030. This is a normative study, meaning the researcher based her findings solely on the secondary sources on the topic of food safety. In conclusion it can be note that the path to reaching the SDGs by 2030 has been significantly delayed by the emerging difficulties of the Covid-19, and the World Health Organization and Food and Agricultural Organization, as responsible agencies, are working on this issue with the goal of adding food safety as an SDG indicator by 2025.

**Key Words:** *Food Safety, Sustainable Development Goals, Right to Food*

**Evaluation of ‘greenness’ in the manufacture of ribbed smoke Rubber sheets by SMEs:**

**A case study**

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Smallholders engage in manufacturing ribbed smoked rubber sheets (RSS) at small and medium scale level enterprises (SMEs). The ‘greenness’ (manufacturing efficacy, profitability and benefits to people and the planet) was assessed using a questionnaire survey (n=60) in Kalutara, Kegalle, Gampaha and Kurunegala districts focusing on material recycling, minimization of hazards, energy and wastes, skilled labour and safety, optimum resource usage and cost effectiveness. Data were analyzed using SPSS software. Skilled labour was mainly provided by males >60 yrs. Only 15% processing centers were in par with recommendations of manufacturing of high quality RSS (grade1) which are sold at a high price. Although SMEs had a good networking among latex suppliers, they were not checking the quality of latex being brought. Costing aspects were neglected other than the cost for chemicals. SMEs were aware of the safety aspects during the use of chemicals, maintenance of machinery but not aware on production efficacy, optimization of resource use, minimization of smoke emissions, hazards and risks in the working environment, release of waste products, saving energy and water, use of ecofriendly material for wrapping, multitask storage and transportation. The reasons for their poor knowledge in greening aspects could be due to their ‘trial and error’ working pattern, negligence on the recommendations provided, and not getting involvement of the younger generation, who may be much aware of the aspects given above. SMEs involved in rubber latex processing are not ‘green’, hence conducting awareness on cost effectiveness, material use efficacy, minimization of environmental impacts during production and strict adherence to recommendations is vital for the efficiency, profitability and sustainability of the sheet rubber manufacturing SME’s. Accelerating Higher Education Expansion and Development (AHEAD) Operation of the Ministry of Higher Education, Sri Lanka funded by the World Bank is acknowledged for financial assistance.

**Key words:** *greenness, rubber, latex, Sri Lanka*

## Examining Factors influencing Employee Motivation: A Study of the Insurance Industry in Sri Lanka

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The commitment of employees to a company is the result of motivation and work satisfaction. Employees are motivated by this enthusiasm. Without motivation, it would be difficult to achieve goals and organizational effectiveness. Therefore, every organization plans and strategy in a competitive business climate. Increasingly, organizations are recognizing the need to identify employee motivating elements in order to remain competitive and thrive in today's business environment. The study objectives were to (1) identify the motivating factors that drive the organization's employees. (2) provide top management with a thorough grasp of the importance of motivational factors in increasing productivity. (3) determine what motivates employees in the insurance sector the most and what motivates them the least. In this study, data was collected from 260 respondents using a questionnaire method. Primary and secondary resources were used to obtain the data. Secondary data was gathered from books, textbooks, online databases, and periodicals. Factor analysis has been performed to identify the motivational factors for employees in the industry. From the obtained results, promotion opportunities, financial benefits, appreciation and recognition, personal satisfaction, job environment, and empowerment were identified as the major elements of employee motivation in the organization. Furthermore, the results revealed that personal satisfaction is the most motivating factor for employees in the insurance business, while the job environment is the least motivating factor. Based on the conclusions of this study, it is determined that management personnel should make a concerted effort to identify the organization's motivating factors, since this has a direct influence on the organization's performance.

**Keywords:** *Employee Motivation, Work Satisfaction, Motivational Factors, Personal Satisfaction, Organization's Performance.*



**Mutual collaboration among institutions in accelerating progress achieving sustainable development goals**

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In 2015, governments of 193 countries around the world, representing five continents, have agreed upon committing to achieve 17 sustainable development goals by 2030, which encompassed development challenges such as poverty, hunger, health, education, sanitation, gender equality, climate, environment, and ultimately economic growth. At this point in time, almost 7 years have passed and the need for an accelerated action plan has become crucial to achieve the agreed outcome within the targeted planning horizon. The stakeholder governments have their respective plans in ways which are appropriate to their own social economic strengths and opportunities. The objective of this study is to identify and evaluate the potential strategies that could be followed to accelerate the mission towards achieving sustainable development goals by 2030 with the mutual cooperation among the institutions in Sri Lankan context. In order to achieve this objective, this paper would discuss about the current challenges faced by the institutions alone within the countries during the process so far and strategies followed by the other countries integrating institutions previously in their growth periods as well as the steps followed by the governments who are about to achieve their sustainable development goals and objectives. Information was gathered from secondary data sources, utilizing both qualitative and quantitative research aspects by following mixed method in analyzing data. This study recommends that strategies and steps to be followed by the responsible authorities to achieve suggested outcomes. Also, it evaluates the progressive measures taken by the respective governments in order to ensure the desired outcome as well as a strategic time and action plan in acceleration of the progress of sustainable development goals. Similarly, the outcome and recommendation of this study is not limited to the Sri Lankan context, but also applicable to other countries which share homogenous characteristics adopted in developing pathways.

**Key words:** *Sustainable development goals, strategies, Homogenous, Strengths, Opportunities*

**Review of literature on the importance of different formative assessment strategies  
for an effective and collaborative teaching learning environment**

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Formative assessment is considered as a continuous process which is designed to involve both of the teachers and the students to assess where they are in the learning process and teachers to identify the instructional activities on students' performance. Therefore, it should be clearly identified the formative assessment strategies which support to create effective teaching and learning environment. The main objective was to investigate effective formative assessment strategies that can be used by the teachers in their classrooms. This study used the methods for conducting systematic literature reviews in the social sciences described by Petticrew and Roberts (2008). Accordingly, this literature review mainly focused on online research articles and books that investigated the formative assessment strategies. The information extracted from selected articles was organized according to the objectives of the study. The data analysis was done using the thematic analysis. Literature mainly pointed out ten sets of varied key strategies on formative assessment which have been presented by different researchers from 2004 to 2020. Some of the researchers such as Stiggins, Arter, Chappuis and Chappuis (2004), Tierney and Charland (2007), William and Thompson (2008), Assessment Reform Group, UK (2013), Magno & Lizda (2015), Wylie and Lyon (2016), Chappuis (2017), Moss and Brookhart (2019) and Figa et.al (2020) have presented varied formative assessment strategies and highlighted its importance for creating effective teaching learning environment. However when considered most commonly used strategies by each researcher, it was found four key strategies on formative assessment: providing clear learning targets and success criteria, collecting evidence of learning through various forms of assessment, providing descriptive and constructive feedback on student performance and using self and peer assessment for further improvement on student learning. These findings clearly show the importance of different formative assessment strategies to establish an effective and collaborative teaching learning environment.

**Key words:** *Formative assessment strategies, Effective, Collaborative, Teaching learning environment*

**Family businesses as a vehicle for sustainable development: Evidence from a Sri Lankan : case study**

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This research aims to explore how a family business (named as TipToes Company) implements strategies embedding sustainability concept, while contributing to the achievement of Sustainable Development Goals (SDGs). The selected organization for the study, TipToes Company is a family business which has been operating successfully for several generations consecutively for over 50 years. It is a leading footwear manufacturing company in Sri Lanka which has expanded its operations in a variety of sectors. A qualitative research methodology with a case study approach was followed in this study incorporating interviews with 15 top level and middle level managers which comprise family and non-family members. Furthermore, documentary analysis was also carried out in order to verify the interview data obtained. It was evident that this family business embeds the concept of sustainability and aids in achieving SDGs. For instance, it was observed that TipToes Company takes initiatives for reducing poverty and reducing hunger through provision of job opportunities for people of different social and economic backgrounds. Furthermore, as a company which is deeply rooted in its values, TipToes Company provides facilities for employees to enjoy a decent work environment. The company has invested in a hydro power plant, thus assists in generating affordable and clean energy. Furthermore, a highly qualified professional team is engaged in research activities in order to come up with new designs, reduce cost and to suggest sustainable production processes which ensures fostering innovation and adopting responsible consumption and production practices. All these measures would contribute towards sustainable economic growth. However, the contribution of family businesses in achieving SDGs could be further enhanced through provision of policy support and basic infrastructure from the government and relevant authorities as well as access to finance through banks.

**Key Words:** *Family Business; Sustainable Development Goals (SDGs); Case study; Strategies; Sustainable Growth*

**Leaving the diversity behind: The Impact of criminalizing same-sex relationships on sustainable development goals**

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The underpinning motto of sustainable development goals (SDGs) ‘leave no one behind’ principle is specifically applicable to LGBTQI people, who have been continuously left behind by national as well as international development initiatives. This principle is especially relevant for lesbian, gay, bisexual, transgender, queer, and intersex (LGBTQI) persons that are systematically excluded from the society based on their real or perceived sexual orientation, gender identity, and expression, and sex characteristics (SOGIESC). In September 2015, the United Nations General Assembly Resolution 70/1, outlined the SGD goals- a set of 17 goals and 169 targets to advance sustainable development by 2030. Since, LGBT people are often seen as gender transgressors and gender deviants by other members of society, breaking gender norms is often perceived as a threat that can be punished through social sanctions (Schilt and Westbrook, 2009). Mainly discriminatory laws and policies that are unable to address their specific needs and social attitudes hold LGBT people back. Further, the cultures have been deeply embedded homophobic and transphobic attitudes towards LGBTQI individuals. The unacceptable repercussions of these actions are, LGBT people in all parts of the world are experiencing lower-income, gender inequalities, worse health, less education, and so forth. Among these consequences, this doctrinal research will address how criminalizing of the same-sex relationship of LGBT community affect SDGs in a country with special reference to the context of Sri Lanka.

***Key words:*** Decriminalization, Gender Equality, LGBT people, Discriminatory Laws

**Study on challenges faced by non-state universities in adopting online tools: with special reference to ABC University**

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The adoption of online tools in higher education around the world has dramatically increased with the Covid-19 pandemic and it's a challenge to many non-state universities. Hence, the research problem emerged as; "while Sri Lankan non-state universities use some online tools; they do not seem to get the maximum advantage out of these tools. Moreover, there is no substantial framework developed with respect to Sri Lankan non-state university context to provide guidelines to overcome these challenges." Main research objective is to explore challenges faced by non-state universities in adopting online tools and provide recommendations. Research has been formulated under the Yin's case study methodology. A multi-disciplinary non-state university depicted as "ABC University" is selected for the study. Within the total population of 32 academics and 835 students, the total academic population and 471 students were selected based on the convenient sampling with reference to the Morgan table of sampling aligning with the deductive approach mixed strategy adopted with interviews and online surveys for the data collection. Based on literature review a conceptual model and hypothesis are derived. The collected data analyzed and the quantitative evidence indicates 67% of students and 52% of academics experiencing challenges adopting online tools. Hypothesis tested using spearman correlation and qualitative analysis in line with thematic content analysis. Results indicated module types, IT infrastructure issues and user training are the challenges of ABC university. In addressing these challenges, it is recommended to utilize interactive slideshows wherever possible, deployment of specific tools for challenging modules and interactive portal implementation to develop academic relationships between academics and students. Conducting well structured training while enhancing IT infrastructure would entail the social interaction and better understanding of online tools. Finally, further steps need to be taken to enhance mental wellbeing to mitigate the negatives of the IT driven applications.

**Keywords:** *online tools, non-state university, challenges, framework*

**User satisfaction with the Information Management System for a sustainable  
development in the Public Sector in Sri Lanka**

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This research evaluated the user satisfaction of Pension Information Processing Management System (PIPMS) in Sri Lanka. The main objective of this research is to determine the factors associated with the user satisfaction of PIPMS. The dependent variable is the user satisfaction, and the independent variables are information accuracy, system quality, service quality, infrastructure, personal characteristics of the users. Head office users, District Secretarial office users, and other public office users are the three main group of users of PIPMS. In this research the data were collected from other public office PIPMS users. Data were collected from a questionnaire mailed to a sample of 364 other public officers. A simple random sampling technique used to select the other public officers. The response rate is about 85%. Based on the descriptive analysis, the average satisfaction of other public officer users is 3.25 (out of 5) and the standard deviation is 0.98. So, most of the PIPMS users in the other public office users are fairly satisfies with the system. Most of the PIPMS users in the other public office users believe that the PIPMS is a successful system, and they are comfortable with the features of the system. About 50% of the users are females. From the inferential analysis it was found that user satisfaction is varying with the user's age, gender, level of education, designation, work tenure, department tenure, computer training. Furthermore, user satisfaction is varying with the information accuracy, system quality, service quality, and infrastructure. Support services, the accuracy of the system information, the integrity of the system without constant crashes, the ability to easily connect to the system using any device, and the security of the information system directly increase the user satisfaction.

**Keywords:** *Information System, Public Sector, Satisfaction, Sustainable Development*

**Employee engagement in Public Institutions, myth and factors; A case of a selected Public Sector Establishment**

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Employee engagement has been recognized as a key concept for the organizational success. To understand the nature of the employee engagement in the public sector, determinants such as job satisfaction and sub variables such as working conditions, job security, pay and benefits and training and development, concepts have been explored in this study. With respect to the research problem of poor employee engagement in public sector will be examined in line with the objectives of identifying the impact of the contextual factors of job satisfaction in the public sector on the employee engagement and to generate prospective mechanism to enhance organizational performance. This study will support the government sector to uplift the service standard through employee engagement. Population has been recognized with reference to the executives of selected public sector establishment's head office. This study would entail organization to recognize possible factors which would enhance employee engagement; similarly this would enhance the extent of empirical evidence especially in local context. Finally, this would address to the knowledge gap and the unveiled theoretical considerations. A deductive approach and quantitative method was applied, and sample population was 80 from total population of 102 and Regression analysis was utilized for the purpose of analysis. According to the analysis except the factors working conditions and job security other two variables of the job satisfaction (Pay and benefits, training and development has values of less than 0.05 level of significance), Thus, they have a significant impact on the job engagement. It is recommended that by managing the pay and benefits systems that are currently in place and resourcing and focusing more on training and development, employee engagement in the workplace can be increased and improved, thereby enhancing organizational performance.

**Key words:** *Employee Engagement, Job satisfaction, Pay and Benefit, Public Sector, Training and Development*

## Generation Z: Expectations on Employment and Career Paths in Sri Lanka

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The front end of the Generation Z (born after 1995) is just beginning to start their careers. In a western global context, the Generation Z (Gen Z) was born to a world highly dependent upon digital technology. Not only they are comfortable with digital devices, but they draw their information, entertainment and education through digital devices and digital media as well, which makes the Generation Z lot more computer literate. As an independent and entrepreneurial generation, Gen Z career pathways are still arguable. In the Sri Lankan context if all employment sectors are taken into consideration these characteristics of the Gen Z may not be directly applicable. Empirical survey reports that fifty percent of Gen Z digital natives are drawn toward working in the tech industry rating technology as a top priority. With Gen Z entering the labor market and digital environment becoming a top priority, Sri Lanka's ICT industry has the greatest potential, especially in providing decent job opportunities in this field. Today the ICT industry is one of the most dynamic and fastest growing sub sectors in the national economy creating many young breadwinners. However, recent research work made several important observations with respect to the availability of skills for growth and competitiveness for the ICT sector under review and identified the scarcity of three areas of skills namely, cognitive skills, soft skills, and technical skills. To have a globally comparative ICT sector it is imperative that the demands of both the ICT sector employer, and the Gen Z potential employee must synchronize. It is fair to conclude that there is a potential mismatch of technical skills, cognitive skills and soft skills possessed among the potential workforce of the ICT industry and this mismatch needs to be adjusted in order to have the vibrant ICT sector in Sri Lanka which could be the most sought out employer for the Gen Z.

**Keywords:** *Generation Z, Career Expectations, ICT industry, Employability, Skills*



## Teacher personal practice theories on implementing formative assessments in classrooms

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This research study analyses personal practice theories of teachers, which guide their pedagogical practices in the context of implementing classroom assessments of English language teaching subject. Analysis of contextual factors, and teacher related factors that cause the teachers to implement assessments of their selection and during the process how their professional identity is formed are the objectives of this research study. The preliminary investigations revealed that teachers implement summative evaluations more often than formative assessments. Thus, the survey questionnaire was designed to single out the formative assessment features at a micro level within classroom pedagogical practices. Semi structured interviews were conducted to analyze the extent to which the contextual factors like type of the school, the assessment protocol of the school and teacher related factors, teacher's knowledge and experience, past language learning experience influence their implementation of formative assessments. Document analyses was conducted to analyze the extent to which the teachers' pedagogical practices are aligned and guided by the prescribed curricular content. The survey questionnaire was administered to 257 teachers of English in the Central province and the participants returned 182 questionnaires. In depth analyses of the survey questionnaire revealed that teachers carry out School Based Assessments (SBA) as well as monthly tests and unit tests. It was revealed that 68% of the schools highlighted summative assessment protocol in their schools and implemented lesson evaluations after the teaching sessions. It is recommended that the classroom assessment protocol need to be a combination of efforts of the teacher, the school and the departmental officials. A change of protocol of practice of the teachers in implementing classroom assessments need to be highlighted to form professional identity of the teacher.

**Key Words:** *Teacher personal practice theories, formative assessments, sustainable assessment practices, English Language Teaching, professional identity*

## Financial Literacy and Debt trap of SMEs in the Northern Province of Sri Lanka

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According to the report of Department of Census and Statistics, Sri Lanka has notable rate for print literacy. As of 2018, the adult literacy rate is at 92% and Sri Lanka is the most literate country in South Asia. Considering this, it is surprising to discover that Sri Lanka's financial literacy rate is only 35% according to Standard & Poor's Global Financial Literacy Survey 2018. This clearly indicates that, there is further scope to promote financial literacy among Sri Lankans, and despite of the well-developed financial system with financial infrastructure, many investors still struggle to use these advancements effectively. The purpose of this study is to identify the level of financial literacy among SME entrepreneurs and understand the impact of that on the financial behavior of entrepreneurs and the level of debt trap of the SME sector particularly in the Northern Province. Focusing on to the Labour Force Survey results as of 2019, of the Department of Census and Statistics, the Northern Province has a higher level of unemployment, lack of labour force participation and poverty in comparison to all other provinces. Further, the survey conducted by Central Bank in 2016, the report indicates that the indebtedness has sharply increased in the Northern Region. This study would help the entrepreneurs and the financial institutions to improve their decision-making and also support the regulatory and government institutions in developing policies for SMEs to overcome their financial distress. The study contributes to the existing literature on behavioral finance, where it incorporates the level of financial literacy to the Prospect Theory (PT) developed by Daniel Kahneman and Amos Tversky in 1979, where relating the two different stages of decision specifically to the SME sector. This study will be a cross sectional descriptive survey, conducted during a particular time. The respondents will represent the SMEs of the various industries, located in five districts of the Northern Province.

**Keywords:** *financial literacy, financial distress, small and medium enterprises, behavioral finance, financial decision making*

**Dynamics of communication platform based secondary education; A study in a school in Colombo district**

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Use of technology in education has rapidly increased in the recent years. With the advancement of technologies, the pedagogical techniques have been altered. However, the incorporation of solely technology-based education system is not common in the secondary educational setting and the dynamics that determine the student satisfaction and behavioral intention to use a technology-based education system and their actual use of such system have been underrepresented in the literature related to technology acceptance and use theories, including Unified Theory of Acceptance and Use of Technology (UTAUT). This study sought to address this gap in knowledge by providing insights from a school in the district of Colombo. The study utilized a 2-stage mixed method with a dominant quantitative stage followed by a qualitative stage. A structured questionnaire was developed using UTAUT and other contextual constructs to best fit the educational context and the hypotheses were statistically analysed using SPSS v.26. Both Pearson and Spearman Correlation statistics showed that performance expectancy, effort expectancy, facilitating conditions, social influence and social interaction were each correlated to satisfaction whereas satisfaction correlated to behavioral intention and in-class performance. The study further revealed that the self-efficacy and attitude were positively correlated to the effort expectancy whereas anxiety was correlated negatively. The group statistics revealed that the gender had no impact on attitude and anxiety but on self-efficacy. In the second stage, the thematic analysis of student responses to semi-structured questionnaire and teacher responses in the interviews resulted in interesting themes, even suggesting that the students could grow free of control of teacher role in such education system. Triangulation of quantitative and qualitative data sets yielded complementary findings. Implications provide a better understanding of unique needs of school students in relation to communication platform-based system.

**Key words:** *Communication platform based secondary education, dynamics, student satisfaction, behavioral intention, performance*

**Challenges in Effective usage of Enterprise Resource Planning System for a Sustainable Development: A case of Conglomerate of Company in Sri Lanka.**

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Today, sustainable development of a business depends on the effective usage of Information Systems (IS) to manage the process of work of the business. Companies are seeking continuous development of IS that can easily handle business workloads. Enterprise Resource Planning (ERP) systems enhance productivity and working quality by offering integration, standardization, and simplification of multiple business transactions. This research was focused to find out the challenges of using an ERP system. In this research Personal, system, technical, operational, and managerial characteristics were considered as the independent variables and the effectiveness of the usage of the ERP system is the dependent variable. The target population of this study was 150 and the sample size was 108. Stratified randomly sampling technique used in this study. Mainly descriptive statistics, independent sample t-tests, Analysis of Variance tests were used to analyze the data. Based on the results, lack of IT knowledge, having sufficient user training sessions, complicated system interfaces, user reluctance and data migration are identified as main challenges for an effective usage of an ERP System in the selected company. However, the employees have positive attitude towards the ERP system. They believe that, it provides real time data, support management to make smart decisions with evidence of numbers and calculate as well to forecasting by using record. Furthermore, the ERP system improved organizational wide communication and provide better use of organizational data resources as well it has enough capacity & storage. The department of the respondents and previous working experience with an ERP system influence the effectiveness of ERP system. Further, system, technical, operational and managerial characteristics have a positive relationship with effectiveness. It was found that after adopting the ERP system, the organizational working culture has changed. As the main benefits, it has save time for individual task/duties and speed-up the operation.

**Keywords:** *Enterprise Resource Planning, Information Management System, Private Sector, Challenges, Sustainable Development, Effective Usage*

**Factors associated with students' performance in G.C.E (O/L) examination: A case of Northern Province of Sri Lanka**

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Students' academic performance is a key feature in Education. Many factors influence students' performance in the G.C.E (O/L) examination. The Northern Province of Sri Lanka is severely affected by the long term civil war. Due to the war and post-war effects, fluctuations are found in students' performance in G.C.E (O/L) examination. The decreasing the students' performance will have a massive impact on the sustainable development of Northern Province. It may lead to a decrease in intellectual capacity. This study investigates students' performance and the elements that influence it in the G.C.E (O/L) examination in Sri Lanka's Northern Province. It used a mixed method approach to address the research issue since it was influenced by a three-phase pragmatism research philosophy. The case study included twenty-one schools from eight different educational zones. Primary data was gathered from school principals, teachers, students, ZDEs, ADEs, and ISAs utilizing KII and FGD. Secondary data obtained from the Department of Examination and Education Management Information System. The study found that during the war era (before 2009), the Northern Province had a greater percentage of students passing the G.C.E (O/L) test than the rest of the country, but this was reversed in the post-war era. It was also discovered that the percentages of students who passed the G.C.E (O/L) examination in the Northern Province from 2005 to 2019 was inconsistent across time and location. It was also discovered that students, teachers, school resources, examinations, curriculum, family, and society all had an impact on students' performance.

***Keywords:*** *Students, performance, G.C.E (O/L), Northern*

## Trade secrets and rights of the skilled employee in Sri Lanka

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Confidentiality and value attained through it, are two gemmed aspects of 'trade secrets' recognized commercially. Coco cola's taste, Siddhalepa formula and Google's search algorithm are all considered as trade secrets. Presently, the trade secret protection laws favour the owner of trade secrets revealing the unbalanced approach to other stakeholders in the relationship. Thus, the problem is whether the Sri Lankan law is satisfactory to protect the rights of skilled employees while protecting trade secrets of the employer. Aim is to understand the loopholes in the Sri Lankan law in the protection of rights of skilled employees and trade secrets and to recommend legal improvement to Sri Lanka while analyzing the international standards. In this research it is utilized both primary and secondary sources. Black letter approach in law, systematic literature review approach and comparative research methodology are followed during this study. Employer should be given the opportunity to protect his trade secrets to sustain in the market while the employee is provided with a fair environment to utilize the professional knowledge and skills without harming the employer's business. From a legal perspective, the protection of commercial secrets needs a balance between different interests. At all costs, a trade secret should not be protected by law, and there should be fine line between all the rights and obligations of all the stakeholders. Trade secret protection and the employment relationship should be recognized in a statute to overcome the difficulties encountered by skilled employees and the employers who hold trade secrets while recommending a similar law as enacted in USA by way of 'Freedom to Create' statutes, with more coverage to skilled employees to embrace their skills freely.

**Key Words:** *Trade secrets, Employment, Skilled employee, Shop Rights, Sri Lankan legal framework*

## **User Satisfaction on the National Education Management Information System (NEMIS): Case study based on the Western Province**

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The Ministry of Education has been introduced the National Education Management Information System (NEMIS) to manage the educational data within the educational institutions under the ministry in the year 2012. As the Ministry of Education requires implementing significant changes to the usage of the system by its employees (system end-users) with confidence. However, it is evident that the Ministry of Education was unable to fulfil the educational data requirement using the system introduced for the past eight years. Therefore, the end-user satisfaction is not at the expected level so far. This study attempts to find out the overall user satisfaction of end-users by assessing major Information System components i.e. Information, System and Service satisfactions. Subsequently the research was focus to find out the relationships with the demographic variables and the user satisfaction. It is expected that, the findings of this research will help Ministry of Education to improve the satisfaction of its end-users with the system. The survey was carried out within the western province covering all the zonal education offices, western provincial education department and the Ministry of Education. Data was collected via self-administered questionnaire from the end-users in above offices. There were 280 end-users used the system in the western province educational institutes and distributes the questionnaire among total population as census and 195 end-users were responded to the survey and quantitative method was used for data analysis. As per the results of the study, the satisfaction with the NEMIS of end-users received higher rating; mean score of 3.91 and the  $p$ -value is less than 0.05. Overall, the users were statistically satisfied with NEMIS. To identify the association of demographic factors with the user satisfaction there were six hypotheses were formulated in the study. According to the hypotheses tests done in the analysis the  $p$ -values are greater than 0.05 therefore, the average satisfaction level is not different among male and female users and with respect to the age groups. There is no difference of the average user satisfaction with related to the both Highest Education level and the level of ICT qualification of NEMIS users. The average satisfaction of users is not different with respect to the years of experience of NEMIS. According to the last hypotheses formulated and tested, the  $p$ -value is less than 0.05. Therefore, there is significant overall difference between average satisfactions in relation to the system usage frequency of NEMIS.

**Keywords:** *National Education Management Information System, User Satisfaction, Information Satisfaction, System Satisfaction, Service Satisfaction.*

## Theorising return migration from the Gulf region

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The guest-worker-based (*kafala*) migration system operative in the Gulf region is a unique model in international migration studies. However, the experiences of Gulf migrants have not been sufficiently covered in the existing theories of return migration. Therefore, based on an extensive review of return migration theories and limited empirical studies on these theories, I propose a theoretical framework encompassing the New Economics of Labour Migration (NELM) theory, structuralism and transnationalism to capture the experiences and circumstances of return migrants from the Gulf region. As the *kafala* system in the Gulf region allows only temporary migration to the region, the foundation of this proposed theoretical framework is the NELM theory, which is the theory of migration that primarily discusses the motives for migration as being predominantly enabling temporary labour movements. The NELM theory is also included because of its basis for assessing remittances sent home by migrant workers. However, as the NELM theory on its own is inadequate to capture all elements related to return migration from the Gulf, two other theories, namely transnationalism and structuralism, are also incorporated to expand the scope of this theoretical model. Transnationalism is included in this theoretical framework because it examines various cross-border relations that migrants maintain with their families and friends in their home countries and because it takes into account the circulatory of migration flows, both of which are common attributes of Gulf migrants. Structuralism is included in the theoretical framework because it looks at the social, institutional and other contextual factors in the home countries of the migrants ignored by the NELM theory and transnationalism. Structuralists' explanation of return migrants engaging in unproductive and ostentatious spending in an attempt to be reaccepted by their communities are typical behaviors of returnees from the Gulf region identified in many empirical studies on the subject.

**Keywords:** *return migration; Gulf region, theorising migration*



## Small State Security Syndrome: The Case of Sri Lanka up to 1978

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“I consider Sri Lanka part of the new geography. It is part of the new maritime geography, and that makes it very important” (Kaplan,2011)

Sri Lanka’s strategic location in the Indian Ocean Region, equidistance from the East-West has been the topic of immense conversation and debate since ancient times to post-independence and even in contemporary discussions. The research represents a pioneer attempt to investigate the foreign policy and security strategies of a small state with special reference to the 1948-1978 period in Sri Lanka. It laid a foundation on the notion that small states facing the necessity for constant change adaptation in terms of security and survival strategies. Moreover, the importance of conducting this research comes from its interest in the security of a small state in general and the Sri Lankan situation in particular. The ultimate aim of this research is to conceptualize, map, and critically investigate the security challenges of Sri Lanka as a small state and identify the challenges and the opportunities of small states, and discuss the pros and cons of the different security strategies followed by us as a nation-state. By applying neoclassical realism as the theoretical basis of this study, the author can explain how domestic intervening variables interfered in foreign policy decision-making. The researcher uses an interpretivist epistemological paradigm with a qualitative methodological approach to developing the main arguments of this research paper. It will be helpful to find external and internal variables that determine the foreign policy behavior of three decades (1948-1978) in Sri Lanka. Finally, the author will be able to provide policy recommendations for future administrations to take the message of when molding Sri Lanka’s foreign policy.

**Key words:** *(Small States, Security, Foreign Policy, Neutrality, Power)*

## The Impact of Sustainable Consumption Communication on Consumer Behavior

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‘Responsible consumption and production’ is recognized as one of the Sustainable Development Goals (SDGs) by the United Nations. It is the twelfth goal in the ‘2030 Agenda for Sustainable Development’. The 2030 agenda calls for fundamental changes in how societies produce and consume to move towards more sustainable production and consumption patterns. Businesses worldwide are attempting to change the way they produce to more sustainable ways enabling consumers to adopt sustainable ways of consumption. Sustainable consumption is a popular concept among academics, which explains a consumer’s behavior in the form of acquisition, usage and disposal of products and services considering the impact on ecological and socioeconomic circumstances in the current context and for future generations. The communication of sustainable consumption is an important aspect that drives consumers to change their behavior to more sustainable ways. Sustainable Consumption Communication (SCC) is a concept that has gained traction in the recent past which discusses the communication of sustainable means of consumption to customers. In this discussion, one of the important aspects is how consumers respond to sustainable consumption communication presented by business organizations. Past studies have explored individual responses for sustainable initiatives from multiple perspectives. Some studies have focused on sustainability initiatives by the government and individuals’ responses to such initiatives. Another group of scholars have studied how consumers respond to Corporate Social Responsibility (CSR) initiatives implemented by business organizations. However, when reviewing the literature, it was identified that there is a lack of clarity on how consumers respond to specific campaigns on sustainability (e.g. sustainable products). This proposed study attempts to address the previously mentioned gap in the literature, which explores the impact of sustainable consumption communication on consumers’ responses towards a sustainable product or service. There are three objectives of the study, 1) To explore the impact of sustainable consumption communication on consumer emotions, 2) To explore the impact of consumer emotions on consumer responses, 3) To explore the impact of sustainable consumption communication on consumer responses. The ‘Hierarchy of Effects’ model will be used as a theoretical framework for this study. The proposed study will take a positivistic approach. Population of this proposed study is the consumers who have come across sustainable consumption communications by corporates. A sample of respondent will be selected based on the convenience sampling strategy which is a non-probability sampling technique. Data will be analyzed primarily using the multiple regression method. The study is expected to contribute to the novel research area of sustainable consumption communication with a specific emphasis on how consumers’ emotions are impacted by such communication leading to consumer responses.

**Keywords:** *Sustainable Development Goals (SDGs), Sustainable Consumption, Sustainable Consumption Communication (SCC), Consumer Emotions, Consumer Responses*

**Sustainable Development through the early interpretations and future developments.**

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The article aims to examine the influence over the early interpretations before going in to details about the significance of ecological sustainability. Further the article covers the areas relevant to moral and fundamental legal principle that supports the mighty concept of sustainable development. Initial interpretations of sustainable development derived from weak sustainability do not tackle the earth's limitation or our failure to control consumer behaviors. Every passing day the earth faces many challenges, climate change being one of them requires a more ethical approach based on the ecological capacity of the Earth. Another goal of this article is to thoroughly examine the importance of sustainable development as policy tool in the twenty-first century. An argument can be brought forward on the basis that, considering the challenges faced by the earth today, specifically climate change, the early interpretations of sustainable development as an elusive, and loose policy tool grounded on weak sustainability. Every action carried out of earth has its fundamental reliance on the earth's ecosystem and as such it is imperative that decisions taken regarding the environment are done with extreme care. Present legal frameworks are far more concerned with addressing private property and individuals' rights to be concerned with the implications of such laws on the ecology of the work and as such are failing to meet the modern needs. Thus, strong legal support is required to create a strong moral and legal normative framework. A creation of a new ethic is paramount to operating within the ecological capacity of the world. The ecological sustainability initiative imposes a positive responsibility of every individual of the earth to protect and restore the integrity of the earths ecological system. Like justice and equality, ecological sustainability is an approach and should considered a fundamental legal principle.

**Key words:** *Sustainable Development, early interpretation, weak sustainability, climate change, legal principles.*

## **Risk management practices and performance of Islamic and conventional Banks: A Data Triangulation Approach**

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Banking industry is one of the major participants of financial sector and consist of two main systems i.e., Islamic and Conventional banking. Islamic banking is an emerging segment of banking industry and growing significantly all over the world. While, effective implementation of risk management practices is crucial for both types of banks because risk management issues not only have influence on bank's performance but also on national economic and general business growth. However, implementation of risk management practices does not guarantee success because wrongly implemented risk management practices provide a false safety net to the organization. So, this paper aims to study and compare the effectiveness of risk management practices and their impact on performance of Islamic and conventional banks using data triangulation (primary and secondary data). Out of 20 Islamic and 21 conventional banks, panel data of 9 years (2009-2017) was collected from annual reports of 5 full fledged Islamic and 7 conventional banks of Pakistan. While, primary data was collected through 200 self-administered questionnaires from employees of selected banks. Descriptive statistics, ratio analysis, diagnostics tests, and regression analysis were used to study the effectiveness of risk management practices, performance level of banks, model fitness and hypothesis testing respectively. Outcomes of the descriptive statistics show that conventional banks are better in credit risk management, liquidity management and Islamic banks are better in operational efficiency than conventional banks. While secondary data analysis reveals that risk management practices significantly influence the performance of both types of banks where loan to deposit ratio and cost to income ratio are important determinants of profitability of both types of banks. Outcomes of this study are useful for existing and potential customers, investors, strategy managers and regulators to make investment decisions, strategy maneuvering and regulatory elevation.

**Key Words:** *Risk Management Practices, Profitability, Operational Risk, Credit Risk, Liquidity Risk*

**A Systematic Analysis: The Impact of prisoner programs on ex-offender employability in the context of Western province Sri Lanka.**

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Prison work programmes are carried out across the globe to enhance the lifestyles of the prisoners. The whole process of streamlining the prisoners to participate in prison work and trying to create a labourer in them would in the future assist them to be self-affording through legal means. Hence, understanding the labour market outcomes for ex-offenders are crucial at this point. At present, in the Sri Lankan context, convicted prisoners are engaging in prison programmes however post follow-ups have not been carried out in order to understand whether participating in these programmes actually impacted them to be employed- post release. It is stated in literature when the offenders are able to save money during imprisonment there is a higher possibility that they choose to lead a more free life and settle in a better paying employment ; the education qualification and age have a very less impact on their success of finding a job- post release ; ex-offenders who have been unemployed would always exhibit an instability ; the most lucrative factors that determines the wages after release depends on the economic structure of the local labour market and so forth. Hence this study was aimed at conducting a systematic literature analysis to derive the analysis to understand the applicability to the Sri Lankan context. No primary data collection was conducted. Therefore, the objective of the study was to understand if prison programmes contribute to the employability of ex-offenders. As per the analysis, it was clearly seen that these programmes would affect the prisoners to have a crime free life once released from the prisons and also prosper ex-offenders to have more confidence to take up ethical and legal jobs in the society once they are released. This would lead to a reduction of the crimes in the long-term enhancing their life skills and assisting towards the reduction of unemployment.

***Key words:*** *Employability, prison programs, prisoners, Sri Lanka*

## Sustainable Development Goals and Public International Law: An Analysis

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The goal of this study is to examine the relationship between the 2016–2030 Sustainable Development Goals (SDGs) agenda and existing Public International Law (PIL). It strives to ascertain the effectiveness of the SDGs in giving coherence to what might otherwise be a fragmented and even inconsistent collection of institutional arrangements, and to ascertain whether international law is likely to be beneficial for the integrated implementation of the SDGs. It does so by employing a qualitative approach in a descriptive manner. The study begins with an examination of the SDGs and a comparison to the Millennium Development Goals (MDGs), and then assesses their similarity to pre-existing Public International Law. Given the sheer number of SDGs and sub-goals and the lack of depth, significance, and fundamental understanding of key definitions based on professional standards, i.g. basic definitions of "sustainable" or "development" that served as the foundation for international law or professionalism, recognizing the SDGs' importance requires a monotonous approach. When examining the SDGs' sub-goals in greater detail, it becomes clear that the use of any screening processes to ensure that the SDGs do not violate international law or professional standards for Sustainable Development is essentially non-existent. It is critical to comprehend the significance of PIL in the field of Sustainable Development. While it is believed that PIL establishes rules and regulations for matters affecting humankind, such as the environment, human rights, and international commerce, it is important to highlight those various international agencies have previously implemented these norms. The SDGs' fundamental flaw is its lack of connection to existing public international law. Given the international community's acceptance, adoption, and implementation of Public International Law for over 70 years, the SDGs' lack of connection to and support from Public International Law weakens their efficacy, effectively rendering them ineffective.

**Key Words:** *Sustainable Development Goals, International Law, Millennium Development Goals, United Nations, International Community*

**Exclusion, executive control and the risk of deportation: The case of Murugappan  
Family in Australia**

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Out of many forms of exclusion entrenched in the Australian asylum system, deportation is a method of making migrants excluded, rejected, and removable from the state. Australian deportation policy is two-fold: voluntary and involuntary (Song & Cuthbert, 2017). When asylum seekers have exhausted all possible avenues to win their asylum claims by adhering to Australia's refugee determination process, they are designated for immediate deportation. These practices of deportation are facilitated through an infrastructural network that supports arrest, detention, and removal. This paper examines the most recent and controversial case of the Sri Lankan Murugappan Family who lived in a small township "Biloela" in Central Queensland facing deportation. This removal order, which is deeply political in nature raises questions about migrant illegality, human rights, and protection within the context of asylum in Australia. Nicholas De Genova's (2002, 2010, 2012) discussion on deportation and deportability of "unauthorised" or "irregular" migrants identifies such issues related to migrant exclusion. The punitive deportation laws built on exclusionary politics continue to strengthen the Australian border protection regime. This paper argues that the ways in which practices of deportation are implemented by the Australian government have negative implications for the lives of Sri Lankan asylum seekers living in the community for extended time on temporary visas. The case of the Murugappan family also shows the most terrifying and inhumane ways people are forcibly dragged from their homes by the authorities and reflects the unprecedented powers held by the immigration department to impose punitive restrictions on vulnerable individuals who seek protection from persecution. Asylum seekers who are caught in an immigration limbo experience persistent discrimination at different levels in the society. Stories of asylum seekers that revolves around neglect, racism and exclusion constantly remind them of their deprived and temporary migrant status in Australia.

**Key words** – *Sri Lankan boat arrivals, Asylum, deportation, exclusion, and temporary protection*

**A financial resource but a disloyal group?****Inquiring Sri Lankans' perceptions towards 'Sri Lankan migrants'**

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Sri Lankan out-migration is a complex phenomenon. It is estimated that over one million migrants are living outside Sri Lanka on a permanent basis. In this paper, I specifically explore the ways in which Sri Lankan public discourses imagine *Sri Lankan migrants*, as it would facilitate us to understand how the country can engage with her emigrants more closely. To unpack Sri Lankans' perceptions, I investigate the reasons and factors behind the dominant narratives towards Sri Lankan migrants. Employing a qualitative methodology, I use research methods such as interviews, observations and discourse analysis to collect and analyse data. The data show that Sri Lankan society does not have an adequate knowledge about the Sri Lankan emigrant community. The data also show two key themes based on which the dominant rhetoric towards Sri Lankan migrants is framed: i) migrants as a financial resource and ii) as a disloyal group. Regarding the first theme, there is a visible over-estimation about the financial capacities of Sri Lankan emigrants. The other perception contradicts with the positivity observed in the former. Here, Sri Lankan society perceives migrants as a group of disloyal people, hence, has a negative connotation. I argue that this suspicious approach towards Sri Lankan emigrants is derived from home countries' traditional beliefs about their emigrants that is heavily based on territoriality. In conclusion, I suggest to employ a transnational framework to engage with emigrants. By trying to employ a new approach to view and make sense of our emigrant communities, the country would find a more progressive and a productive way to engage with them, rather than unnecessarily ignoring them.

**Keywords:** *Sri Lankan migrants, emigrants, disloyalty, transnationalism*



**New Economic regionalism towards ASEAN's "Noodle Bowl" of AFTA**

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The recent advent of Free Trade Agreements (FTAs) will undoubtedly have a significant impact on Asia's trade policy and its status as a world factory. This research deals with the spread of FTAs in economically important Asia since 2000, including the current FTA landscape, the challenges FTAs pose for business and public policy, and what might be exercised to make Asian FTAs more multilateral-friendly. The growing literature on the spaghetti bowl and the Asian noodle bowl together cover the economic, political and legal perspectives are too broad to be served justice here. There are many helpful studies on early economic studies. The primary objectives of AFTA are to: create a single market and international production base; attract foreign direct investment; and. To boost trade and investment within ASEAN. To support economic cooperation among member countries, the ASEAN Free Trade Zone (AFTA) was created in 1992. The agreement sought to eliminate tariff barriers between member countries and create a regional market for 500 million people. The main purpose of this research is to study the challenges posed by in AFTER. And also studies the behaviour of the Asian noodle Bowl phenomenon. The main problem in this research is what are the challenges posed in the AFTA and what is the behavioural strength of the Asian noodle Bowl phenomenon. Qualitative methodology was used for this research and secondary data sources were also used. The research work was carried out by analysing the literary sources in multiple ways. New evidence from business surveys, agreement analyses, and CGE models can be useful in addressing some of these challenges and laying out a path forward. Asia has experienced a spectacular increase in FTAs since the early 21st century. Large clusters, such as the People's Republic of China, Japan and the Association of Southeast Asian Nations (ASEAN), have emerged. Increasing de facto economic integration and the absence of common economic institutions have led Asian countries to adopt pro-FTA commercial policies. Free trade agreements (FTAs) have become an important feature of the multilateral trading system and an important trade policy tool for World Trade Organisation (WTO) members. The spread of FTAs is the result of several factors, from the economic to the political. East Asia participates without exception in the process and attends the establishment of FTAs at multiple levels. When the proliferation of FTAs in East Asia benefits the regional trade and economic growth, questions have been raised about "Asian noodle bowl" effect, pointing out multi-layered FTAs in East Asia have created new trade barriers and raised the cost of commercial enterprise in the area. To achieve this, East Asia needs to shift from multi-level FTA proliferation to a region-wide FTA with greater participation and coverage.

**Keywords:** *Economic Regionalism, ASEAN, AFTA*

## **Build back better world vs belt and road initiative and the probable emergence of a new cold war**

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The Group of Seven (G7) 2021 announced the Build Back Better World (B3W) initiative as a values-driven, high-standard, and transparent infrastructure partnership led by ‘major democracies’ to help infrastructure needs across the developing world. China's Belt and Road Initiative (BRI), which is considered the largest investment program in history, is aimed to improve connectivity and cooperation on a transcontinental scale, connecting 63 percent of the global population in 140 countries. This paper aims to compare and contrast the B3W initiative and the BRI, and analyze its potential impact for a New Cold War characterized by a Bipolar World, in the Multipolar World System. A qualitative approach was materialized by drawing data from multiple secondary sources. While the B3W has indicated political interests and strategic areas of intervention to help countries caught in China’s BRI debt-trap diplomacy, a question arises whether B3W is an alternative to BRI or an attempt to impede BRI to halt China’s expansion in the world. The study identifies a relationship between the current world contexts with the post-World War II era Marshal Plan of the United States (U.S.), and how the U.S. gained its status as a superpower creating a unipolar world system after the end of Cold War. Based on this, it is argued that the B3W could be a perceptive idea of the U.S. to reconstruct the Global South, to regain power in the existing world order. The study further argues that the emergence of B3W could escalate contesting relations, and the competition between B3W and BRI could move towards a New Cold War with techno-economic strategies as weapons of power, characterized by a bipolar world, within today’s multipolar multiplex world system.

**Keywords:** *Build Back Better World, Belt and Road Initiative, USA, China, New Cold War*

**Effect of the COVID 19 pandemic on coaches and its consequences on the future of the Sports industry: A case study of Sri Lanka**

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Sports instructors are a vital part of the social and educational systems and they play a key role in the development of mental and physical wellbeing of athletes. Sports also significantly contribute to the peace processes and have been used as a tool for peacebuilding in Sri Lanka after the ethnic conflict. Coaches are the foundation of the sports industry and are responsible for sustaining and building the nation's athletes. Unfortunately, many coaches experience financial and social difficulties due to the COVID -19 lockdown because of the lack of policies and regulation to assist them during difficult times. This research explores the economic and social plight of coaches of Sri Lanka during the new normal and how it will affect the future of the sports industry. Forty coaches, sports ministry officials and sports federations were studied to gather data. The interviews conducted revealed, sports instructors have suffered financial losses due to the lockdown, received minimal support from the significant authorities, insufficient amenities to conduct training in the new normal and many coaches had to find mediocre alternative sources of income. Due to these difficulties many of them indicated that they will presumably not return to coaching and stated that they will discourage young generation from a choosing coaching career. If these issues are not attended to urgently, it will lead to the peril of the sports industry with repercussions on peace and development. However, a few simple steps could revive the enthusiasm and job security of the sports coaches. They are: affordable insurance policies, favorable infrastructure arrangements according to the new normal, a collective coach's association and increase job securities. If these suggestions are implemented the future of Sri Lankan Sports would thrive even in the COVID -19 situation, creating better national and international gains for the country.

**Key Words:** *Coaches, Sports Industry, New Normal, Economy, COVID-19*

## Factors affecting to fintech adoption intention in Sri Lanka: with Special reference to Banking industry

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The primary objective of the study is to find out the possible variables which affect user's adoption intention of Fintech products in Sri Lanka while proposing a conceptual research model combining the constructs identified from both consumer acceptance theories from the information system field and the concept of 'Fintech to Finlife'. The findings of the study will provide practical recommendations to both existing and potential Fintech startups and incumbent players of the financial services industry. Three principal theoretical models, (Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology Model (UTAUT), and Adoption of Risky Technology (ART)) which are well aligned to special characteristics of Fintech products were scrutinized. Also, the concept of 'Secanrization of Finance' also considered as the main focus of Fintech in providing easier life for the currently underbanked or unbanked population from innovative financial products. Accordingly, digital capabilities, digital accessibility, and convenience offered by the products were taken as significant constructs which drive the adoption intention. Social influence, personal innovativeness, price value and security concerns were identified as the most significant person-specific characteristics referring to the theoretical models scrutinized. In developing the conceptual framework, the moderating impact of age, gender and education level of consumers are also considered. An online survey will be conducted with the participation of banks' existing customers in order to collect the data. Structural equation modeling, using the partial least squares approach will be used to test the statistical hypotheses.

**Key Words:** *Financial Technologies, Adoption Intention, Senarization of Finance, Digital capabilities, Digital accessibility, security concern, personal innovativeness*

## A Study on India and China relations

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This paper concerns the big issue of recent time: the rise of India and China and the challenges faced by the two nations. As the emerging powers of Asia, both India and China enter into the power game and try to safeguard their position in the Asian continent. Both India and China struggle for future leadership. China is a fast-growing country and India's powerful neighbour. There is a strategic competition between India and China in the Indian ocean. But still, India and China maintain their normal relations while using different strategies. But both India and China need to emerge as the major powers of the Indo-pacific. China's growing presence of Indian ocean, as well as the South Asian region, became an important strategic involvement. But India wants to become the leader in South Asia and also India has the priority to become the leader. The overall nature of India China relation is not one of enmity. China and India relations in South Asia improve the threat balancing approach means to balance the power among them. Both India and China need to achieve the supremacy in South Asia as well as the Indian Ocean region. Qualitative data collected from both printed and electronic documents which includes Books, journals, webs and present periodicals to find out recent hostile relations between India and China. Qualitative data analysis will be done with specific theories and diagrams. According to the SWOT, diagram emphasizes that how China and India hostile relations impacted on smaller states in South Asia. There are some strengths, weaknesses, opportunities and threats summarize under this diagram. China's rising profile in the South Asian region is not good news for India. However, both China and India enjoying their substantial regional influence across South Asia due to their power capabilities and strategic diplomatic tools.

**Keywords:** *Asia, China, emerging powers, India, power*

**Impact of system and information quality on the effectiveness of learning: A case study of a university-based Learning Management System in Sri Lanka.**

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With the current development of technologies, many educational institutions are using considerable resources in e-learning systems to care teaching and learning. These systems help to communicate between teachers and students, the facility to track students' progress, and the secure sharing of course content online. Most of the institutions provide higher education facilities with Learning Management System (LMS) to handle teaching and learning activities. The study identified the impact of System Quality (SQ) and Information Quality (IQ) is insufficient as it fails to address the deeper issues associated with the perceived learning effectiveness of a LMS. The study used the dimensions and independent variables of the conceptual framework model adapted from information success model, such as IQ and SQ, to check on the university learning management system's learner's perceived learning effectiveness. The literature survey was employed as an approach in the study to design the conceptual framework. For the questionnaire survey, self-structured questionnaire based on the adapted model were administered as data collection instruments. The questionnaire was conducted online, using Google forms, to LMS users. Using a stratified random sampling method, the questionnaire was distributed to postgraduate and undergraduate students across the nine faculties of ABC University. The collected data was analyzed using descriptive and inferential statistics. In LMS, the SQ and IQ impact is a good step in the right direction and will subsequently yield greater learning effectiveness and better user satisfaction for its users if some of the impeding factors to SQ and IQ were adequately addressed. The result shows that SQ and IQ were significant predictors of learning effectiveness. The study further concluded and recommended that the learner's in the university should implement effective IT knowledge that would instill the efficient management of the university learning management system. And conclude the investment of large scale SQ and IQ in LMS infrastructure need for maximum perceived learning effectiveness.

**Keywords:** *System quality, Information quality, LMS, Dimensions, Perceived learning effectiveness*

**Application of Postgraduate research findings and knowledge of sustainable development of Sri Lanka.**

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University of Peradeniya, Peradeniya, Sri Lanka

The main purpose was to explore how postgraduate research contributes to sustainable development in the social, cultural, and environmental context and to strengthen the correlation between that research and sustainability. In such a situation, it is clear that postgraduate cognitive exploration can be used to ensure a balanced development of student culture. This study was conducted as a mixed research methodology. A sample of 300 postgraduates from the University of Colombo, University of Peradeniya, and the University of Kelaniya participated in the research sample. They were researched under the questionnaires and interviews. The interview was conducted by randomly selecting 25 samples of postgraduate students from the main sample. The questionnaire was distributed to 75 people through an online questionnaire system used as a Google form. According to the data analysis, the field of postgraduate research is designed to highlight the importance of research in our contemporary world as a positive catalyst for the sustainable development of chromosomes. Therefore, graduates need to be encouraged to become partners in adopting new approaches, structures, and initiatives to achieve their vision, to understand the educational environment, the learning environment, and the appropriate solutions for learning methods. It is a matter of that current education policies, moving from the macro-level to the micro-level, should create the curve and quality of research. Accordingly, research can translate into opportunities to recreate this environment, which is essential for active cognitive exploration. This provides an opportunity for postgraduate research in education to rethink itself as a systemic tool for transformative social change that leads to sustainability. The practical implication was that prospective graduates should pay special attention to the challenges in the SD research environment. In conclusion, research demonstrates how systematic exploration of relevant principles in the learning and teaching practices of higher education for a sustainable development process.

**Keywords:** *sustainable development goals, philosophical basis, ideological form, phenomenon~ , Chromosomes.*



# Faculty of Law



*Impactful legal research through an interdisciplinary  
approach*

27<sup>th</sup> November 2021



## MESSAGE FROM THE DEAN

**Dr. N. Sampath Punchihewa**

Dean, Faculty of Law



It gives me great pleasure to send this message on the occasion of the Annual Research Symposium 2021 of the University of Colombo. I am truly delighted to be associated with this event as it is my first research symposium after being elected the Dean, Faculty of Law. The Faculty of Law of the University of Colombo, which is the nation's foremost law teaching institution that shines as a luminous legal light in the context of law, order, justice and jurisprudence in Sri Lanka. The Law Faculty is committed to legal education and research to maintain high standards of excellence and to respond to social challenges and emerging needs. The legal scholarship of the faculty has significantly expanded the horizons and conceptual legal framework of the country.

Against this background, for the twelfth consecutive year, the Faculty of Law has organized the Annual Academic Sessions 2021 under the theme 'Impactful Legal Research in an Interdisciplinary Approach'. More than ever before, interdisciplinary approach to analyze legal problems has come to the forefront of the academic discourse in view of the 'new normal' triggered by the Covid-19 pandemic. Undoubtedly, the annual research symposium is a premier platform/event that facilitates and enables faculty members to showcase their research capabilities and findings and engage in healthy and fruitful discussions with colleagues and stakeholders as to their relevance, accuracy and cogency.

In advancing the University's strong commitment towards research and innovation, the Faculty of Law submits research abstracts from the staff members for this publication every year. One of the important functions of teachers of higher educational institutions is to engage in research with a view to exposing hitherto uncharted territories in their chosen discipline/s. I wish to extend my sincere gratitude, best wishes and congratulations to all research symposium participants. I fervently believe that the impactful research findings and deliberations that emanate from this symposium would certainly expand the horizons of academic scholarship which will undoubtedly be of immeasurable value for policy makers and relevant stakeholders to determine the way forward in the best interests of our motherland.

## MESSAGE FROM THE SYMPOSIUM CHAIRPERSON

**Professor W.I. Nanayakkara**

Faculty of Law



I am privileged to pen this message at the Annual Research Symposium, 2021 of the University of Colombo. The theme of this year's symposium is 'Impactful Research through an Interdisciplinary Approach'. The phrase interdisciplinary refers to knowledge that spans multiple fields of study. In the field of law, interdisciplinary approach is vital. Law has seen dramatic changes in recent decades and it has no borders and does not operate in a vacuum. It is a collaborative endeavor. Academic legal research has grown increasingly multidisciplinary. Legal academia has identified disciplines "outside" of law that are most typically entangled with legal issues. These subjects include, among others, economics, social sciences, and politics. This is significant because law regulates many aspects of society. Lawyers increasingly practice in highly specialized fields requiring not only traditional legal education but also specific tools and knowledge. Also, an increasing number of graduates do not practice law. They use their legal training to a variety of disciplines. It emphasizes the importance of legal education in so many spheres of society. Further, interdisciplinary research makes a significant contribution to the advancement of critical thinking and cognitive ability. The Annual Research Symposium is perhaps the most important annual event which enables University academics to present their research findings for discussion and critique by peers and stakeholders and to engage in healthy and beneficial debates about the relevance, correctness, and cogency of their findings. Academics play an important role in conducting research that aims to expose previously unexplored territory in their chosen discipline or fields. The search for truth is incomplete unless the research findings are validated by stakeholders and other researchers. Furthermore, this motivates academics to create and disseminate new knowledge generated as a result of their efforts to a wider audience. I take this opportunity to express my gratitude to the Vice Chancellor and the organizers of the symposium for undertaking the task of organizing the event and for providing the much needed opportunity to academics to present their research. I wish that everyone who attends the symposium will find it to be a stimulating, academically rewarding and enriching experience. I wish the symposium all success.

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**PROGRAMME OF SESSIONS  
FACULTY OF LAW  
ANNUAL RESEARCH SYMPOSIUM 2021**

**INAUGURAL SESSION**

- |                                |   |
|--------------------------------|---|
| <b>9.00 a.m. – 9.10 a.m.</b>   | Introduction  |
| <b>9.10 a.m. – 9.25 a.m.</b>   | Welcome Address<br><b>Dr. N. Sampath Punchihewa</b><br>Dean, Faculty of Law   |
| <b>9.25 a.m. – 9.40 a.m.</b>   | Address by the Vice-Chancellor<br><b>Senior Professor Chandrika N. Wijeyaratne</b><br>University of Colombo   |
| <b>9.40 a.m. – 9.45 a.m.</b>   | Address by the Chief Guest<br><b>Mr. Jayantha Jayasuriya, PC</b><br>Hon Chief Justice of Sri Lanka  |
| <b>9.45 a.m. – 9.50 a.m.</b>   | Introduction to the Keynote Speaker by<br><b>Professor Wasantha Seneviratna</b><br>Head, Department of Public & International Law   |
| <b>9.50 a.m. – 10.30 a.m.</b>  | Keynote Speech: “ <i>Questioning our questions and rethinking our facts: how and why to broaden legal studies?</i> ”<br><b>Professor Benjamin Schonthal</b><br>Professor of Buddhism/Asian Religions,<br>University of Otago, New Zealand |
| <b>10.30 a.m. – 10.40 a.m.</b> | Vote of Thanks by Symposium Chairperson<br><b>Professor W.I. Nanayakkara</b><br>Department of Commercial Law  |

**TECHNICAL SESSIONS**

- |                             |   |
|-----------------------------|---|
| <b>10.45 a.m. onwards -</b> | Three parallel sessions –<br><b>Departments of Commercial Law,<br/>Private &amp; Comparative Law and<br/>Public &amp; International Law</b> |
|-----------------------------|---|

## INTRODUCTION TO KEYNOTE SPEAKER

### **Professor Benjamin Schonthal**

Professor of Buddhism/Asian Religions  
University of Otago, New Zealand,  
Co-Director Otago Centre for Law and  
Society



Benjamin Schonthal is a Professor of Buddhist Studies and Co-Director of the Otago Centre for Law and Society at the University of Otago in Aotearoa New Zealand. He received his Ph.D. at the University of Chicago and has held visiting positions at Northwestern University, the Institute for Advanced Study (Bielefeld) and the Law School at the University of Chicago. Ben's research examines the intersections of religion, law and politics in late-colonial and contemporary Southern Asia. He is the author of *Buddhism, Politics and the Limits of Law* (Cambridge University Press 2016) and has received awards for both his teaching and his research. He is currently finishing two book projects: an edited volume titled *Buddhism and Comparative Constitutional Law* (with Tom Ginsburg) and a monograph examining the development of Buddhist law in Southern Asia, with a focus on Sri Lanka.

**ABSTRACT OF KEYNOTE ADDRESS****Questioning our questions and rethinking our facts: how and why to broaden legal studies?**

Professor Benjamin Schonthal  
University of Otago, New Zealand

In courts, legal interpretation tends to reduce the complexity of life by focussing only facts that are directly relevant to the categories of state law. But what about the interpretation of law in universities? In this lecture I reconsider the seemingly parallel vocations of legal practitioner and legal scholar. Where legal practitioners must concern themselves with the ‘inside’ of law (its function as a coherent and closed system of regulation), legal scholars ought also to consider the ‘outside’ of law (law's multiple imbrications in society, history and culture). This lecture reflects on how and why one could engage in such a scholarly approach to law. Drawing on examples from recent research, I sketch out a set of questions and methods that can help researchers to broaden their approach to legal inquiry and to engage more actively with theories, techniques and colleagues from across the disciplines.

## Mitigating agency issues in corporates: the potential of artificial intelligence

D. Suthakar\*

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The article explores the effectiveness of artificial intelligence (AI) to reduce the problems pertaining to agent and principal relationships in Corporates. The board of directors has the ultimate responsibility for managing the business and related affairs of the corporation on behalf of such corporations. They accrue more information about the corporation and anticipate acting in good faith. The core problem arises when a director does not act in the company's best interests, for instance The catastrophic fall of Enron in 2011, where the board committed repeated fiduciary failures by allowing Enron to engage in high-risk accounting and interested transactions. It is widely accepted that this high-profile collapse was caused by a failure to avert conflict of interest. This is because the agency problem reached such a substantial proportion that it has led to a collapse of the company. The research argues that AI can be the best tool to assist the directors in exercising the duty of care, loyalty and business judgments to fulfil their fiduciary duties. Consequently, the research article addresses the central question - Are existing Sri Lanka laws sufficient to enable directors to use AI to assist when fulfilling their responsibilities to benefit companies? To this end, the paper examines the potentials of AI to mitigate the agency problems that arise between the directors and the company. The study is basically a doctrinal analysis, and essential data are collected from primary and secondary sources, including statutes and case laws, and concludes that the existing corporate principles of Sri Lanka is to be amended with a new set of principles and laws for the use of the intra-firm AI to mitigate such agency issues. Such principles shall comply with the best standard, for instance as the best practices for AI recommended in recent European Parliament resolution.

Keywords: agency problem, artificial intelligence, conflict of interest, corporate management, directors

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## **The return of colonial cultural property: questions of provenance and prescription- the case of Sri Lanka**

Kamardeen N\*

Department of Commercial Law, University of Colombo

Van Beurden J

Researcher Colonial Collections and Restitution, Free University Amsterdam

Colonial cultural property (CCP) has been treated as a separate area of cultural property. While cultural property law has evolved a right to cultural property and mechanisms to control the current illicit trade in it, it has kept CCP out of this framework and denied countries of origin any right to claim it. It has done so by creating prescriptive periods that prevented former colonies from exercising their right to restitution, and by fashioning questions relating to provenance, which the former colonies find difficult to answer. This paper tries to bridge the gap between the law of cultural property and CCP.

The research is interdisciplinary and involves both social/historical and legal approaches. Both approaches will be analytical, desk based research. The social/historical approach will focus on Sri Lanka's loss of CCP to its former European colonisers and is based on historical catalogues, the UNESCO Intergovernmental Committee for Promoting the Return of Cultural Property to its Countries of Origin (ICPRCP) and other documents. It will also examine the changing thinking in Europe about dealing with colonial collections. The legal approach will focus on analysing the relevant international hard and soft law instruments and conventions and present the legal arguments of both the home state and host state of the CCP. The paper will consider the research from the viewpoint of Sri Lanka as a former colony and a home state of CCP, focusing on the specific experience with the Rijksmuseum Amsterdam. Based on lessons learnt from these experiences, it will suggest possible conditions for former colonies to have better chances to retrieve these lost treasures.

Keywords: colonial cultural property, provenance, restitution, Sri Lanka

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## **Traditional taxation principles and e-commerce taxation: challenges and developments**

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Tax is usually levied according to the world income principles, which are the important Source rule and residence principle. This means that a taxable natural person or a taxable entity is to be assessed with its entire income, regardless of the place of generation. The e-commerce on the internet will create new demands on taxation, regarding the adaptation of tax regulations, as well as its enforcement. Electronic commerce transactions and the development of Internet networks challenge even the most efficient tax collection and enforcement regime, both under direct and indirect taxation. The network forces economic globalization, while fiscal sovereignty mainly remains on the national level taxes on income generation.

The tax administrations could benefit from the new information technologies because they will increase efficiency, opening up new possibilities to exchange information in a more timely and secured manner, and improving the quality of their dealings with taxpayers. However, it is evident that the nature of electronic commerce on the internet provides the opportunity for tax evasion. Further, the fiscal concept of permanent establishment is ill adapted to electronic commerce, because the rule based on physical presence is meaningless in the electronic commerce environment. The results are distortions of competition, unfair tax impacts and loss of revenue. Therefore, the current study aims to review the challenges and developments of e-commerce taxation with regard to the traditional tax principles. Hence, the study addresses the problem of the involvement of e-commerce taxation in Sri Lankan tax law regime and how the current legal regime should be strengthened with new dimensions. This research is based on both library and field. The mode of this research is qualitative. The necessary information will be gathered from secondary sources accessible and available in the library such as journal articles, textbooks, government publications and electronic databases.

Keywords: e-commerce, source rule, residence principle, permanent establishment

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**Protecting ‘Ceylon Golden Pineapple’ as a geographical indication: prospects, challenges and way forward**

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The purpose of this paper is to explore the potential of protecting ‘Ceylon Golden Pineapple’ as a unique geographical indication (GI) of Sri Lanka. The research employs critical review of literature method by following black-letter legal research approach. This research outcome shows that there is a paucity of helpful literature and inadequate treatment on the topic in Sri Lanka, which fact motivated the researcher to undertake this study. From a legal standpoint, a GI is an intellectual property (IP) right recognized over 160 countries in the world. Except for Ceylon Tea and Ceylon Cinnamon, other potential GIs of Sri Lanka have remained by and large an untapped potential up until today. Most importantly, geographical indications (GI) refer to origin-linked products with a name and reputation associated to its origin. From an economic standpoint, a GI is a valuable marketing tool that can be used to obtain premium price for products, facilitate market access and contribute to enhance economic prosperity. Sri Lanka is a country with many origin-linked products which include the Ceylon Golden Pineapple. The story of Ceylon Golden Pineapple is unique for Sri Lanka as it emanates from the fruit of the Mauritius and Kew varieties of the species of *Ananas comosus* and both varieties are indigenous. The physical, organoleptic and chemical characteristics of the product are essentially linked to the environment and the conditions in which the product is grown, as well as production practices applied during the growth stages. The Ceylon Golden Pineapple is easily recognizable due to high content of juice and its remarkable sweet flavour and grown in the low country wet zone. It is a matter of great concern that, in the absence of a standalone specific GI protection regime in the country, Sri Lankan GIs face enormous challenges from other pineapple producers in the global market. This research offers new insights to policy makers on the effective use of IP regime to protect Ceylon Golden Pineapple and facilitate Sri Lanka achieving the Sustainable Development Goals (SDGs) of the United Nations; namely: sustainable food production and consumption patterns to eliminate hunger and improve nutrition (SDGs, 2 and 12). In terms of originality, to the best of the author’s knowledge, this is the first research that explores the use of the GI protection system to promote the Ceylon Golden Pineapple for competitive advantage in the princely competitive global marketplace.

Keywords: Ceylon golden pineapple, geographical indication, socio-economic development.

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**Is the night economy a nightmare? a critical analysis of the law relating to gaming and gambling in Sri Lanka**

P.S.P.G. Vithanage\*

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Gaming and gambling have been part of the Sri Lankan society throughout its history, and they often clash with the attitudinal beliefs of most of the people. On the other hand, it is high time to accept that with the impact of globalization, communities evolve and embrace changes to mingle with international communities and markets. The current Covid 19 situation has also triggered this by normalizing online platforms for almost everything including entertainment activities such as online gaming and gambling too. This backdrop has created a background and justification of this research to perceive whether the current legal and policy landscape on gaming and gambling is competent enough to address the issues and modern trends. Therefore, this paper intends to critically evaluate the adequacy and effectiveness of the current legal framework for gaming and gambling in Sri Lanka by utilizing mainly a qualitative approach supported by findings through one-to-one interviews with relevant stakeholders to ascertain the practical issues. Among many other observations, it is significant to note that the current system is created emphasising more greatly on the regulation than promotion and the recent Colombo Port City Economic Commission Act, No. 11 of 2021 has also created a double-edged sword in this regard. However, the comparative study of India and the United Kingdom as a benchmark reveals many exemplary attributes of a modern and balanced legal and policy approach in addressing the issues relating to these commercial activities. Based on them, this paper concludes with recommendations that the existing legal framework needs to be updated specially to address the modern trends such as online gambling and a comprehensive policy framework with a competent authority should be in place to foster economic benefits while preserving stakeholder protection through a holistic vision.

Keywords: casino, gambling, gaming, tax

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## Intellectual property rights and global pandemic: a patent law perspective

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COVID-19 Global Pandemic has rapidly made countries, governments and policy makers rethink and change their standards, policy decisions in order to adjust with the unpredictable phenomenon. Intellectual Property Rights (IPR) and intellectual property policies are not an exception to this. While IPR promotes research and development, technological development and transfer of technology, it also inspires individual rights, non-competition in the market place and monopoly rights that would hinder some human rights such as the right of health, healthcare and food. In response to the rapid expansion of the pandemic, there are moves from many developed countries who are the owners of many IPR, Patent Offices, research institutions and research universities to go for waivers of IPR and soften the procedure adopted for patent granting. The US Government's announcement that it would support the temporary waivers of IP rights relating to COVID-19 medicinal products including vaccination, the US Patent and Trademarks Office's (USPTO) decision to prioritize patent examination for COVID related inventions for a nominal fee, the move of some IPR owners to grant free licenses to manufacture vaccines and other COVID related products, and universities and research institutions coming forward to collaborate with industries in curbing the COVID-19 Pandemic are few among them.

However, these moves are subjected to many criticisms from IPR perspectives. It is argued that IP protection should not liberalize but should introduce a massive drive of technology transfer and capacity expansion. This paper analyzes how this global situation and new trends in IPR would affect the Sri Lankan IP law and recommends that Sri Lanka should look forward to promoting technology transfer while softening its IPR laws for COVID related inventions.

Keywords: patent rights, global pandemic, technology transfer

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**Overcoming consumer grievances through consumer advocacy during pandemic: a socio-legal analysis of consumer protection laws in Sri Lanka**

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COVID-19 outbreak creates complex challenges in every reasonable expectation of human life, and therefore empowering consumers through consumer advocacy becomes inevitable to protect vulnerable consumers from commercial fraudsters. An unprecedented number of consumer rights violations such as price gouging, dumping, misleading sales, tied selling, and scams are occurring in the aftermath of the COVID-19 outbreak. Such violations are taking place despite the prevalence of the Consumer Affairs Authority (CAA) Act No 9 of 2003. Under the Public Security Ord, the Sri Lankan government declared an economic emergency to protect consumers from an artificially created shortage of certain essential food and the resultant escalating prices. Violations are being continued even after such a declaration, and therefore consumer advocacy is needed. The CAA is vested with considerable powers to deal with many issues such as eliminating illicit business practices, fixing control prices, handling issues related to refusal to sell goods, denial of possessions, conditional sales, and hoarding of goods. However, there seems to be no improvement in the position of disadvantaged consumers, and it may be due to a lack of consumer advocacy. While consumer protection laws have proven effective even in times of crisis in many foreign jurisdictions, it is not so in Sri Lanka. The UN Guidelines on Consumer Protection are considered valuable principles for setting out the characteristics of effective consumer protection legislation, enforcement mechanisms, and providing redress systems. While many countries have implemented these guidelines and thereby offered adequate protection to consumers, the CAA Act of SL enacted in 2003 has not been amended. This research is an effort to investigate the socio-legal perspective of consumer protection under Sri Lankan law in the aftermath of the pandemic and focuses on consumer rights violations in both physical and online platforms. This research is a doctrinal analysis that combines descriptive and analytical approaches to provide a depth-analysis of the chosen area and data for this research based on the available primary and secondary sources.

Keywords: advocacy, commercial fraudsters, consumer protection, consumer rights violations

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## Controlling cybercrimes, challenges and legal responses in Sri Lanka: the way forward

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In the present digital world cyber and information technology related crimes have steadily exacerbated. Cybercrime is universal and has been a significant issue world over and in Sri Lanka as well. With modern technological development, the use of computers, similar devices and the internet has become integral tools in all spheres of our daily lives. Notwithstanding many advantages and innovative uses, the rapid growth of the internet and social networks has caused not only irreparable damages to computers, computer systems and information stored on computers but also irreversible harm to national economies, national security, territorial integrity, world peace, etc. These are perpetrated by hackers, fraudsters, illegal and illegitimate users. Due to their trans-national & borderless nature and a lack of appropriate international legal infrastructure compelling all the States to take appropriate actions, cyber criminals act with safety and impunity. The challenges to control or mitigate its occurrence to maintain a crime free environment are also explored. Sri Lanka has legislation to counter these crimes, their effectiveness is analysed. This article gives an overview of Sri Lanka's current cybercrime legislation from social, technical and legal perspectives. Also, it highlights certain perceived gaps, which may hamper the expected goals of the law. The article continues with an analysis of the best practices adopted by the European Union in implementing the Budapest Convention in the fight against cybercrime. It is proposed that a common convention prohibiting acts of cybercrimes, in whatever form, in any State and all the countries shall work towards annihilating this malady. The author recommends among others, to ensure proper use of and protection in the cyber world, it is vital to establish a comprehensive universal cybercrime protection legal framework.

Keywords: cybercrime, fraud, abuse, legislation, technology

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**The extended Continental Shelf: a legal perspective of the implementation of Article 76 of the United Nations Convention on the Law of the Sea of 1982 (UNCLOS)**

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This paper provides a legal perspective of the implementation of article 76 of the UNCLOS and its criteria for the determination and delimitation of the outer limits of the extended continental shelf beyond 200 nautical miles. The concept of continental shelf was developed by a series of interventions; 1945 Truman Proclamation and the 1958 Geneva Convention on Continental Shelf. The author clarifies the legal perspectives of the article 76 in light of pertinent legal principles as it surfaces complexity of legal and scientific interface. The Truman Proclamation, which opened up for exercise of jurisdiction and resource exploitation by coastal States, while the North-Sea Continental Shelf Cases (1969) stressed that States had an inherent right to such territory on the basis of natural prolongation. On the matter of maximum limits that a State can claim in Continental Shelf, 1958 Convention set out 'exploitability test'. The 1970 Declaration on Principles Governing the International SeaBed articulated that the seabed beyond national jurisdiction was the 'common heritage of mankind'. Sri Lanka made a historical intervention during the deliberations of the 1958 Convention for a special method of determining the outer limit of the Continental Shelf. Since 1994, there have been many competing claims for an extended continental shelf, and Sri Lanka too made a submission in 2009 before the Commission for an extended continental shelf in the Southern Part of Bay of Bengal. Therefore, such claims are to be determined judiciously by implementing the article 76 criterion of natural prolongation or in consideration of principles of international law. The author concludes that physical or scientific features are not the same in all cases while it is the paradigm shift of theories and thus, a reasonable approach is required in varying degrees for contextual importance.

Keywords: UNCLOS, Article 76, Extended Continental Shelf

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**“Right to Internet” in preserving equal access to education: Prospects and challenges**

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Access to Internet has now become an inseparable tool of our daily life. By January 2021, there are about 10.90 million internet users in Sri Lanka which is a drastic growth compared to the previous years. Despite that trend, there are many drawbacks in equal access to education in Sri Lanka due to the outbreak of covid-19 pandemic. Schools have been closed from March 2020 and universities are working online. There are many criticisms leveled against the quality of the online education provided in the island. Lack of access to meaningful internet is one of the major reasons among many socio-economic reasons behind this phenomenon. In this paper author argues that there is an indispensable connection between right to internet and right to equal access to education. Main objective of this qualitative research is to analyze the importance and challenges of recognizing right to internet as a fundamental right in Sri Lanka to enhance the quality of equal access to education. Thus, Part I of this paper discusses the normative scope of the right to internet by analyzing international and regional human rights documents. In this part, author argues that Sri Lanka has the possibility to locate this right either as an autonomous right or construe it as an emerging right within the broader scope of already existing freedom of expression. Part II of the paper attempts to draw a logical connection between right to internet and equal access to education in Sri Lankan context while analyzing possible challenges that need to be addressed to full realization of both rights. Drawing from the above said analysis, part III of the paper presents the identified challenges and recommendations to policy makers.

Keywords: right to internet, right to education, online learning, emerging rights

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## **Of men and the ruling ring: Sri Lanka's executive presidency through Tolkien's trilogy**

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In this paper, I read Sri Lanka's executive presidency through Tolkien's three-volume novel, the Lord of the Rings. I commence this interdisciplinary endeavour by using the Lord of the Rings story as an allegory to elucidate the extent of the hegemonic power accorded to the executive president by the Constitution of Sri Lanka 1978. For this purpose, I compare the nature of the power dynamics resulting from the executive presidency with that of the One Ring, which allows its wielder the power to overpower the novel's world. I draw parallels between their design and the effect upon those who possess them. However, the significance of delving into the nuances of this comparison between law and literature lies not only in its capacity to elucidate the current power dynamics of the executive presidency but also in its potential to pose an artistic challenge towards these power dynamics. The contribution of fantasy literature is especially important in this regard because the very function of the fantasy genre is to defy convention, defy the status quo, and imagine the impossible. Therefore, I approach fantasy literature also as a form of literary resistance. Focusing on law, the capacity to imagine new visions for justice plays a significant role in the development of the law itself. Therefore, I explore what the Lord of Rings can offer to further develop our vision regarding the executive presidency of Sri Lanka. With this aim, I interpret the novel's quest to destroy the ring as a saga of persistent resistance and apply this interpretation to the Sri Lankan attempts at abolishing and limiting the powers of the presidency so far.

Keywords: law and literature, fantasy fiction, hegemonic power, executive presidency, Sri Lanka

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## Strengthening environmental rule of law in Sri Lanka

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Enforcement of Law is the ultimate expression of addressing the seriousness of environmentally sensitive issues. Although Sri Lanka has adopted legislative measures to protect the environment, there remains an issue even where where compliance is pursued to some extent, the sustainability of the process over time is a major challenge due to various political, cultural and social factors. This attitude created a serious threat in reversing the environmental degradation factors and redirecting them towards environmental sustainability. Meanwhile, the 'Goal 16' of Sustainable Development Goals also emphasizes promoting peaceful and inclusive societies for sustainable development, providing access to justice for all, and building effective, accountable and inclusive institutions at all levels of governance based on the concept of Rule of Law. Thus, this research aims to evaluate Sri Lanka's attempts to enforce environmental laws in light of the concept of 'Environmental Rule of Law'. This research is conducted as exploratory research using both primary and secondary sources exerting a qualitative approach. The findings reveal that there is a need for improvisation of fair, certain, and implementable environmental laws; access to information; public participation, and access to justice; accountability and integrity of institutions and decision-makers; clear and coordinated mandates and roles, across and within institutions; accessible, fair, impartial, timely, and responsive dispute resolution mechanisms; recognition of the mutually reinforcing relationship between rights and the Environmental Rule of Law; specific criteria for the interpretation of environmental law in Sri Lanka. As a response to the lacunas identified, the research proposes two primary recommendations. One addresses the need for constitutional provisions embracing environmental rights and extending Constitutionalism into the environmental domain, which will confirm the legitimate and accountable government, judicial review, democracy, and respect for human rights. The other proposes further recommendations based on key indicators for the Environmental Rule of Law. Thus, the research argues that the adaptation of the Environmental Rule of Law not only paves the way to achieve Goal 16 of Sustainable Development Goals but also contributes to the development of Rule of Law in Sri Lanka.

Keywords: environmental rule of law, environmental constitutionalism, environmental protection, sustainable development, inclusivity

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**Defending a wife who killed her husband: gender justice in defence of provocation in Sri Lanka**

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Murder is an unjustifiable killing according to its legal definition. However, the Penal Code of Sri Lanka identifies some murderous acts of an accused where those can be considered as 'justified kill'. A murder committed due to sudden and grave provocation is one of them. The conjunction 'and' is interpreted in the law of Sri Lanka as to generate the meaning of 'associated with'. In order to this interpretation, defence of Provocation in Sri Lanka has failed to cover the situations where a woman kills her husband due to prolonged trauma resulting from his abusive ill-treatment towards her. In the meanwhile, the Prevention of Domestic Violence Act which is gender-neutral, also failed to recognise the same since its dependency on Penal Code. This woman is known as the 'Battered woman', and the said term originated from a psychological trauma known as the 'Battered Woman Syndrome'. The primary objective of this paper is to recognise the Battered Woman Syndrome as a mitigatory defence in offence of Murder. The major part of the study is followed by adopting a doctrinal methodology by evaluating the secondary sources. However, in the concluding remarks, the author has conducted an empirical research by having interviews with psychologists and women's rights activists to affirm the main arguments presented. Throughout the research, the author has suggested valuable recommendations to be incorporated into the criminal justice system such as, broadening the scope of the defence of provocation and domestic violence in light of prescribed international standards, considering the bio-social perspectives before deciding a guilty mind of a woman, and incorporating rights-based reform systems and gender sensitive penalties for the female accused. As the advancement of women depends both on the 'difference' and 'sameness' approach, extending the same to the protection of a battered woman is essential for the growth of both gender and criminal justice.

Keywords: battered woman syndrome, bio-social perspectives, defence of provocation, domestic violence, murder

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## **Soft law versus hard law: Critiquing the categorisation of sources of international law from a third world perspective**

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Effective implementation of international law has been challenging, given the distinctive characteristics of international law. Categorisation of international law sources as soft and hard law aggravates the lapses in enforcement. This research examines the aptness of this categorisation from a third world perspective. Researcher argues that this divide is arbitrary and used by powerful States to achieve their geo-political interests against less powerful States. Credence and authority attached to hard laws as opposed to soft laws discourage States in contributing to their enforcement. International law makers create a boundary between hard and soft laws. It may dissuade the law takers as they may perceive the classification as a regulator. Sovereign States prefer to follow soft laws than hard laws mainly due to the desire to preserve their political independence and territorial integrity from international scrutiny led by powerful States. Particularly, States, belonging to the ‘third world’ camp, are reluctant to be bound by certain hard laws to avoid perceived geo-political dominations. Researcher further argues that such a behaviour is not at fault as the unequal application of international law challenges its foundational principles, such as sovereignty and equality of States. This attitude may hinder effective enforcement of international law. Collapse of law and order in several countries, such as in Afghanistan and Guinea, provide examples about the unfounded classifications of international law, manipulated for the gain and control of powerful States. Underlying western plots attest to the soundness of this argument when one carefully examines the history of such situations. This research is a doctrinal analysis based on the critical body of work developed by ‘third world approaches to international law scholarship’(TWAIL) and discusses selected case studies as its methodology.

Keywords: soft law, hard law, sources of international law, third world approaches to international law (TWAIL)

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**Ill or Evil: comparative analysis of the defence of unsoundness of mind in England,  
India, and Sri Lanka**

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Mental illness is not an uncommon phenomenon. As found by the medical research studies Psychotics are more prone to abnormal behavior including criminality. Unsoundness of mind is recognized as a general defence that can be claimed by an accused of any offence. In every judicial system in the world, a successful plea results not in a normal acquittal but in the qualified acquittal that the defendant is not guilty by reasons of unsoundness of mind. Section 77 of the Penal Code which is based on the age-old M’Naghten rules is the only legal provision in the criminal law of Sri Lanka that permits an accused to claim the defence of unsoundness of mind. There is a concern among the academics in the field of law and some legal practitioners as to whether the law specified in this provision is sufficient to cover all forms of psychological disorder situations. The objective of this study is to critically analyze the law relating to insanity defence in Sri Lanka whilst comparing our law with India and England. It also suggests reforms to the existing criminal law in Sri Lanka to cover all forms of psychological disorder and abnormal conditions of a person which resulted in criminal behavior. This research is mainly a doctrinal study consists of a conceptual analysis of section 77 of the Penal Code and Supreme Court judgments pronounced from 1948 to date on the cases of the insanity defence. To achieve the main objective, this study further reviews the law relating to the defence of unsoundness of mind available in India and England. Information gathered from Psychiatrists, judges, lawyers from the official bar and un-official bar is also utilized to complete the study.

Keywords: culpability, diminished responsibility, general exceptions, insanity defence, mental abnormality, psychological disorder

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## Sri Lanka's Port City: Constitutional Perspectives

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In what ways is constitutional governance impacted by the establishment of the Port City in Sri Lanka? I argue first that the legal regime that provides for the Port City generates complex and unique challenges to constitutional governance. Second and relatedly, I argue that this legal regime amounts to a legislative carving out of geographical, cultural, economic and constitutional space from Sri Lanka's constitutional democracy. This development, therefore, is a critical juncture in Sri Lanka's ongoing state formation project and has implications for state sovereignty (however understood). This paper is an early effort at identifying the specific issues, the ways in which they intersect and at assessing their constitutional implications through a doctrinal analysis. My objective is to engage in an analytical mapping exercise. I begin (part I) by locating the Port City within the broader historical, political, economic and legal context. Here I also identify the different issues and questions that arise from a constitutional perspective. I draw specifically from the Determination of the Supreme Court on the constitutionality of the Port City Bill and the Colombo Port City Act No 11 of 2021. In parts II, III and IV respectively, I consider constitutional perspectives in relation to the way in which the Colombo Port City Act impacts foreign direct investment, arbitration and the exercise of administrative discretion. Drawing from this analysis, I assess the normative impact of the Port City on Sri Lanka's state formation project.

Keywords: Port City, judicial review, foreign direct investment, arbitration, administrative discretion

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**Dilemma of mandatory vaccination for COVID 19: analysis of constitutional and legal issues under the Sri Lankan Law**

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Sri Lankan authorities have suggested that the vaccination card for COVID-19 be made mandatory for citizens above the age of 30 years old, whenever they visit public places from Sept. 15, 2021 onwards. Such policies appear to be effective in convincing some non-vaccinated individuals to get their dosage to ensure community safety. Even so, this raises many complex issues regarding the interplay of competing rights. The key issue is where to draw the line between government's duty to protect the health and community protection and the individual autonomy, bodily integrity and human dignity, particularly when a worldwide pandemic causes millions of deaths and economic devastation. Another crucial point that need to be considered in the current vaccination debate in Sri Lanka is that Covid-19 poses a major public health risk not just to people who are non-vaccinated by choice, but to those who cannot yet get vaccinated, such as children due to irregular and inconsistent supply of vaccines, issues in the process of vaccination prioritization and people who did get vaccinated but develop breakthrough infections. First part of this paper presents a constitutional and legal analysis of the possibility of the country making the vaccination against COVID-19 mandatory. Second part of the paper seeks to reflect debates in other jurisdictions as well where mandatory vaccination is being recommended to tackle the COVID-19 pandemic. Finally, the paper suggests the proportionality approach in designing and implementing such a law or policy and substantiates the argument that a mandatory vaccination would be legal if the government has designed and implemented rational criteria within the explicit parameters that a mandatory vaccination is required and proportionate in the interest of public health and safety and for the protection of the rights and freedoms of the community. The research employs a doctrinal black letter approach by referring to relevant primary and secondary sources.

Keywords: mandatory vaccination, fundamental rights, public interest, constitutionality, legality

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## Reforming the law relating to adoption of children – for whose interests?

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Adoption of children in Sri Lanka is regulated mainly by the Adoption Ordinance of 1941. The few amendments made to the Ordinance thus far, particularly to address large-scale trafficking of children, were *ad hoc*, and the statute retains ideals and mechanisms inconsistent and inadequate to address the lived realities of the country. The paper identifies two main reasons for the inconsistency: (a) its failure to

gauge the present socio-cultural structure, which has transformed during the last eight decades, and (b) the child rights governance which fluctuates between central and provincial authorities resulting in a tug-of-war between multiple authorities entrusted with the same task. Amidst insensitivities, adversaries and corruption, the system fails to ensure the best interests of the child. Underlining the necessity to uphold the significance that the Sri Lankan Constitution bestows upon the concept of *'family'*, and the state obligation to protect the rights of the child, the paper stresses the need to relocate the adoption law within a child-rights-centered framework. Being mindful of the multi-faceted and large-scale exploitation and trafficking of children, and the powerplay between central and provincial authorities entrusted with probation and childcare as well as child protection, it emphasizes the necessity to overhaul the law and the institutional framework. The research uses a mixed method based on statutes; international documents; regulations and circulars; and documented empirical studies; and engages views of experts in psychology. Aiming to strike a balance between human rights issues; psychological and psychosocial issues; and issues relative to governance, the study recommends introducing substantive and procedural mechanisms that protect rights of the child while upholding the Sri Lankan family value system. It also emphasises that due to the nature of adoption of children, legality must interact with non-law concerns, and adhere to globally accepted standards.

Keywords: adoption, child-rights-governance, reform

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**Conundrums of the extremes expounded in Bolam and Bolitho tests: unlawfulness in  
Delict as a way forward**

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The application of Bolam and Bolitho tests as expounded in *Bolam v Friern Hospital Management Committee* (1957 1 WLR 583) and *Bolitho v City Hackney H.A* (1998 A.C. 23) respectively has been subjected to prolonged criticism in medical negligence litigation. While, under Bolitho, the purported peer medical opinion can be challenged, or departed from, on the grounds of the said opinion being incapable of withstanding logical analysis, or is irresponsible or unreasonable, Bolam inordinately relies on the peer professional medical opinion, leaving the peers to set the required standard of care, and thereby, to be the final arbiters of medical negligence litigation. Owing to the complexities of the two extremes expounded in Bolam and Bolitho, much controversy has engendered on the healthy balance of doctor-patient relationship. Additionally, the judges are often placed in a dilemma as to the proper approach to be adopted, when adjudicating medical negligence litigation. In light of such a quandary, the author proposes Wrongfulness/Unlawfulness in Delict as an opportune element to pitch the extremes expounded in Bolam and Bolitho. According to the test of Wrongfulness, the negligent conduct or the omission that causes harm, will be analysed in light of the general reasonable yardstick, on considerations of policy and on the legal convictions of the community, as established by the courts. Hence, the author views that, since the reasonableness criterion in Wrongfulness applies as a mechanism that inquires into the question whether a legally protected interest of a person has been infringed in an unreasonable manner or not, the judges can be more circumspect in evaluating medical opinion. Further, it would pave the way for the judges to objectively assess the situation, without rejecting medical opinion merely because it does not withstand logic and/or rationale, or the accepted medical opinion states otherwise.

Keywords: Bolam, Bolitho, extremes, wrongfulness, reasonableness

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## **Masking face at workplace: unmasking the law relating to termination of services in Sri Lanka**

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A labour issue that has emerged due to the COVID – 19 pandemic is dealing with employees who do not wear a face mask at workplace. The objective of the research is to assess whether not wearing a face mask at workplace justifies termination of services. The research is qualitative research based on statutory provisions and decided cases. An employee does not have the freedom of personal choice to refuse wearing a mask as he places not only himself but also others at risk. As it is a legal requirement to wear a mask in a public place and an employer has a legal obligation to ensure that every person in his workplace wears a mask, the employer shall insist his employees to wear a mask. If an employee does not wear a mask, the employer shall provide a mask and insist him to wear the mask. Failure or refusal to wear the mask would be disobedience which warrants disciplinary action against him. The question whether the misconduct justifies warning or termination of services depends on the nature of the workplace, nature of the work and exposure risk. If an employee has health issues in wearing a face mask, the employer shall explore suitable arrangements to the employee or terminate the employment of the employee on non-disciplinary ground by following the procedure under the Termination of Employment of Workman (Special Provisions) Act. It is recommended to enact legislation with regard to occupational health and safety, and include a clause obligating the employers and employees to safeguard health and safety of all persons in workplaces.

Keywords: COVID -19, disobedience, mask, termination.

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## **The impact of trade secrecy on COVID 19 vaccines: an analysis through a human flourishing lens**

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The novel coronavirus disease is far from over causing enormous challenges to the human race. At the same time, COVID-19 vaccination tells us another story about the world dominance by big pharma companies through their intellectual property (IP) rights. Whereas many have known that vaccinations are protected under the patent regime, what is untold is that some aspects of vaccines have been protected as trade secrets. For instance, certain information including mRNA manufacturing technologies of Pfizer-BioNTech COVID-19 Vaccine has been kept as trade secrets. This paper argues that such protection may impede the human flourishing. As postulated by Amartya Sen and Martha Nussbaum, flourishing includes people's ability, functioning and freedom to achieve the capacities to live a dignified-full-fledged-life. Given the understanding that vaccination is the effective and sustainable way to overcome the problem, protecting vaccines and related aspects as trade secrets is highly problematic. First, protecting embryonic ideas, negative know-how and clinical trials data as trade secrets may contribute to slow-down the advanced medical solutions to the problem. Secondly, protecting related information as trade secrets may be having a chilling effect on follow-on innovation. Thirdly, when an invention is protected as a trade secret, it discourages manufacturers from successfully concluding voluntary licensing deals and technology transfers. This paper argues that these side effects of trade secrecy may impede central capabilities that a human should possess in order to live a complete and satisfying life with good health. Whereas there is a proposal from countries such as India and South Africa to temporarily waive IP rights over vaccines, it is yet to be implemented. Even if this proposal is implemented, such a measure will undoubtedly discourage investing in inventions on vaccines. As such, this research proposes to introduce a concept of 'compulsion in the public interest' as an exception to trade secrets protection. Accordingly, when there is a global health crisis which challenges human existence and flourishing, a government should be able to force a trade secrets holder to reveal the secret in exchange for a royalty in order to reproduce the secret product or process. This proposal may be implemented in line with the compulsory licensing system of the patent regime.

Keywords: COVID-19 vaccine, intellectual property, trade secrets, human flourishing

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## **A comparative analysis on the relevance of intent based statutory interpretation**

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Sri Lanka's colonial history and legal developments have brought numerous legislations to the country. This includes the form of regulations, proclamations and ordinances passed before independence and the Acts and statutes passed after independence. Even though these laws were enacted during different times, the legislation enacted before independence are also valid through Article 168 of the 1978 Constitution of Sri Lanka. Some of the legislation like the Penal Code (Ordinance No. 2 of 1883) of Sri Lanka were enacted around 100 years ago and still in function. Application of these old legislations to present day issues requires an active involvement of the judiciary. The interpretation of a statute involves different theories to bring about justice to the case before the court. This paper mainly focuses on the intent based interpretation which comprises the theories of intentionalism and purposivism. The main objective of this paper is to compare the relevance of these intent based theories in interpreting the laws enacted during different periods in Sri Lanka and to analyse the prospects and challenges of these theories. An effective interpretation of legislation is of crucial importance to meet the changing needs of the society. This is mainly qualitative research carried out by reference to legislation, case laws, text books and data collected from the internet. The judges are expected to interpret a statute to reach the conclusion of a case based on the actual legislative intent under the intentionalism theory. The intentionalism theory has a restrictive approach to interpretation whereas purposivism gives considerable flexibility to a judge to interpret a statute in order to find out the purposes at different levels in a particular case. Therefore, this paper argues that judicial activism would be possible for the Sri Lankan judiciary through the application of the purposivism theory to bring justice despite the age of a statute.

**Keywords:** judicial activism, intentionalism, purposivism, legislative intent

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## **Quest for legalizing same-sex marriage: a natural law analysis**

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Marriage equality through legalizing same-sex marriage has become a long-running debate where law and morality play a vital role. Leading natural law theorists, such as John Finnis, Robert George, and Richard Duncan have attempted to offer the most common intellectual defense for criminalizing same-sex marriage and such relationships. Conversely, Ronald Dworkin in discussing the connection between law and morality has not seemed to have believed in the entire discriminatory legal framework for homosexuality. The objective of this research piece is to explore a new possible approach to defending same-sex marriage through the lenses of natural law. The author intends to critically analyze the natural law theory on homosexual marriage as advanced by John Finnis while investigating the Dworkinian perspective of justifying same-sex marriages. Selected Dworkin and Finnis mainly because they both specifically have addressed the moral issues involved in the debate on same-sex marriage from contrasting standpoints. Although Finnis has aimed homosexuality as unacceptable and immoral, Dworkinian liberalism approaches the issue purely based on the principle of equality. It is intended to argue that recognizing same-sex marriage is a way to reiterate the commitment and solidarity that is needed in forming the foundation of the union called 'marriage', regardless of sex, gender, or sexual orientation of the parties concerned. Public interest demands an objective approach to the issues cropping up as to the relationship between morality and law. This is doctrinal research particularly based on primary and secondary legal resources. The author concludes that legal recognition of same-sex marriages against all odds is a matter of justice and is in the interest of the public good.

Keywords: same-sex marriage, natural law, John Finnis, Ronald Dworkin, liberalism

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**The time for data protection is nigh: a robust data protection framework to assist in legitimately curbing the Covid-19 pandemic**

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The Covid-19 pandemic took the world by storm, leaving countries with little to no ability to have anticipated the measures they would have to resort to, to combat this pandemic. Amidst the chaos, there has been a worldwide surge of concern over how data of individuals would be used to curb the pandemic. Various measures have been adopted to collect, store and act on data pertaining to individuals to which Sri Lanka has been no exception. The right to privacy is not a recognized fundamental right in Sri Lanka. While several statutes refer to privacy and cases have alluded to the right this has not been crystallized in law. This study draws a comparison between the data protection regulations of the European Union – General Data Protection Regulations – which have provided an effective regulatory framework for authorities to carry out data-related emergency measures in order to curb the pandemic, while countries in which ad hoc measures have been adopted in the name of emergency laws, have failed to remain accountable to the people. This paper analyses the Data Protection Draft of Sri Lanka which is largely in line with European Union regulations and argues that it is time for Sri Lanka to adopt the requisite laws in tracking and tracing infection during the pandemic. It argues that this would provide a more robust system for gathering information, all the while respecting people's right to privacy, especially in an emergency situation such as Covid-19.

Keywords: data protection laws, right to privacy, Covid-19

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## **Ownership and commodification of human biological materials: ethical and legal dilemmas**

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The ownership of human biological materials is a controversial issue because of its legal and ethical considerations. Some scholars argue that people should retain ownership of their biomaterials indefinitely. On the other hand, researchers argue that granting property rights over human bio samples via ownership will convert human bio materials into a commodity by preventing the development of the research industry. Therefore, the law expresses hesitation about construing the meaning of the human body or its biomaterials in terms of ownership because owning oneself can result in the recreation of the concept of slavery. This paper aims to examine the ethical and legal difficulties surrounding ownership and use of biological material and products that originate from humans, including those used for commercial purposes. This research was conducted primarily as qualitative research based on primary and secondary data. The paper is divided into three sections. Firstly, the paper examines the concept of ownership and its nature by using Tony Honoré's analysis on the social constructivist theory of ownership. Secondly, it moves on to denote the legal and ethical complications and concerns relating to human biomaterials with special reference to the concept of the commodification of biomaterials. Thirdly, the research paper considers the pros and cons of granting ownership rights over human biomaterials and emphasises the importance of having specific legal recognition of human biomaterials by analysing the law relating to human biological materials in India with particular reference to the amended Transplantation of Human Organs and Tissues Act 1994 and National Organ Transplant Program. This paper suggests that ownership rights should be granted over human biological materials under a property law regime. At the same time, lawmakers should adopt an ethical framework that has universal binding authority to address the issues related to the commodification of human biomaterials.

Keywords: human biomaterials, ownership, social constructivist theory, commodification

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## The property right to exclude: a right in need of reinforcement?

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Property impacts on political, social, and economic aspects of human life, throughout history and across nations. Testifying to property's singular importance are multifarious property theories occupying a large conceptual space in scholarly work not limited to law. Within this gamut exists attributes of ownership pivotal to conceptualizing property. Widely accepted is that 'right to exclude', an entitlement to exclude unwanted persons from private property, is a cornerstone of ownership attributes essential for efficient use of property, and foundational to the in rem nature of property rights. Despite its importance 'the right to exclude' is often narrowed in the public interest in modern governance.

This paper focuses on research hypotheses that (1) eviscerating right to exclude results in economic cost to owners; and (2) strengthening right to exclude enhances economic efficiency to owners. It examines narrowing of right to exclude in Sri Lanka using legislation, and case law on servitudes and encroachments. South African property jurisprudence is studied as residuary property law in both countries is received Roman-Dutch law, though constitutional protection of property in South Africa since 1996, is noted as a change agent. It draws on the June 2021 US Supreme Court case of *Cedar Point Nursery et al v Hassid et al* where under constitutional protection of private property rights a 1975 California regulation granting right of access to unions to enter properties of agricultural landowners to meet workers was struck down as contravening owner right to exclude. Constitutional property analysis remains pertinent since Sri Lanka contemplates constitutional change, with givens of firstly, its Supreme Court's reflection in *Soysa v Arsecularatne* decrying judicial expansion of Roman-Dutch law to meet new contexts, and secondly, its Constitution's nineteenth amendment granting right to information, and throwing into relief proprietary nature of information. Since interdisciplinary research is mandated, the analytical tool of law and economics is used to consider economic efficiency of narrowing right to exclude. As the literature review reveals, on both counts the paper is original research in Sri Lanka. This exploratory research shows narrowing right to exclude leads to downturn in economic efficiency of property, a matter which policy makers need to consider.

Keywords: property, right to exclude, economic efficiency

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## **Adoption leave: time for an equal motherhood**

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Motherhood is a unique experience for women whether it is attained through natural birth or by adoption. Adoption is a process where persons adopt children according to the legal framework, who are born to some other parents. After having an adoption order, the adopted child gets the exclusive position of a child born to the adopter in lawful wedlock, even though there are several discriminations faced by the adoptive mother, especially with regard to maternity leave as they are not entitled in Sri Lankan legal context. The main objective of this research is to analyze the need of introducing adoption leave in Sri Lanka to allow adoptive mother to bond with adopted child and to provide opportunity for the child to acclimatize to the new mother. For this purpose, the following aspects are addressed by this research; (i) similarities and differences between natural mothers and adoptive mothers; (ii) current legal position of adoptive mothers in Sri Lanka; and (iii) rationale behind providing adoptive leave. The study uses qualitative analysis in order to gain insights into the existing laws relating to maternity leave in Sri Lanka. The research also adopts a comparative study of existing statutes and literature mainly from the UK, and South Africa and the international documents such as ILO conventions, CEDAW, and UNCRC. The research showcases the adoption leave is equally important as maternity leave, especially when the adopted child is under a certain age. The restrictions and the guidelines to adhere when providing adoption leave are also identified based on the comparative analysis. In conclusion, the research provides a timely and necessary study of the need of introducing adoption leave to Sri Lanka in order to protect the rights of adoptive mothers with several restrictions and guidelines.

Keywords: adoption leave, adopted child, adoptive mother, natural child, maternity leave

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**Work from home, now and forevermore: the way forward for the new normal  
employment rights in Sri Lanka**

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The technological advancement coupled with the safety measures adopted to combat the global pandemic had geared to experience many unprecedented working strategies within the employment sphere. Within which the concept of, “Work from Home” (WFH) or “Remote working” plays a significant role. It is significant in the sense that many of the organizations have travelled through a one way door where they cannot return back to the conventional work settings, as they have allowed their employees to work remotely and permanently, while setting their terms for the future. The solidity to this has been provided by the technologically developed labour platforms. Yet remote working is not a very novel concept to the entire world of work but it is an unprecedented legal arrangement to the Sri Lankan employment regime, as it does not hold any express specifications to legal recognition. On the backdrop of having no express legal recognition to the new normal practices of remote working, the paper attempts to critically evaluate the extent to which the existing legal regime could be applied to recognize the employment status of remote home workers and to what extent their employment rights could be availed under the existing laws. While the research findings emphasize that certain existing legal provisions could stand for a constructive protection to the rights of home workers, it is predominant that the existing laws enacted in a phase where remote working and the current advancement of digital labour markets were unforeseen will not stand for a wider protection. Thus, the paper stresses for the need of a technological based legislation and thereby recommends for a legal reform. Also, for a better outreach, the paper recommends for the ratification of the ILO’s Home Work Convention 1996.

Keywords: information communication technology, remote working, work from home

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## Delict law's response to police negligence: the Sri Lankan experience

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The incidents pertaining to abuse of police powers in Sri Lanka have led the legislative and judicial arms of the State to take progressive steps to ensure that the police powers are exercised in a manner to strike a balance between the interests of law enforcement and the rights of the people. Though, these steps have opened few avenues to the victims of abuse of police powers to seek redress at different forums, the pattern of cases presented before these forums reveal that only those victims who have met the criteria to access those forums to be successful in their claims. In this backdrop, the victims of police negligence have become the niche, vulnerable group whose interest have not been adequately addressed in the Sri Lankan legal system. The recent developments taken place in South Africa and England pertaining to the concept of duty of care have modelled up the police's common duty of care within delict/tort sphere. Compared to this, the status of the Sri Lankan law remains stagnant and thus, the litigants are unaware about the chance to try out this avenue for damages. In responding to this finding, this paper explores the idea as to how the recent developments of the selected jurisdictions could be used in the Sri Lankan context to uphold the rights of the victim to impose liability on the police for their negligence and omissions. For this purpose, the study makes reliance on the rights thesis, the concept of rule of law and proposes a legislative amendment to the *Police Ordinance No 16 of 1865* to incorporate clauses on common duty of care and the avenue to seek redress when it is breached.

Keywords: victim protection, police powers, duty of care

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## **The potential impact of Covid-19 pandemic on trusts' investments and estate planning in Sri Lanka: the way forward**

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The institution of the trust perhaps represents English law's most distinctive and important contribution to jurisprudence. A trust involves a relationship wherein a person (the settlor) transfers property to another (the trustee) for its management and control for the benefit of someone else (the beneficiary). In the context of Covid-19 global pandemic, the investment of trust assets and estate planning are likely to be significantly affected by the ensuing economic fallout. Some of the most important duties of the trustees are the prudent investment of trust assets and obligation to review investments etc. Many more obstacles are arising to the investment portfolios out of the global financial crisis because of the risk of trades and businesses and changed nature of many industries due to the global pandemic. Further, new legal anguishes and confusion continue to arise in the matters on trusts and estate planning. A global pandemic situation can be affected to protect and preserve an individual's legacy after their death and make the estate administration economically inefficient and, further, the beneficiaries and the trustees can be more stressful. This research paper not only attempts to spell out where we currently stand with our conceptual work but also suggests a re-orientation which places a strong emphasis on the institutional conditions of trust development in future research. This is qualitative research which seeks to identify the reasons why the trust has proved itself to be such a valuable legal institution and make the potential recommendations to the substantive law of the country in a pandemic situation. The competent authorities of the country should have a legal empowerment in the aspect of trusts law and there should be an encouragement to a deeper reflection among policy makers and legal practitioners about how to achieve the right balance between preserving the flexibility and legal innovation which the institution of the trust continues to facilitate and preventing abuses through the use of the trust.

Keywords: global pandemic, trusts' investments, estate planning, Sri Lanka

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**Patient care and medical responsibility in telemedicine during the pandemic: a comparative study**

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Telemedicine has become an essential aspect of clinical practice in modern medicine. Telemedicine, a subset of telehealth, refers to information and communication technology to improve patient's conditions by increasing access to care. During the COVID-19 pandemic, telemedicine is heavily used to manage high-risk groups and prevent overcrowding in outpatient departments. One of the significant problems in telemedicine in Sri Lanka during the pandemic was the reduced doctor-patient relationship resulting in a lack of care and monitoring, which caused uninformed decisions. This approach impacted severely on the patients' health. This study examines the standard of care expected from the medical professionals in telemedicine and their liability for possible delict/tort claims for lack of care during the pandemic. This study is significant since it requires balancing the rights of the patients and the responsibilities of the medical persons who work under pressure created as a result of the COVID -19 pandemic. Sri Lankan health guidelines do not refer to such detailed provisions; hence, it is worth looking at other favourable jurisdictions like India and Australia for a comparison. India provides generic telemedicine guidelines applicable to health professionals which could be adapted to the pandemic situation efficiently, while Australia makes specific guidelines for COVID-19 pandemic promoting 'good practices' applicable to telemedicine. In order to minimize the mismatch of the patient's rights and the medical responsibility, this qualitative study makes policy recommendations to enhance the existing policy framework on caregiving through telemedicine in Sri Lanka in the time of the pandemic by drawing examples from India and Australia.

Keywords: telemedicine, COVID-19 pandemic, delict/tort claims, patient care, medical liability

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**Filling the gaps and addressing the deficiencies concerning the rights of purchasers of provisional condominium property: prospectus and challenges from a Sri Lankan context**

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K. A. A. N. Thilakarathna

Institute of Human Resource Advancement, University of Colombo

While the condominium properties have emerged as a part of new urbanization, this new concept is an exception to the classical Roman concept *superficies solo cedit*. An owner of a condominium property has a restricted ownership which is confined to the prorate extent of the land together with the owners of other parcels of the same condominium, which could be considered a notional ownership. This is exemplified when one considers provisional condominium property where the ownership is vested on a thing which is either not being fully built or is in the process of being built. These are usually carried out with the investments of individuals, who intends upon the purchase of such properties upon their completion. Using the black letter approach embedded in the qualitative methodology, this research endeavour to critically analyze the rights of the owner of a provisional condominium property. The findings of this research have revealed that, the non-existence of the subject matter at the time of entering the contract is detrimental to the owner of such a property since the owner of such provisional condominium property may not have anything to show for till the property is erected. A further issue relates to the bankruptcy of the developer, in which event the investor may not be left with an effective remedy, unless his investment was insured. There is also the issue of registering the property since the law does not make it mandatory. Therefore, there is an urgent need to find law reforms in these areas to uplift the rights of purchasers of provisional condominium property and one of the best solutions can be found in introducing an insurance system to safeguard the rights of the investor.

Keywords: apartment ownership, provisional condominiums, Roman-Dutch Law

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# Faculty of Management and Finance



## *Strategic Resilience, Reinvention and Digital Disruption in Business Management*

22<sup>nd</sup> October 2021

## MESSAGE FROM THE DEAN

**Professor M.P.P. Dharmadasa**

Dean

Faculty of Management and Finance



I am delighted to send this message to the Annual Research Symposium 2021 of the University of Colombo. In line with the Annual Research Symposium of the University, the 16<sup>th</sup> Annual International Research Conference on Management and Finance (IRCMF) of the Faculty of Management and Finance will be held on 22<sup>nd</sup> October 2021 on the theme of *"Strategic Resilience, Reinvention, and Digital Disruption in Business Management"* via a virtual platform. IRCMF is a flagship event in the faculty, being organized annually in conjunction with Doctoral Colloquium. I would like to extend my heartfelt gratitude and thanks to our Conference Chairs for paving the way in making this happen. Certainly, this conference brings scholars and researchers into one platform to share the latest insights on topics of their interest. Moreover, this conference is a testament to faculty and researchers' commitment to learning and research and their resilience and adaptability to new situations and requirements. The papers submitted are fitted with the overarching objective of our research conference and had a peer-reviewed process to maintain the academic rigor, and the work showcased is evidence of this learning process. I sincerely hope that this conference deliberates and discusses all the different facets of the exciting theme and recommendations that will lead to advance the world through enhanced knowledge.

I wish the Annual Research Symposium -2021 of the University of Colombo a great success.



## MESSAGE FROM THE FACULTY COORDINATORS OF THE ANNUAL RESEARCH SYMPOSIUM



**Dr. S. Buvanendra**

Senior Lecturer

Department of Finance



**Dr. S.D.K. Wanninayake**

Senior Lecturer

Department of Human Resources Management

It is with great pleasure that we welcome you to the special Annual Research Symposium (ARS) Track of the 16th International Research Conference on Management and Finance (IRCMF 2021) organised by the Faculty of Management & Finance, University of Colombo, Sri Lanka. IRCMF 2021 is themed “Strategic Resilience, Reinvention and Digital Disruption in Business Management”.

Five abstracts are presented in the ARS Track of IRCMF 2021. These abstracts were accepted to be presented following a double-blind review process. They focus on a wide range of topics including Accounting, Auditing, and Financial Reporting Standards in small and medium-scale enterprises (SMEs) in Sri Lanka, the impact of microfinance on women empowerment, effective approaches to teaching and learning through active student and tutor engagement in online education, work-life balance of women entrepreneurs in Sri Lanka, and the role of transformational leadership in managing employee grievances of private sector banks in Sri Lanka. All presentations are followed by discussions with co-presenters and participants, as well as feedback from a panel of eminent researchers and academics.

One of the key highlights that presenters of abstracts in the ARS Track of IRCMF 2021 would experience is the keynote speech. We are honoured and delighted to have Professor Craig

Deegan, Professor of Accounting, College of Business & Economics, University of Tasmania, Australia as our keynote speaker. Professor Deegan, the author of three leading textbooks *Financial Accounting* (Mc Graw Hill, 9th edition 2020), *An Introduction to Accounting: Accountability in Organisations and Society* (Cengage, 1st edition, 2019), and *Financial Accounting Theory* (McGraw Hill, 5th edition) is one of the most cited researchers with over 28,000 Google Scholar citations.

Successful completion of the special ARS Track of IRCMF 2021 would not have been possible without assistance and guidance of many. We would like to extend our gratitude to Professor M.P.P Dharmadasa, the Dean of the Faculty of Management and Finance, the members of the IT support committee, media coordinators, internal and external reviewers, and panelists for their input. There is no conference or symposium without authors and participants, therefore, we especially acknowledge, value and thank all authors who submitted their work to the ARS 2021 and all participants.

## KEY PERSONNEL

### **Organising Committee of the Special Track for Annual Research Symposium 2021**

Dr. S. Buvanendra

Dr. S.D.K. Wanninayake

Mr. D. Lakshman

### **Panel of Reviewers**

Professor Arosha Adikaram

Professor Pavithra Kailasapthy

Professor Tharusha Gooneratne

Dr Nihal Hennayake

Dr Rajitha Silva

Dr Nuradhi Jayasiri

Dr Mayuri Atapattu

Dr Dharshani Thennakoon

Dr Tharindu Ediriwickrama

Mr D.M.S. Dasanayake

Mr Rajishtha De Alwis Seneviratne

## Programme

9.00 am	Registration
9.30 am	National Anthem
9.45 am	Video on 16 <sup>th</sup> International Research Conference on Management and Finance (IRCMF) 2021
9.55 am	Welcome Address by Dr. (Mrs.) S.D.K. Wanninayake Co-Chair: IRCMF 2021
10.15 am	Address by Senior Professor Chandrika N. Wijeyaratne Vice Chancellor – University of Colombo
10.25 am	Address by Professor M.P.P. Dharmadasa Dean – Faculty of Management and Finance, University of Colombo
10.40 am	Keynote Address by Professor Craig Deegan Professor of Accounting, College of Business & Economics, University of Tasmania, Australia
11.40 am	Vote of Thanks by Dr. (Mrs.) N. K. Jayasiri Co-Chair: IRCMF 2021
1.50 pm – 3.30 pm	ARS Track of IRCMF 2021

## INTRODUCTION TO KEYNOTE SPEAKER

### **Professor Craig Deegan**

Professor of Accounting

College of Business and Economics

University of Tasmania



Craig Deegan is Professor of Accounting at the College of Business & Economics, University of Tasmania, Hobart, Tasmania, Australia. Craig was formerly a Chartered Accountant in practice. He has published in many leading international accounting research journals, predominantly in the area of social and environmental accountability. His work has attracted in excess of 25,000 citations (as per Google Scholar) making him one of the most highly cited accounting researchers internationally.

Craig regularly provides research expertise to corporations, government, and industry bodies on issues pertaining to financial accounting and corporate social and environmental accountability. Craig is also the author of the leading financial accounting textbooks, *Financial Accounting* (now in its 9th edition with Mc Graw Hill), *Financial Accounting Theory* (now in its fourth edition with Mc Graw Hill), and *An Introduction to Accounting: Accountability in Organisations and Society* (with Cengage Learning). In September 2020, one of Craig's book was awarded the prestigious individual award of Outstanding Tertiary and VET Resource across all disciplines by Educational Publishing Awards Australia.

## **OUTLINE OF THE KEYNOTE SPEECH**

**Professor Craig Deegan**

**Professor of Accounting, College of Business & Economics, University of  
Tasmania, Australia**

**The evolving role of 'accounting' and 'accountants' in a world of changing expectations about organisational responsibilities and accountabilities**

Applying a four-step accountability model, the presentation will link changing perceptions of organisational responsibilities (including to such issues as climate change and fair work practices/modern slavery), to changing perceptions of organisational accountability, the role of 'accounting', and accountants. We will explore why it is vital that accounting educational programmes at both the tertiary and professional level consider, in depth, the rich issues of organisational responsibilities and accountabilities. Accounting as both a technical and social practice shall be emphasised, with specific reference to accounting for climate change, modern slavery, and COVID 19.

## **Adoption of Accounting, Auditing, and Financial Reporting Standards by Small and Medium-scale Enterprises (SMEs) in Sri Lanka**

A. W. J. C. Abeygunasekera

Department of Accounting, Faculty of Management and Finance, University of Colombo, Sri Lanka

Small and Medium-scale Enterprises (SMEs) play an important role in developing economies, and financial reporting (FR) is vital for SMEs' survival and growth. Accounting regulators in Sri Lanka make many efforts to promote FR standards among SMEs. This study aimed to identify the: (1) extent of adoption of accounting and auditing practices and the FR standards by Sri Lankan SMEs; (2) reasons for maintaining accounting records (AR) and FR by Sri Lankan SMEs; (3) challenges they faced in maintaining AR and FR; and (4) support expected from accounting regulators for maintaining AR and FR, by Sri Lankan SMEs. The study used a quantitative approach, and data collection was done through a survey of 100 SMEs around Sri Lanka. As per findings, 99% of SMEs maintained some accounting record; while 61% maintained the complete set of financial statements (i.e., Balance sheet, Income statement, Statement of changes in equity, Cashflow statement, and Notes to accounts), others maintained only a few. For maintaining the AR, 58% used accounting software; 'QuickBooks' is the most used. Only 67% of the SMEs obtain the service of an auditor, mainly to facilitate bank loans and taxation. Though 68% of SMEs were knowledgeable about their specific accounting standard, only 48% adopted it. The most mentioned reasons for maintaining AR and FR were decision-making, tax purposes, and negotiations for bank loans. The most mentioned challenges for maintaining AR and FR were related to lack of knowledge on accounting standards, high cost for the process, inadequate staff, and lack of time and information. The SMEs expect guidance to prepare AR and FR from accounting regulators through conducting awareness sessions and training, providing technical support on standards with exemplary examples, and having simple standards. Findings facilitate the initiatives on the development and promotion of accounting practices and standards by regulators and government.

**Keywords:** Accounting, Accounting standards, Auditing, Financial reporting, SMEs

## A Reality of the Impact of Microfinance on Women Empowerment

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Many researchers and practitioners of microfinance prescribe microfinance as a tool of poverty alleviation and women empowerment in terms of financial empowerment (FE) and social empowerment (SE). Meanwhile, a reasonable number of empirical research reveals that microfinance's impact on poverty reduction and women empowerment is unclear or even negative, leaving the poor worse off. Thus, such deviations of outcome from the expected direction of microfinance are framed as myths of microfinance. In such a context of inconclusive findings, despite seminal work investigating the impact of microfinance on poverty, it is hard to find seminal work that examines the impact of microfinance on women empowerment. After 30 years of the North-East war in Sri Lanka, government and non-governmental organizations have been implementing various development programmes targeting the marginalised people in the war-affected area. However, the consequences of such programmes, including microfinance programmes implemented by the Samurdhi Authority through Samurdhi Banks, are not evident. In light of this, the present study investigates whether microfinance programmes lead to FE and SE of women and whether this differs between urban and rural sectors in Mannar?

In order to address the research questions, a quantitative research approach is used, and the survey strategy is adapted. Cross-sectional data are collected by administering a questionnaire [independent variables are the participating in the microfinance program (measures as membership years and a number of loans) and demographic factors; the dependent variable (women empowerment) is measured adopting standard scales] among the members of the selected branches of Samurdhi Bank (Urban and rural). A simple random sampling technique is applied to select a hundred respondents (fifty from urban and rural sectors) as the sample.

A multiple regression analysis technique is used to address the first research question considering FE and SE as the dependent variable in separate models. Membership years with Samurdhi bank influences significantly FE and SE. Using MANOVA technique, the second



question is addressed. The results confirmed that though SE is not significantly different in both sectors, FE is significant marginally and higher in the urban sector. We conclude that longer membership with microfinance providers increases women empowerment, perhaps through other services provided by the bank and FE is well pronounced in the urban sector due to the availability of economic opportunities. The generalizability of these findings might be limited to a certain level due to classificational issues of urban and rural. Future research can consider the interaction effect of other services on women empowerment.

**Keywords:** Microfinance, Women empowerment, Rural area, Urban area

**Effective Approaches to Teaching and Learning through Active Student and Tutor  
Engagement in Online Education: Reflections on Practice**

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University of Colombo, Sri Lanka

Active student and tutor engagement is key to a successful teaching and learning. However, unlike face-to-face teaching and learning, online delivery presents a unique challenge as the interaction between the student, and the tutor is mainly via the internet. Drawing from the researcher's online teaching experience with a UK-based business school for students residing in Asia, this paper presents five case studies on various strategies implemented into the design and delivery of an online course to foster a higher level of student and tutor engagement on multiple pedagogies. The paper thus answers two questions; (a) what are the challenges face by teachers in the online education? (b) what strategies can be implemented to increase active students and tutor engagement in online teaching? The study has identified several challenges in online teaching; lack of student participation for online learning activities, weak students' response in the online platform, low quality of students' assessments submission, weak involvement of guidance tutors and their low confidence in online teaching. Based on the self-regulated theory, the paper presents five case studies focusing on; re-designing learning activities, active student engagement, peer-observation with peer-based moderation, developing effective learning environment and assessment with feedback to learners in online education. In line with the 15 core dimensions as specified in the United Kingdom Professional Standards Framework (UKPSF), the five case studies elaborated the areas of actions the teaching team has taken towards effective teaching, learning, and assessment of an online delivered undergraduate programme. The reflections through the case studies contribute to the wider discourse of active teaching and learning strategies and how a technologically enhanced learning environment may align with self-regulated learning. This paper contributes to a developing field of research related to the design and delivery of online courses in the pursuit of actively engaged students and tutors in higher education.

**Keywords:** Online learning, Active teaching and learning, Student engagement, Self-regulated theory

## Work-life Balance of Women Entrepreneurs in Sri Lanka

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In Sri Lanka, female entrepreneurship is contributing towards the economy. However, women entrepreneurs seem to struggle between the two distinct roles: one at work and the other at home which make them difficult to achieve work-life balance (WLB). Hence, the main aim of this study was to enrich the understanding of women entrepreneurs' WLB in Sri Lanka by drawing on work/family border theory. The research was designed to understand the meaning of WLB from the perspective of women entrepreneurs, to examine the factors affecting their WLB, and to identify how they manage their dual responsibilities at work and home. A qualitative research approach and semi-structured interviews were used. Purposive sampling was used to select 12 women entrepreneurs from micro, small and medium-sized enterprises across industries. This study found three meanings of WLB from the perspective of women entrepreneurs. They are: harmony between work and life, felicity in life, and dynamic with priorities. It identified four factors that influenced the WLB of women entrepreneurs. They are workload and work pressure, childcare, lack of time, and blurring of borders. Finally, it identified that women entrepreneurs use support system and coping strategies to manage their dual responsibilities. Support system comprised of family support, spousal support, and staff support. The coping strategies comprised of planning, scheduling and organizing, networking, and time-offs and breaks. The study also supports the border theory by identifying that segmentation creates synergy in domain responsibilities of women entrepreneurs and blurring of borders would create more work-life balance issues because of greater permeations across borders. Further, we identified that the support from border keepers (e.g., spouse) and other domain members (e.g., sibling) would enhance the WLB of women entrepreneurs by assisting their domain responsibilities. Thus, segmentation and support system can be used to achieve greater WLB.

**Keywords:** Work-life balance, Women entrepreneurs, Qualitative research, Border theory

## The Role of Transformational Leadership in Managing Employee Grievances: A Case of Private Sector Banks in Sri Lanka

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Employee grievances are a key human resource concern for all types of organizations. In the context of the Sri Lankan private banks, it is observed that there is an increasing trend of reporting work related grievances among the frontline employees despite the best procedures adopted. As a result, there are some significant negative organizational outcomes such as decreased employee satisfaction, demotivate to work, increase employee absenteeism, and increase employee turnover. Therefore, to overcome these negative repercussions, organizations must reshape their grievance handling procedure whereas organizational leadership plays a major role. Among the various leadership styles available, most researchers have expressed that transformational leadership is more effective in handling employee grievances. Based on that, this study aims at two research objectives. First, to explore the types of grievances encountered by the frontline employees in Sri Lankan private sector banks and second to explore the transformational leader characteristics that support effectively handle such grievances. To achieve these two objectives, the study adopts a qualitative approach by using 20 frontline employees from three purposively chosen private banks employing a semi-structured interview strategy to collect the data. The findings, in terms of the first research objective, the study identified several grievance types including work related grievances, performance management related grievances, wellbeing related grievances, work resources related grievances, and interpersonal relationships related grievances. In terms of the second research objective, it is revealed that transformational leader characteristics support grievance handling in suggesting new ways, individual consideration, providing support and aspirations, creating a collective sense of mission, and prioritizing employee well-being. As the theoretical implication, this study fills the lacuna that exists in the domain of grievance handling literature to explore its link to transformational leader characteristics while the practical implications include providing insights to practitioners in shaping their leadership approach to serve the demands of the employees.

**Keywords:** Employee grievances, Grievance handling, Transformational leadership

**Faculty of Medicine**  
**Colombo Medical Congress 2021**



***NCD and COVID 19: Tackling Two Pandemics***  
***Through Collaborative Research***  
25<sup>th</sup> to 27<sup>th</sup> November 2021

## MESSAGE FROM THE DEAN

**Vidya Jyothi Prof. Vajira H. W. Dissanayake**

Dean

Faculty of Medicine

University of Colombo



It gives me great pleasure to welcome all the in person and virtual delegates to Colombo Medical Congress 2021. The Inaugural Congress held last year as the pandemic was breaking out was a grand success. The Colombo Medical Congress, from this year, would become an annual event in the calendar of the faculty and it would be held in the last quarter of the year. I would like to invite the alumni of the faculty to keep the time free and make it an occasion to make an annual visit to the Faculty to enjoy not only the scientific feast but also to the warmth and hospitality of your alma mater.

This year's theme "NCD and COVID-19: Tackling Two Pandemics Through Collaborative Research" highlights the twin challenges that we face - the omnipresent NCDs and the new challenge COVID-19. We all hope that the lessons that we learned from dealing with COVID-19 would inform new ways of dealing with the NCDs.

I wish to thank Prof. Sampath Amaratunga, our Chief Guest, and Dr. Soumya Swaminathan, our Guest of Honour for accepting our invitation. I also wish to thank Prof. Chandrika Wijeyaratne, the Vice Chancellor for her support. The conference is enriched by the talks given by the plenary speakers, speakers in symposia, the Bus Stop talks, and abstract and poster presentations. I wish to congratulate Dr. Sumudu Seneviratne, who would be delivering the Faculty Oration, and Dr. Ananda Wijewickrama, who would be delivering the COMSAA Oration.

The members of the organising committee, the scientific committee, and members of the administrative staff of the faculty deserve special mention for their untiring efforts.

I wish all the delegates a productive and enjoyable conference.

## MESSAGE FROM THE CO-CHAIRPERSONS



**Vidya Jyothi Prof. Prasad Katulanda**

Co-Chair, CMC 2021  
President CoMSAA  
Faculty of Medicine



**Prof. Dilshani Dissanayake**

Co-Chair, Scientific Committee  
Director, RPFC  
Faculty of Medicine

We are delighted and privileged to send this message for the Colombo Medical Congress 2021 (CMC21), jointly organized by the Colombo Medical Faculty Alumni Association (CoMSAA) and the Research Promotion and Facilitation Centre (RPFC) of the faculty, aligning with the Annual Research Symposium of the University of Colombo. The success of CMC2021 belongs to all the members of the organizing committee consisting of academic staff of the Faculty, CoMSAA members and members of the non-academic staff including members of the technical officers' research community of RPFC. The student members of Medical Faculty Research Community (MFRC) contributed immensely to make this event a reality. The organizing committee received constant guidance from the Dean of the Faculty Professor Vajira Dissanayake and the Vice chancellor of the University, Professor Chandrika Wijeyaratne. The congress is adorned by a keynote speech by an international expert, two orations, two plenaries and nine symposia. Plenaries and symposia are chaired and resourced by eminent researchers and experts in the respective fields who will share their knowledge and experience on a variety of topics. The oral and poster sessions highlight the cutting-edge research conducted by the researchers of the Faculty and CoMSAA. The medical debate will be an attractive feature in which a timely topic is debated by experts in the field. A separate session for student research is coordinated and chaired by the students of MFRC. Another highlight of the congress is the session organized by the Technology Transfer Office of the RPFC, focusing on innovations and involvement of technical officers of the faculty for innovative research. The post-graduate session will showcase skills of our post-graduate students in communicating research to public. The organizing committee invite all the researchers in the higher education institutions in Sri Lanka and all CoMSAA members to share, learn and celebrate findings of research at the Colombo Medical Congress 2021. We hope that the CMC will expand and flourish in the years to come.



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**OP-01: Evaluation of the Covishield vaccine (1<sup>st</sup> and 2<sup>nd</sup> doses) induced antibody response, in a cohort of participants in Colombo**

SA Gunawardena<sup>1</sup>, TMRR Jinasena<sup>2</sup>, GW Katulanda<sup>1</sup>, B Agampodi<sup>3</sup>, H Dodampahala<sup>4</sup>, DJGGN Dissanayake<sup>1</sup>, IN Jayasinghe<sup>2</sup>, TInthujah<sup>1</sup>, SMPP Samarakoon<sup>1</sup>, BMCM Balasooriya<sup>1</sup>, N Sujeeva<sup>1</sup>, ZTM Thowfeek<sup>1</sup>, S Prashanthan<sup>1</sup>, WAM Wijesuriya<sup>1</sup>, OMO Siddiqi<sup>1</sup>, P Thushyanthi<sup>2</sup>, AMTU Athapaththu<sup>2</sup>, M Samarasinghe<sup>2</sup>, TW Ediriweera<sup>1</sup>, SP Hewa<sup>2</sup>

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**Introduction:** As a part of the global effort to combat SARS Cov-2 infection the first immunization program using Covishield vaccine was launched in Sri Lanka in early 2021. To evaluate the success of the initiative it is essential to assess the immune response of recipients.

**Methods:** It is a hospital based multicenter prospective cohort study. Health care workers and general public between 18-75 years of age were enrolled by consecutive sampling at vaccination centers, National Hospital of Sri Lanka and Colombo South Teaching Hospital. After taking the consent blood samples were collected on day 0, 14, 21, 45 and 90 following the first dose and on day 0, 14 and 3 months after the booster dose. Total antibody levels to receptor binding domain of spike protein were measured using Advia XP chemiluminescent assay method.

**Results:** Out of 190 recruited participants (45.45% male, 54.55% female) seroconversion observed in 87.5% (77/88) on day 14, 95.0% (127/133) on day 21 and 100% (30/30) on day 45 following a single dose of the vaccine. Greater response was noted on day 45 following the 1<sup>st</sup> dose (median-14.43 Index, IQR-5.5-34.3) with a maximum response at 2 weeks following the booster dose (median-237.14, IQR-194.73-322.64). Participants with extremes of BMI (less than 18.5kg/m<sup>2</sup> or more than 30kg/m<sup>2</sup>) showed significantly low response, while >30kg/m<sup>2</sup> category showed a slow increase with time. Participants who received booster 3 months following the 1<sup>st</sup> dose had a significantly higher response at post 2 weeks of the second dose (mean-259 index) compared to individuals who received the 2<sup>nd</sup> dose 45 days later (mean-83.42 index). Three months following the booster dose a significant reduction of antibody levels (median 67.68, IQR 35.33-107.27) were noted in participants (80/83) with a p value of <0.05.

**Conclusion:** Two doses of the vaccine showed a good antibody response. Significant reduction of antibody levels at 3 months following the booster dose indicate the need of further studies to assess the need of a third dose in recipients.

**Key Words:** Covishield, seropositive, Immune response

**Acknowledgement:** National Research Council grant CVD 20-41

**OP-02: An analysis of COVID-19 positive deaths reported from an urban Sri Lankan population after the introduction of the COVID-19 vaccination program**

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Department of Forensic Medicine and Toxicology, Faculty of Medicine, University of Colombo, Sri Lanka

**Introduction:** The SARS COV-2 outbreak has drastically altered mortality rates globally and much attention is now being given to the impact of vaccination on preventing COVID-19 related deaths. This study aims to analyze the the demographic details, vaccination status and the mortality trends among forensic autopsies reported from Colombo suburbs where COVID-19 positivity was detected.

**Method:** A retrospective analysis was done on the postmortem databases of the department of Forensic Medicine, Colombo. All deaths which were reported during the months of April to August following confirmed COVID-19 infection or where postmortem PCR was detected to be positive during routine screening were included in the study. Those who had obtained at least one dose of any COVID – 19 vaccine, regardless of the time of vaccination were included in the vaccinated group.

**Results:** A total of 231 positive cases were identified. M:F ratio was 6:5. Median age was 73 years (3 ½ months to 103) and >50% of cases were in the 61-80 age group. 78.8% of these deaths were non-vaccinated and only 4.8% had received both doses. There was no significant age difference or gender disparity between the non-vaccinated and vaccinated groups. COVID-19 was given as a direct cause of death in 132 (57.1%) and as a contributory cause in 61 (26.4%) of cases. COVID-19 was an incidental finding and not related to the death in 33 cases (14.3%) which included 3 accidental deaths and 2 suicides. There was a higher percentage of non-vaccinated individuals where COVID-19 was related to the death (85.1%) in comparison to the vaccinated individuals (77.5%) which however was not statistically significant.

**Conclusion:** There was a higher proportion of non-vaccinated individuals among the COVID-19 positive deaths reported during April to August. Although no significant difference was found, the study revealed that there is a higher probability of COVID-19 being a direct or contributory cause of death if non-vaccinated individuals were infected with the virus.

**Key words:** Post-mortem PCR examination, COVID-19 mortality trends, forensic autopsies, mortality surveillance

**OP-03: Mortality trends in a Sri Lankan urban population before and during the COVID – 19 pandemic based on autopsies referred to a forensic institution in Colombo**

JW Gunawardana, S Kanthasamy, ULH Ranganatha, BI Keerawelle, P Pathmanadan, K Kiritharan,  
NV Wijeweera, R Samaranayake, SA Gunawardena

Department of Forensic Medicine & Toxicology, Faculty of Medicine, University of Colombo

**Introduction:** There is much debate on how the COVID–19 pandemic has affected health and mortality of populations. This study aims to compare the mortality trends within a Sri Lankan urban community before and during the pandemic.

**Methods:** All autopsies referred through six police divisions to the Department of Forensic Medicine and Toxicology, Colombo between 1<sup>st</sup> of January 2019 to 31<sup>st</sup> of July 2021 were analysed using a proforma based on demographic data, circumstances and causes of death.

**Results:** A total of 1398 deaths (Mean age 58.71 +/- 18.59) were analysed. M:F ratio was ~7:3. More deaths reported in the first 7 months of 2021 (n=525) than the previous two years (n<sub>2019</sub>=463; n<sub>2020</sub>=410). Significant differences (p<0.001) in the mean ages of deaths were noted in 2019, 2020 and 2021 (54.69; 58.84 and 62.18 respectively). The percentage of natural deaths increased from 63.5% in 2019 to 78.1% in 2021 while the percentage of accidental deaths were 16.6%, 17.8% and 10.3% in the three years respectively. Majority of deaths were due to cardiovascular causes (2019=36.1%; 2020=33.7%; 2021=39.0%). 2021 had a significant increase in deaths from infections (23.8%) compared to other years (p< 0.001). There were 144 SARS CoV-2 positive deaths out of which 74.3% were within May-July 2021. COVID-19 was a direct or contributory cause of death in >80% of these cases. From 2019 to 2021, a significant reduction was observed for road traffic fatalities (p<0.001) while suicides dropped from 10.2% to 4.8% and homicides dropped from 1.7% to 0.6%.

**Conclusion:** Although, there is an apparent reduction in unnatural deaths including traffic fatalities, suicides and homicides during the COVID-19 pandemic, overall mortality rates have drastically increased in 2021 with cardiovascular diseases and infections accounting for more than 60% of deaths. The results reflect the potentially harmful effects of disruption of hospital services and reluctance for seeking healthcare during the COVID-19 pandemic.

**Keywords:** COVID-19 excess mortality, forensic autopsies, health care seeking behaviour, SARS n-COV-2 pandemic

**OP-04: Facemask literacy and usage among employees of the University of Colombo during the COVID-19 pandemic.**

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Department of Physiology, Faculty of Medicine, University of Colombo, Sri Lanka.

**Introduction:** Correct use of facemasks prevents COVID-19 spread. Improper disposal of used facemasks promotes spread of infection and environmental pollution. This study assessed the knowledge and practises of facemask usage during COVID-19 infection among employees of the University of Colombo.

**Method:** A descriptive cross-sectional study was conducted among academic, non-academic and administrative staff, consisting of individuals representative of general community with dynamic socio-demographic backgrounds and educational levels. All consenting respondents to a pre-tested, web-based, self-administered questionnaire, e-mailed once by the university Network Operating Centre were recruited. To assess the knowledge and usage patterns, scores were given separately for the questions assessing them.

**Results:** All 208 respondents (male: female = 33:19) always wore facemasks using the correct technique when leaving home. Majority preferred N-95 (70%) masks or surgical masks (64%) over cloth masks (3%) and most practised double-masking (81%). However, use of facemasks was only 70% at workplace, 50% while using public transport, 51% at home when an outsider was present and 28% at home when with a family member having respiratory symptoms. Removing/lowering facemask in public washrooms (19%), at public places with a 1m distance between each other (7%) or when answering phone calls (3%) was reported. Main problems encountered were; difficulty in breathing (59%), feeling hot (50%), spectacle-fogging (42%), and earache (42%). Majority disposed facemasks by burning (46%) or with garbage collected by municipal council (38%). Knowledge scores on face masks were significantly higher ( $p<0.05$ ) in females. Correct facemask usage scores were significantly higher ( $p<0.05$ ) in academics and employees with educational level  $>A/L$ . Low response rate (10%) is a limitation.

**Conclusion:** Though the majority adhered to the correct facemask usage, some unsatisfactory practises were evident, which require prompt intervention to optimise mask literacy and practices. Reinforcing education on the value and use of facemasks and developing methods for disposal are immediate necessities.

**Key words:** Facemasks, COVID-19, University, Colombo

**OP-05: Efficacy of four different clearing agents for the detection of helminth eggs in thick fecal smears**

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**Introduction:** Kato-Katz thick smear is the standard technique recommended by the World Health Organization for microscopic diagnosis of intestinal helminth infections. In the Kato-Katz technique, glycerin functions as the clearing agent while malachite green (or methylene blue) stains the background against which helminth eggs can be visualized clearly. Although glycerin and malachite green are commercially available, they are fairly costly. Therefore, this study was done to identify cost effective substitutes for use in the local setting.

**Methodology:** Fecal clearing properties of six different locally available substitutes were compared against the standard agent, glycerin. Clarity of fecal smears for detection of helminth eggs was observed through light microscopy. Four substitute agents with the best clearing properties were then selected: (i) pure castor oil, (ii) pure coconut oil, (iii) castor oil combined with distilled water and methylene blue (100:100:1) and (iv) citronella oil combined with distilled water and methylene blue (100:100:1). Methylene blue was used due to unavailability of malachite green. A stool sample positive for helminth eggs (Sample X) was randomly tested 10 times using the standard Kato-Katz technique and egg counts recorded at 15minute intervals for 3 hours. Similarly, three random tests were done from Sample X using the Kato-Katz technique substituted with each of the four selected test agents and egg counts recorded. Mean helminth egg counts were determined and compared between the standard and substitute agents using the Anova statistical test.

**Results:** Mean egg counts recorded by the standard Kato-Katz was 21 eggs/smear (range: 16 – 31), while it was 18, 28, 20 and 17 for the four substitute agents (i) - (iv) mentioned above, respectively. No significant differences were observed in the mean egg counts recorded between the standard and substitute agents ( $P>0.05$ ).

**Conclusion:** Four substitute agents showed good faecal clearing properties and mean egg counts compared to the standard. Pure coconut oil could serve as a cost-effective alternative in the local setting.

**Keywords:** Kato-Katz, coconut oil, castor oil, citronella oil, helminth egg counts

**OP-06: Demographic, lifestyle and co-morbidity patterns of COVID-19 infection**

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**Introduction:** Corona virus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has created a public health crisis. Extensive research has been conducted on COVID-19 infection in developed countries and in China. However, data are still scarce in South Asian and Sri Lankan setting. We aimed to identify common demographic, lifestyle and co-morbidity patterns of COVID-19 infection among adults.

**Methodology:** A cross sectional study was carried out in all patients (n=3861) admitted to the triage medical ward of National Hospital of Sri Lanka Colombo from December 1st, 2020, to January 31st, 2021. Data regarding age, sex, presence of diabetes mellitus (DM), hypertension, dyslipidaemia, chronic kidney disease (CKD), chronic obstructive pulmonary disease, smoking, alcohol consumption and SARS-COV2 rapid antigen test (RAT) results were collected. Associations with aforementioned parameters and COVID-19 status were assessed using Chi square test and odds ratios (OR).

**Results:** A total of 250 (6.5%) were positive for COVID-19 infection. Mean age of the population was 51.29 (SD=17.04) and 42.8% were males. Age groups (<30, 30-60, >60, p=0.032), diabetes mellitus (p=0.027), hypertension (p=0.006), CKD (p<0.001), smoking (p=0.005) and alcohol (p=0.001) were associated with being Covid-19 positive. A majority of 58.4% (146/250) of infected cases were in 31-60 age group. Alcohol consumption (OR=2.004) and smoking (OR=1.877) were predictive of having COVID-19 infection. Higher percentage of Covid-19 negative patients had DM (29.8% & 20.5%, OR=0.718), hypertension (29.6% & 15.4%, OR=0.657), and CKD (15.4% & 0.6%, OR=0.206) than covid-19 positive patients.

**Conclusion:** The age group representing the workforce (30 – 60 years) was at an increased risk. Alcohol consumption and smoking increased the risk of acquiring the infection. Those with co-morbidities had a lower rate of COVID-19 infection. It can be suggested that their co-morbidities made them adhere to safety precautions.

**Key words:** COVID-19 infection, Demographic features, Co-morbidities, Smoking, Alcohol consumption

**OP-07: Prevalence of Gastro Oesophageal Reflux Disease Symptoms in Western Province,  
Sri Lanka**

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**Introduction:** Gastro oesophageal reflux disease (GORD) is a common problem encountered in medical practice in Sri Lanka. Surprisingly, its community prevalence in Sri Lanka is unknown. In this preliminary study, we assessed the prevalence of GORD symptoms in the Western Province of Sri Lanka

**Methods:** A total of 330 adults (age 18-70 years, mean 45.7 years, SD 13.7 years; F:M=1:1.1) were recruited from all 3 districts of Western province by random cluster sampling. An interviewer administered questionnaire with a country validated GORD screening tool (which measures the frequency and severity of heartburn, regurgitation, chest pain, bloating etc.) and other tools (validated stress level questionnaire, food frequency questionnaire etc) to measure various associated factors were used. Weight, height, waist, and hip circumference were measured using standard techniques.

**Results:** Eighty-five people (25.8%) had heartburn and/ or acid regurgitation at least once a week which is an internationally used criterion for probable GORD. When comparing those with GORD versus those without, female gender (females 57.6% vs. males 42.4%), use of medications such as antiasthmatics (11.8% vs. 4.1%) and statins (24.7% vs. 13.1%), asthma (14.1% vs. 5.7%), abdominal obesity (77.6% vs. 62%), high stress level (55.3% vs. 33.9%) and habits such as skipping breakfast (37.6% vs. 19.2%), sleeping after meals (54.1% vs. 38%) and smoking (30.6% vs. 19.2%), were found to be significant factors ( $p<0.05$ ).

**Conclusions:** Western province of Sri Lanka has a high GORD symptom prevalence rate of 25.8% which is higher than reported in many other Asian countries and is comparable to that reported in Western world. This could be due to highly westernised lifestyle habits and diet in this province.

**Key words:** Gastroesophageal reflux disease, prevalence, Sri Lanka, heartburn, reflux

**Acknowledgments:** Funded by University Grants Commission



**OP-08: Advertising literacy on non-core food and beverages, its inter-relationships and associated factors among grade 12 children in 1AB schools in Colombo educational zone**

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<sup>1</sup> Department of Community Medicine, Faculty of Medicine, University of Colombo.

**Introduction:** Children are the target of non-core food and beverages through television advertisements which exploit them leading to poor food choices and non-communicable diseases. Children should be empowered with advertising literacy to counteract harmful advertising. Aim of the study was to describe the advertising literacy on non-core food and beverages, its inter-relationships and associated factors among grade 12 children in type 1AB schools in Colombo district.

**Methods:** A cross-sectional analytical study conducted among 636 grade 12 students in six Type-1AB schools in Colombo educational zone by two-stage stratified cluster sampling. A self-administered questionnaire was used to assess conceptual, attitudinal advertising literacy and advertising literacy performance. Using means, participants were divided into sufficient/insufficient levels of literacy. Associations were assessed using t-test, ANOVA and Chi-squared tests.

**Results:** Response rate was 97.5%. Mean age of students was 16.62 ( $SD=0.6$ ). Majority were girls ( $n=331, 52.0\%$ ); Science Stream ( $n=375, 59\%$ ); monthly family income less than Rs.100,000/=( $n=343, 54\%$ ); pocket money less than Rs.1000/=( $n=423, 66.5\%$ ); and watching television less than two hours a day ( $n=526, 82\%$ ). Mean conceptual, attitudinal and performance food advertising literacy scores were 70.6% ( $SD=8.2\%$ ), 66.8% ( $SD=8.8\%$ ) and 55.8% ( $SD=14.4\%$ ), respectively. Mean score of overall food advertising literacy was 67% ( $SD=5.9\%$ ) with 51.9% (95% CI=48.1-55.7) of sufficient food advertising literacy.

Food advertising literacy performance showed weakly positive significant correlations with conceptual ( $Pearson r(636)=0.106, p=0.007$ ) and attitudinal ( $Pearson r(636)=0.133, p=0.001$ ) advertising literacy and no correlation between conceptual and attitudinal advertising literacy ( $Pearson r(636)=-0.003, p=0.946$ ). Food advertising literacy was significantly higher in females ( $p=0.014$ ), high monthly family income ( $p< 0.001$ ), low pocket money( $p=0.04$ ), A/Level Science Stream ( $p=0.003$ ), less television screentime ( $p=0.012$ ) and having parental influence on food advertising ( $p=0.001$ ). There was no difference with type of school ( $p=0.12$ ) or ethnicity ( $p=0.073$ ).

**Conclusions:** A little over half of the sample had sufficient advertising literacy. Performance significantly correlated with both knowledge and attitudes on literacy. High family income and parental influence, low pocket money and screentime are associated with high advertising literacy.

**Key words:** Advertising literacy, non-core food and beverages, children

**OP-09: Network pharmacology-based approach to investigate major compounds present in  
*Aloe vera* leaf gel against chronic gastritis**

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Sri Lanka.

**Introduction:** *Aloe vera* leaf gel has been reported to possess a wide range of pharmacological properties. It has been extensively used to treat gastric symptoms. However, the pharmacological evaluation of major *Aloe vera* leaf gel compounds for the treatment of chronic gastritis remains vague to date. Potential drug targets of aloeresin D, aloesaponarin I, aloesin, aloin, azelaic acid, chrysophanol, erucic acid, esculetin, helminthosporin, rhein and umbelliferone, major *Aloe vera* leaf gel compounds, were analyzed using a network pharmacology approach.

**Methods:** First, chronic gastritis related gene targets were acquired using DisGeNET and Kyoto Encyclopedia of Genes and Genomes (KEGG) data bases. Second, predicted drug targets of above compounds were extracted using Phrammapper, SwissTarget Prediction and Similarity ensemble approach (SEA) databases individually. A network for active ingredients-candidate targets-proteins” was constructed and visualized using Cytoscape software. Finally, compound targets and enriched pathways were observed by Gene Ontology (GO) and KEGG pathway enrichment analysis.

**Results:** A total of 267 genes were identified to associate with chronic gastritis. Following analysis, 33 predicted targets of all major *Aloe vera* compounds mentioned above were found to intersect with genes associated with chronic gastritis. Predicted targets were validated using KEGG pathway analysis. The results of the pathway enrichment analysis indicated that putative targets of major *Aloe vera* gel compounds mostly participated in signaling pathways associated with anti-inflammation response. Among the putative targets of *Aloe vera* gel compounds, *NOS2* (Nitric Oxide Synthase 2), a major mediator of gastritis related inflammations, was identified.

**Conclusion:** This analysis provides a rationale for researchers to explore molecular mechanisms implicated in *Aloe vera* gel compounds for chronic gastritis *in-vitro* and *in-vivo*.

**Key words:** *Aloe vera* leaf gel, chronic gastritis, pharmacology-based approach, Nitric Oxide Synthase 2 (*NOS2*)

**OP-10: The use of *Caralluma fimbriata* as an appetite suppressant and weight loss supplement: a systematic review and meta-analysis of clinical trials**

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**Introduction:** Obesity prevalence has increased during the past few decades, causing a pandemic with an influx in other co-morbidities. Many factors influence weight gain in an obesogenic environment therefore strategies for treating obesity may vary from conventional dietary and physical activity interventions to pharmacotherapy. A shift in unconventional strategies as herbal products for treating obesity have been investigated and one such plant extract is *Caralluma fimbriata* (*C. fimbriata*), found as supplements in the form of capsules or powder sachets. The potential effects of *C. fimbriata* as an appetite suppressant and weight loss supplement was systematically reviewed by the studies included.

**Methods:** A systematic review of clinical trials reporting the effects of *C. fimbriata* as appetite suppression and anti-obesity supplement was reported according to PRISMA guidelines. Data were obtained by searching three databases: PubMed<sup>®</sup>, Web of Science<sup>®</sup> and SciVerse Scopus<sup>®</sup> for studies published until 30<sup>th</sup> April 2020.

**Results:** A total of 7 articles studying *C. fimbriata* satisfied the inclusion and exclusion criteria and belonged to various countries including Australia (3), Cuba (1), India (2) and Spain (1). Almost all studies recruited adults either overweight or obese with a BMI > 25kg/m<sup>2</sup> (n=5). Parameters assessing obesity, biochemical and appetite factors were analysed via a meta-analysis. Compared to placebo group, *C. fimbriata* extract significantly reduced WC by 1.59 cm (95% CI, -3.07 to -0.10, *p* = 0.041) and WHR by 0.06 (95% CI, -0.12 to -0.01, *p* = 0.05) with no significant effects on BW, BMI and HC. Biochemical and appetite parameters outcome with *C. fimbriata*. had no significant changes. Side effects of the extract were reported by few studies, most common effects were constipation, diarrhoea, nausea and rashes.

**Conclusion:** Appetite parameters showed no significant changes and metabolic parameters did not improve with *C. fimbriata* supplementation therefore it is unlikely to recommend *C. fimbriata* as a weight loss supplement and an appetite suppressant.

**Keywords:** *Caralluma fimbriata*, Obesity, Appetite, Weight loss

**OP-11: Effects of long-term meditation on telomere length, and plasma telomerase level: a case control study**

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**Introduction:** Meditation is being increasingly known as a practice of health promotion which enables the relationship between the human mind and body. A growing body of research suggested that long-term meditation practice has been popularized among multidisciplinary scientific communities due to its wide array of benefits including enhanced telomere maintenance. This study aims to compare the telomere length, and the levels of plasma telomerase enzyme between long-term meditators and controls.

**Method:** In this case control study long-term meditators who practised meditation for more than 3 years were recruited from meditation centres in Sri Lanka and age, and gender matched controls (non-meditators) were recruited from the community using purposive sampling. Blood was collected into an Ethylenediaminetetraacetate (EDTA) tube using the venepuncture method. DNA was extracted from the buffy coat using a commercially available kit. Telomere length was measured via quantitative polymerase chain reaction using Absolute Human Telomere Length Quantification qPCR Assay Kit and plasma telomerase levels were measured using Human TE (Telomerase) Enzyme-linked Immunosorbent Assay (ELISA) Kit. Socio-demographic data were collected. Independent sample t-test was used to compare the mean relative telomere length, and plasma telomerase level between meditators and controls.

**Results:** Twenty six of the 36 participants (72.2%) were male and the mean age  $\pm$  standard deviation (SD) of the meditators and controls were  $42.78 \pm 9.8$  and  $42.83 \pm 9.78$  years, respectively. Average telomere length (meditators: mean  $\pm$  SD= $10.32 \pm 1.10$  kb; controls: mean  $\pm$  SD= $6.82 \pm 0.65$  kb;  $p=0.010$ ) and telomerase level (meditators: mean  $\pm$  SD= $9.82 \pm 1.99$  ng/mL; controls: mean  $\pm$  SD= $8.06 \pm 1.57$  ng/mL;  $p=0.026$ ) was significantly higher in meditators compared to controls.

**Conclusion:** The findings of this study suggest that long-term meditation practice may have potentially beneficial effects on the telomere length and telomerase level and thus, delay cellular ageing.

**Keywords:** Meditation, telomere length, telomerase, long-term meditators, case-control study

**Acknowledgment:** Accelerating Higher Education Expansion and Development (AHEAD) Operation of the Ministry of Higher Education funded by the World Bank (Grant No. 6026-LK/8743-LK)

**OP-12: A descriptive study of the genetic aetiology of rare and undiagnosed disorders in a cohort of Sri Lankan patients**

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**Introduction:** Today it is possible to detect the underlying genetic aetiology of rare and undiagnosed disorders using Whole Exome Sequencing (WES) without the need to sequence genes separately reducing the time from presentation to diagnosis. The objective of this study was to report the genetic aetiology of patients with rare undiagnosed disorders undergoing WES in the Human Genetics Unit, Colombo.

**Methods:** A database of patients tested in our unit consisting of phenotype and genotype data was maintained prospectively from 13<sup>th</sup> November 2014 to 26<sup>th</sup> March 2021 and analysed retrospectively. Genotype data was generated by Illumina HiSeq platform.

**Results:** 123 patients were sequenced. 75 (61%) were male. Age ranged from 14 days to 18 years. The genetic aetiology was confirmed in 58 (47.2%). 27 (22%) had *novel* variants. The systems affected, the total number and percentage of patients, the number and percentage of patients diagnosed and the total number with *novel* variants in each system respectively were: neurological, 66 (53.7%), 30 (45.5%), 17; musculoskeletal, 16 (13.0%), 7 (43.8%), 2; multisystem, 16 (13.0%), 5 (31.3%), 2; eye, 7 (5.7%), 6 (85.7%), 3; metabolic, 7 (5.7%), 5 (71.4%), 2; blood and lymphoreticular, 4 (3.3%), 0 (0%), 0; cardiovascular, 3 (2.4%), 2 (66.7%), 0; skin, 2 (1.6%), 2 (100%), 1; gastrointestinal, 1 (0.8%), 1 (100%), 0 and renal, 1 (0.8%), 0 (0%) 0.

In those with a definitive diagnosis, a pathogenic variant related to an autosomal dominant condition was found in 30 (51.7%); an autosomal recessive condition in 23 (39.7%); an x-linked dominant condition in 2 (3.4%) and an x-linked recessive condition in 3 (5.2%)

**Conclusion:** The use of WES has made it possible to arrive at the genetic aetiology in nearly half of the patients with rare and undiagnosed disorders tested in our Unit. It has led to early diagnosis, accurate prognostication and appropriate treatment of these patients.

**Key words:** Rare and undiagnosed disorders, Whole Exome Sequencing, novel variants

**OP-13: Design and implementation of a novel assay for a selected *SERPINC1* Gene Variant in a cohort of portal vein thrombosis patients in the Sri Lankan population**

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**Introduction:** Portal vein thrombosis (PVT), is a thromboembolic disorder with a genetic etiology. In developing countries, PVT presents in 40% of portal hypertension cases. Anti-thrombin (AT) deficiency is a major risk factor for venous thromboembolic disorders. The *SERPINC1* gene encodes AT-III, a protease inhibitor. A comprehensive literature review revealed that a variant of the *SERPINC1* gene (rs2227589, g.5301G>A), is associated with an increased risk of thrombosis in South Asian populations. The objective of this study was to design and implement an assay for determining the presence of the *SERPINC1* gene variant in a cohort of PVT patients.

**Methods:** The study population comprised of 80 PVT diagnosed individuals, who were referred to the Human Genetics Unit, Faculty of Medicine, University of Colombo, for genetic screening. Their blood samples were acquisitioned following ethical clearance. DNA extraction was conducted by a silica membrane based nucleic acid purification technique. A novel tetra-primer amplification refractory mutation system-polymerase chain reaction (T-ARMS-PCR) assay was designed and optimized to genotype the *SERPINC1* gene variant. The optimization included a gradient PCR to detect the optimum melting temperature and also primer concentration series to detect the optimum primer concentrations. The optimized protocol was validated by Sanger sequencing.

**Results:** The presence of two simultaneous peaks at the desired location in the Sanger chromatogram confirmed the PCR protocol. The allele frequency for the normal variant (G/G) and the heterozygous variant (G/A) was 62.4% and 31.2%, respectively. No homozygotes for the pathogenic variant were identified. The minor allele frequency for the g.5301G>A genotype was 0.01 ( $p=0.90$ ) according to the Hardy Weinberg equilibrium.

**Conclusions:** The designed T-ARMS-PCR assay can be implemented to genotype the *SERPINC1* gene variant. Strong conclusions regarding the sensitivity and specificity cannot be drawn from a single study using a small sample size. Furthermore, no homozygotes for the pathogenic variant were detected in this study.

**Keywords:** PVT, Thrombosis, *SERPINC1*, Anti-thrombin, T-ARMS PCR

**OP-14: Genetic diversity and population structure of *Phlebotomus argentipes*: vector of *Leishmania donovani* in Sri Lanka**

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**Introduction:** *Phlebotomus argentipes* is the vector of *Leishmania donovani* which causes the disease leishmaniasis, a neglected tropical disease and a growing health problem in Sri Lanka. A proper understanding of the population genetic structure of sand fly vectors is considered important prior to planning and implementation of a successful vector control program. Thus, the present study was conducted to determine the population genetic structure of sand fly vectors in Sri Lanka.

**Methods:** DNA was extracted from individual sand flies ( $n \leq 10$  per site) followed by PCR amplification using two mitochondrial genes namely *Cytochrome c oxidase subunit 1 (Cox 1)* and *Cytochrome b (Cytb)*, and the internal transcribed spacer 2 (ITS2) region from the nuclear ribosomal DNA and sequencing. Analyses included maximum likelihood method, network analysis and DNA polymorphisms.

**Results:** The outcome revealed that the *cox 1* gene had a relationship with sand flies isolated previously from Sri Lanka, India and Israel. The sequences from *cytb* gene of 4 sand flies that aligned with those isolated earlier from Sri Lanka and 3 from Madagascar. Furthermore, *cox 1* gene and ITS 2 region analyses based on  $F_{ST}$  values indicated a possible gene flow between the study sites whereas *cytb* gene analysis favoured the existence of genetically distinct populations of *P. argentipes* in each of the study sites.

**Conclusion:** Poor population differentiation of *P. argentipes*, a possible consequence of a gene flow, is indeed of concern due to the risk imposed by promoting the spread of functionally important phenotypes such as insecticide resistance across the country, making future vector control efforts challenging.

**Keywords:** Insecticide resistance, Gene flow, *P. argentipes*, *Cox 1*

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**OP-15: Awareness of genetics and its applications among individuals in Colombo district,  
Sri Lanka**

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**Introduction:** The field of genetics is fast becoming important in the screening, diagnosis and prognostication of many diseases including cancer. However, the uptake of genetic services depends on public awareness of its' applications. This study aimed to assess knowledge and attitudes towards genetics, genetic testing and cancer genetics of the general public in Colombo, Sri Lanka.

**Methods:** A cross-sectional study was carried out on individuals over 18 years of age living in Colombo district using voluntary sampling technique. An interviewer-administered questionnaire and a web-based questionnaire was used to collect data from a sample of 1027 participants. Knowledge and attitudes were evaluated under 3 subsections; the basic concepts of genetics, genetic testing and genetics related to cancer. The Statistical Package for the Social Sciences (SPSS) software version 25 was used for data analysis.

**Results:** A majority of the participants were female (n=646, 63%) with a median age of 26 years (IQR-12). Participants had a good overall knowledge score with a median of 69%. The median scores for each of the 3 subsections on basic genetic concepts, genetic testing and cancer genetics were 74%, 67% and 63%, respectively. Prior awareness about genetic testing was associated with significantly higher knowledge (p=0.000) and positive attitudes towards genetic testing (p=0.000). Younger age (p=0.034), female sex (p=0.000) and having received tertiary education (p=0.000) were significantly associated with better overall scores. Attitudes regarding genetic testing were mixed with a median score of 50%. Participants who had received tertiary education (p=0.010), were employed (p=0.000), had prior awareness about genetic testing (p=0.000) and had higher knowledge scores (p=0.000) were more likely to have positive attitudes.

**Conclusions:** Participants had generally good knowledge about genetics, including genetic testing and cancer genetics. Although attitudes towards testing were mostly mixed, this outlook may be transformed positively with proper education from expert sources.

**Keywords:** Genetic services; genetic testing; attitude; Sri Lanka



**OP-16: A comparative study of *in vitro* cytotoxic effect of herbal decoctions of *Withania somnifera* and poly-herbal preparation against colorectal cancer**

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**Introduction:** Sri Lankan ayurvedic treatments for colorectal cancer are primarily based on herbal decoctions. However, the anticancer effect of most of these decoctions has not been scientifically validated. Current study was targeted to prove the cytotoxicity of a herbal decoction of *Withania somnifera* (WS) which is used to treat colorectal cancer in Sri Lanka. The cytotoxicity of WS was compared with the cytotoxic activity of poly-herbal decoction (PH) composed of *Adenantha pavonina*, *Thespesia populnea*, *Withania somnifera* and *Tinospora cordifolia* which is used to treat cancer.

**Methods:** The fresh plant materials were washed with deionized water and air dried for 1.5 hours. Dried materials were freeze dried and decoctions were prepared according to a recipe in Ayurveda. Cytotoxicity of WS and PH on Human Colorectal cancer (HCT-116) and Human Kidney (HEK-293) cell lines was determined by 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. Morphological changes of the treated cells were observed by Ethidium Bromide and Acridine Orange (EB/AO) staining.

**Results:** WS showed IC<sub>50</sub> values of 83.09± 2.40 µg/mL for 24 hr, 17.42± 1.20 µg/mL for 48 hr and 3.10± 3.20 µg/mL for 72 hr. WS exhibited less cytotoxicity (IC<sub>50</sub>= 534.45± 3.20 µg/mL for 24 hr) on normal cells compared to cancer cells. PH exhibited IC<sub>50</sub> values of 383.07± 2.51 µg/mL and 1159.16± 3.40 µg/mL for 24 hr against HCT-116 and HEK-293 respectively. EB/AO staining indicated characteristic apoptotic changes such as shranked cells, fragmented nuclei and apoptotic bodies.

**Conclusions:** These results indicate that WS possess strong cytotoxic activity compared to PH with less cytotoxicity for normal kidney cells. Current study provides preliminary scientific evidence for the claimed anti-colorectal cancer activity of WS in Sri Lankan ayurvedic medicine.

**Key words:** colorectal cancer, herbal decoctions, *Withania somnifera*, anticancer effect

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### OP-17: Adrenaline, Cortisol, Glucagon and Growth Hormone concentrations among long-term meditators

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**Introduction:** Adrenaline, cortisol, glucagon, and growth hormones are involved in the stress response. Long-term stress results in altered blood concentrations of these hormones leading to altered immune response and metabolism. The outcome of Buddhist meditation on these hormones have not been studied in one cohort. This study assesses the hormone concentrations in experienced meditators and compare them with an age, gender and education level matched non-meditating group.

**Methods:** This is a cross sectional case-controlled study and ethical clearance was obtained from the ERC, Faculty of Medicine, Colombo. Adrenaline, cortisol, glucagon, and growth hormone concentration in blood of long-term, experienced healthy meditators (n=18), recruited from Buddhist meditation centers, using a validated interview, and age, gender, BMI and educational / occupational level matched healthy control subjects (n=18) who had never practiced meditation, were determined using commercially available ELISA kits. Concentrations of adrenaline, cortisol, glucagon and growth hormone of meditators and controls were compared using Mann-Whitney U test and independent samples t-test.

**Results:** The mean age of the meditator group was  $42.77 \pm 9.51$  and the control group was  $42.54 \pm 10.43$  years and 67% were males. The mean duration of the meditation practice was  $6.46 \pm 2.89$  years. In the meditator group, the cortisol ( $123.8 \pm 4.12$  ng/ml) (Mean  $\pm$  SEM) concentration was significantly lower compared to the control group who had a cortisol concentration of ( $148.7 \pm 4.74$  ng/ml;  $p < 0.001$ ). Adrenaline ( $37.4 \pm 2.82$  pg/ml) and glucagon concentrations ( $96.5 \pm 4.33$  pg/ml) were lower but not significant compared to adrenaline ( $46.6 \pm 3.72$  pg/ml;  $p = 0.058$ ), and glucagon ( $109.6 \pm 5.56$  pg/ml;  $p = 0.071$ ) levels in the control group. Growth hormone level ( $8.4 \pm 1.37$  ng/ml) was higher in the meditator group but not significant compared to growth hormone level in the control group ( $4.3 \pm 0.90$  ng/ml;  $p = 0.076$ ).

**Conclusion:** These findings suggest that meditation may have the potential to positively alter the concentrations of the stress hormones. Further studies on the effect of meditation on stress hormones and other external stressors are recommended.

**Keywords:** Meditation, Adrenaline, Cortisol, Glucagon, Growth hormone

**Acknowledgement:** This study was funded by the AHEAD Grant (6026-LK/8743-LK)

**OP-18: Dopamine, Gamma-Aminobutyric Acid and Glutamate concentrations among long-term meditators**

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**Introduction:** Meditation is known to reduce stress and anxiety. The balance between inhibitory gamma-Aminobutyric acid (GABA) and excitatory glutamate is the key in controlling the overall level of excitation that leads to stress and anxiety. Dopamine contributes to executive function and motivation. The effect of Buddhist meditation on these three neurotransmitters have not been collectively studied in one cohort. The objective of this study was to assess the dopamine, GABA, and glutamate concentrations in experienced meditators and to compare them in an age, gender and education level matched non-meditating group.

**Methods:** This is a cross sectional, case-controlled study and ethical clearance was obtained from the ERC, Faculty of Medicine, Colombo. Dopamine, GABA and glutamate concentrations in the blood of long-term, healthy, experienced meditators (n=18), recruited from Buddhist meditation centers using a validated interview, and age, gender, BMI and educational level matched healthy control subjects (n=18) who had never practiced meditation, were determined using commercially available ELISA kits. Dopamine, GABA and glutamate concentrations of the meditators and controls were compared using Mann-Whitney U test and Independent Samples t-test.

**Results:** The mean age of the meditator group was  $42.77 \pm 9.51$  and the control group was  $42.54 \pm 10.43$  years and 67% were males. The mean duration of the meditation practice was  $6.46 \pm 2.89$  years. In the meditator group, the dopamine ( $136.1 \pm 22.13$  pg/ml) (Mean  $\pm$  SEM), and GABA concentrations ( $71.4 \pm 3.18$  ng/ml) were significantly higher and glutamate concentration ( $6.3 \pm 0.64$   $\mu$ g/ml) was significantly lower compared to the control group who had a dopamine level of  $86.2 \pm 17.15$  pg/ml (p=0.022), GABA level of  $61.9 \pm 1.90$  ng/ml (p=0.015) and glutamate level of  $7.6 \pm 0.56$   $\mu$ g/ml (p=0.031).

**Conclusion:** The effects of Buddhist meditation on these neurotransmitters may have potential benefits in decreasing anxiety and improving executive functions in individuals. Further studies on meditation and neurotransmitters responsible for anxiety are recommended.

**Keywords:** Meditation, Dopamine, Glutamate, GABA, Anxiety

**Acknowledgement:** AHEAD Grant (6026-LK/8743-LK)

**OP-19: Immediate, post-intervention and short term follow up effects of a supervised muscle strengthening exercise intervention on grip strength in cerebral palsy patients: A randomized controlled trial**

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**Introduction:** Cerebral palsy (CP) causes compromised hand function. The effects of hand strengthening exercises on grip strength in CP patients are not widely studied in Sri Lanka. Follow-up is important to see the persistent effects after the cessation of exercise treatment.

**Objectives:** To determine the effects of a supervised strengthening exercise program on immediate, 4-weeks post-intervention and follow-up on grip strength compared to standard care in CP patients

**Methods:** 40 CP patients (aged 11- 22 years) were randomly allocated into an intervention group (IN) and a control group (CN). The IN followed a supervised handgrip strength exercise routine for 30 minutes, two times per week for 8 weeks, while both IN and CN followed standard physiotherapy care throughout the trial period. Hand grip strength was measured and data of Pre-intervention, post-intervention, and 4-week follow-up were compared between groups.

**Results:** Mean age of the sample 16.8 ( $\pm 5.3$ ) years, male: female 22:18. The baseline mean grip strength of the IN was: right hand (RH) 13.3 ( $\pm 5.3$ ) kg, left hand (LH) 12.3 ( $\pm 5.7$ ) kg. CN group: RH 12.3 ( $\pm 6.1$ ) kg, LH 12.9 ( $\pm 5.2$ ) kg. Post-intervention mean grip strength of the IN: RH 14.9 ( $\pm 5.4$ ) kg, LH 14.9 ( $\pm 5.5$ ) kg, CN: RH 12.6 ( $\pm 5.3$ ) kg, LH 13.2 ( $\pm 5.7$ ) kg. The absolute change in mean difference is statistically significant. CN: RH 0.3kg, LH 0.4kg and IN: RH 1.6 kg, LH 2.6 kg, ( $P= 0.041$ ). Post-intervention 4-week follow-up, mean grip strength: IN: RH 12.1 ( $\pm 3.3$ ) kg, LH 12.2 ( $\pm 3.6$ ) kg. CN: RH 12.2 ( $\pm 5.6$ ) kg, LH 12.1 ( $\pm 4.3$ ) kg. grip strength reduces below baseline.

**Conclusion:** This supervised exercise program was capable of improving the grip strength of the CP patients. Discontinuation of the program indicates a reduction of grip strength to the baseline. A longer duration of the intervention and a larger sample size would provide more statistically significant results.

**Key words:** cerebral palsy, intervention, exercise program, grip strength, randomized control trial

**OP-20: Cognitive functions, electroencephalography, visual evoked potentials and peripheral nerve conduction in long-term meditators: A cross-sectional comparative study**

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**Introduction:** Long term meditation is known to produce changes in nervous system which may be beneficial for overall health. A comprehensive study on central and peripheral neurophysiological parameters in long term meditators (LTM) hasn't been reported before in one cohort. We compared electroencephalography (EEG), visual evoked potentials (VEP), measures of cognitive functions and peripheral nerve conduction (NCS) of LTM with meditation naïve controls (MNC).

**Methods:** Fifteen experienced healthy LTM (n=15; regular practice of >3 years) were selected using a validated intake-interview. Fifteen matched MNC (n=15) were recruited from community. All had Montreal cognitive assessment score of >26/30. Validated Sinhala-version of repeatable battery for assessment of neuropsychological status (RBANS) was used to assess cognition. Using 10-20 system, EEG was recorded with one-minute eyes-closed state followed by 19 minutes of meditation among LTM. In MNC, total of 20 minutes EEG recording was in an eyes-closed relaxed state. EEG wave frequencies in both groups were analyzed from six regions. Latencies for N75, P100, N145 were measured on VEP (Nicolet system). Median and tibial nerve conduction velocities and amplitude were recorded for peripheral NCS.

**Results:** Mean scores of every cognitive domain was higher among LTM (mean age 39.78; SD=9.27 years) than MNC (mean age 40.44; SD=8.39 years): immediate memory, LTM=46.87±SD, MNC=36.2±SD (p=0.004); visuospatial, LTM=37.6±SD, MNC=24.93±SD (p=0.000); language, LTM=39.2±SD, MNC=35.93±SD (p=0.440); attention, LTM=69.33±SD, MNC=61.93±SD (p=0.185); delayed memory, LTM=55.33±SD, MNC=44.73±SD (p=0.000). In EEG, LTM had higher alpha activity (47.27%) at rest in right temporal region compared to MNC (39.2%) (p=0.028). During meditation LTM had higher alpha activity in all regions (p<0.05). N75 latencies were reduced among LTM compared to MNC (p=0.02) with no difference in P100 and N145 latencies. NCS showed higher tibial nerve conduction velocity among LTM than MNC (p=0.016).

**Conclusion:** Long-term meditation enhances cognitive functions and produces measurable changes in EEG frequencies, VEP and NCS. Further studies to assess therapeutic benefits of meditation are recommended.

**Key words:** EEG, VEP, cognition, NCS, meditation

**Acknowledgment:** Grant AHEAD/DOR/STEM-HEMS/FMC/ 81

**OP-21: Significance of amylase level measured in drain fluid on post-operative day 1 (DAD1) after pancreatic resection in predicting post operative pancreatic fistula: a multi-center, prospective observational study**

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**Introduction:** Early prediction of the development of pancreatic fistula (PF) is important to plan post-operative management following pancreatic resection. The objective of this study was to describe the significance of assessing DAD1 level to predict the development of PF following pancreaticoduodenectomy, distal and segmental pancreatectomy.

**Methods:** A prospective observational study was conducted involving pancreatic resections performed at 3 tertiary hepatobiliary referral centers from January 2021 to July 2021. Surgery for pancreatic trauma and drainage procedures for chronic pancreatitis were excluded. Drain fluid amylase levels (highest if multiple drains were placed) were recorded on post-operative day 1 (DAD1) and day 3. Development of post-operative PF (according to the international study group on pancreatic fistula [ISGPF] criteria) was recorded.

**Results:** Out of 38 patients (50% females; mean age 56.5 years) who underwent pancreatic resections (pancreaticoduodenectomy – 11, distal pancreatectomy - 27), 10 patients (26.3%) developed PF (Grade A – 9, Grade B – 1). A significant difference of mean DAD1 level was observed ( $p = 0.004$ ) between those who developed a PF (mean – 550.5 U/l; range 224 - 9902) and those who did not (mean – 1606.7 U/l; range 13.8 - 3024). Receiver operator characteristic curve of DAD1 was 0.62 and a cutoff value of 252.8 U/l provided 80% sensitivity and 43.9% specificity to predict the development of PF.

**Conclusions:** DAD1 level predicts the development of post-operative PF with an acceptable sensitivity, according to the preliminary results of this ongoing study.

**Key words:** Pancreaticoduodenectomy, Whipples, pancreatectomy, pancreatic fistula, amylase

**OP-22: Outcomes of pancreato-jejunostomies in a low volume hepato-pancreato biliary surgery unit in Sri Lanka**

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**Introduction:** Leaks from the pancreatojejunostomy (PJ) after a pancreaticoduodenectomy (PD) occur in 20-40% patients. Clinically significant grade B & C leaks occurring in 12.3 – 16.5% result in morbidity and mortality. This study looks at the outcomes of patients who had a PJ in a low volume HPB surgical unit.

**Methods:** Retrospective analysis of a HPB patient database and records from 2011-21 was done. Patient demography, clinico-pathological details, pancreatic leak rates (ISGPF classification) and survival was recorded. PJs were done using a duct to mucosa technique with 3-0 and 5-0 polypropylene with a stent in-situ.

**Results:** Of the 59 patients, mean age was 55.1 years with a M:F ratio of 1.1:1. 93.2% (n=55) of the PJs were done as part of a PD, 3.4% (n=2) after central pancreatectomy and 3.4% (n=2) after longitudinal PJs. Histologically, 78% (n=46) were malignant and 81.4% had a R0 resection margin (n=35/43) while 18.6% (n=8) were R1 resections. Grade B and C leaks occurred in 6.8% (n=4). One grade B and both grade C fistulae were after PD. The other grade B fistula followed a central pancreatectomy. One grade C leak led to death on postoperative day 18 despite reopening. Among those that developed Grade B or C fistulae, the pancreas was soft in 50% (2/4) and firm in 25% (1/4), whereas 75% (3/4) had a PD diameter  $\leq$  3 mm. The median postoperative ICU and hospital stay were 2 (IQR=3, n=24) and 11 days (IQR=8, n=31), respectively.

**Conclusions:** Clinically significant PJ leaks were comparatively low in this group. However, grade B & C fistulae resulted in significant morbidity and in one case mortality. Even in low volume centres, adhering to standard practice can result in good outcomes.



**OP-23: Outcomes of angioplasty for occlusive arterial disease in a vascular surgical unit**

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**Introduction:** The treatment options for chronic limb threatening ischemia (CLTI- rest pain /tissue loss) includes surgery and endovascular procedures like angioplasty (for unfit patients). This study is on the outcomes of such patients undergoing angioplasty.

**Methods:** This study was done from January 2017 to July 2021. Consecutive patients undergoing angioplasty were included. All angioplasties were done by a single surgeon. Incomplete records and patients lost to follow-up were excluded.

**Results:** 128 were included. 87 (68%) were males. Mean age was 65.38 years (38-93). Rest pain and tissue loss were present in 60(46.9%) and 124 (96.9%). Diabetes mellitus, hypertension, ischemic heart disease (IHD) and chronic kidney disease (CKD) were present in 93%, 66.4%, 53.9%, and 36.7%. All patients had multi segmental disease with involvement of superficial femoral artery in 51(39.8%), Popliteal in 56 (43.8%), distal anterior/ posterior tibial in 112 (87.5%)/106 (82.8%). At a mean follow-up of 17.5 (1-55) months, 85 (66.4%) had healing wounds or reduced rest pain. 18 (14.1%) underwent major amputations. 36 (28.1%) died. The overall survival (OS) and amputation free survival (AFS) at 01,02,03 years were 81.36%,71.12%,58.91% and 69.19%,58.54%,47.03% respectively. Patients with CKD had significantly more mortality (03-year mortality of CKD = 52.40% vs non-CKD = 34.65%,  $p=0.044$ ) and poor wound healing ( $p=0.000$ ) but major amputations at 03 years was not statistically significant than non-CKD patients (CKD = 22.60% vs non-CKD = 11.38%,  $p=0.93$ ).

**Conclusion:** At a follow-up of 03 years the overall survival and AFS was 58.91% and 47.03%. Patients with CKD have the worst outcome. This fact should be explained to the patient when planning complex interventions. This is comparable with other studies because our cohort has more patients with CKD and distal vessel disease.



**OP-24: Overcoming complexity and challenges in managing individuals with Differences in Sex Development: a way forward**

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**Introduction:** Differences in Sex Development (DSDs) are a heterogeneous group of conditions with complex medical and psychosocial needs. Affected individuals face many challenges from birth to adulthood. This study aims to determine challenges in managing children and adolescents with DSDs at a university clinic in Sri Lanka.

**Method:** Ethics approval (EC– 18-092) for this observational study was obtained from the Ethics Review Committee, Faculty of Medicine, Colombo. Socio-demographic and clinical data of consenting patients with DSDs were collected to an electronic database between 2018-2020 and analyzed using descriptive statistics.

**Results:** Out of 115 patients (median age 13), 55% had 46,XY DSD, 30% had 46,XX DSD and 12% had chromosomal DSD. 21% of families had two or more affected children and 17% were of second-degree consanguineous marriages. Karyotyping was available in 112 (97%), while 15 (13%) had a definitive genetic diagnosis. 65 (57 %) presented with ambiguous genitalia at birth. Majority (57%) had undergone genital surgery (mean age of first surgery = 3.5 years) and 8 (7%) had multiple genital surgeries. 18% of females lacked a uterus resulting in future fertility issues. 34% were being reared in a gender incongruent with their karyotype and 7 experienced incongruent puberty. 9 patients required alteration of registered gender. 5 out of 20 evaluated (25%) had gender dysphoria and 7% had learning disability. 51% had been educated about their condition at a mean age 12 years. 84 (73%) were adolescents who would require transition into adult services.

**Conclusion:** The multitude of challenges in DSD care requires highly specialized and dedicated expertise in paediatric and adult endocrinological, surgical, genetic, psychiatric/psychological, transitional, obstetrics/gynecological and legal/social support services. This multi-disciplinary care is ideally provided through a single centre to optimize the care and wellbeing of the affected individuals.

**Key words:** disorders of sex development, challenges, multi-disciplinary care, single centre

**Acknowledgement:** Stella de Silva Research Grant

**OP-25: A descriptive study of patients with skeletal dysplasia presenting with short stature**Y.D. Kolambage<sup>1\*</sup>, T. Wanigasekera<sup>2\*</sup>, U.A. Liyanage<sup>3</sup>, V.H.W. Dissanayake<sup>3</sup><sup>1</sup>Department of Anatomy, Faculty of Medicine, Sabaragamuwa University of Sri Lanka.<sup>2</sup>Organization Development Unit, Ministry of Health, Sri Lanka. <sup>3</sup>Department of Anatomy, Faculty of Medicine, University of Colombo, Sri Lanka. \*Co-first authors

**Introduction:** Short stature is one of the commonest presentations of patients with skeletal dysplasia. Identification of the underlying aetiology of short stature is often difficult due to overlapping clinical features. A definitive diagnosis is essential for prognostication and treatment. The objective of this study was to describe the pattern of skeletal dysplasia and the associated clinical features in a cohort of patients with skeletal dysplasia presenting with short stature.

**Methods:** Patients with skeletal dysplasia were recruited for the study from the Colombo group of hospitals over a six-month period from 1<sup>st</sup> of January to 30<sup>th</sup> June 2014. All ethnic and age groups were included. Patients who were not Sri Lankans by descent were excluded. Their clinical and investigation findings were recorded and maintained in a database. Patients with short stature were analyzed. The diagnosis was made based on clinical, laboratory and radiological findings.

**Results:** A total of 30 patients were recruited. 18 (60%) had short stature. Thirteen (72.2%) were females. The age range was from birth to 26 years and the commonest age group was 1 to 5 years. The following diagnoses were made; achondroplasia (7, 38.9%), osteogenesis imperfecta (6, 33.3%), hypochondroplasia (3, 16.7%) and spondylometaphyseal dysplasia (2, 11.1%). The common clinical features across the different groups of patients were disproportionate short stature (16, 88.9%), bowing of the long bones (13, 72.2%) and spinal deformities (10, 55.6%). A family history of similar illness was found in 16.7% (3/18) of short stature cases. Four (22.2%) were products of consanguineous parents.

**Conclusions:** This is the first report of patients with skeletal dysplasia presenting with short stature in the Sri Lankan population. Achondroplasia and osteogenesis imperfecta were the commonest conditions encountered. A larger national study is required to determine the true burden of skeletal dysplasia in Sri Lanka.

**Keywords:** Short stature, Skeletal dysplasia, Aetiology, Clinical features, Sri Lanka

**OP-26: A retrospective study on presenting features, diagnoses and psychosocial factors among children presenting to a specialized child psychiatry unit in Sri Lanka**

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**Introduction:** Increasing numbers of children present to psychiatry services. We aim to describe diagnoses and associated psychosocial factors of presentations to a specialized child psychiatry service in Colombo, Sri Lanka. This would help identify high-risk cohorts of children.

**Methods:** A retrospective study perusing paper-based clinical records of children up to 18 years presenting from January 2019 to December 2020 was conducted. Diagnostic patterns and associations with psychosocial factors were analyzed.

**Results:** Analysis of 285 records indicated that most were self-referrals by parents (47.3%) with poor school performance (22.8%) and behavioural problems (22.1%). Of the 239 children diagnosed with a mental disorder, majority (71.2%) had a primary diagnosis of developmental disorder; intellectual delay (38.9%) and autism (23.4%). Emotional disorders (15.4%) included anxiety (5.4%), depression (3.8%), adjustment disorder (2.5%), obsessive compulsive disorder (2.5%) and trichotillomania (0.8%). Behavioural disorders (13.4%) were hyperkinetic disorder (12.1%), internet addiction (0.8%) and conduct disorder (0.4%). Behavioural management was prescribed in 83.9%, while 22.5% were prescribed medication.

Children <7 years accounted for 50.9%. Majority (66.4%) were boys and 4.7% required special education. Sinhalese Buddhists accounted for 73.9%. Majority (90.2%) resided with biological families; 67% were nuclear families with 73.3% having two or less children. Most (56.1%) were first-borns. Majority of fathers (57.1%) and mothers (58.2%) had studied up to G.C.E.(O/Level) and 99.5% of either parent were employed. Parenting style was permissive in 84.6%. Family history of mental illness was present in 12.6%, of which 23.5% was depression in a parent. Domestic violence was witnessed by 5.2%. Child abuse was documented in 6.7% with 44.4% being physical abuse. Overall, 81.8% had experienced some form of psychosocial adversity.

**Conclusions:** Majority were diagnosed with developmental disorders. Preliminary analysis did not reveal significant associations between diagnoses and psychosocial variables. Further analysis and extension of the study is planned before conclusions are drawn.

**Key words:** child psychiatry, diagnoses, psychosocial factors

**OP-27: Audit on child and adolescent mental health services available in Sri Lanka**YM Rohanachandra<sup>1</sup>, DMA Dahanayake<sup>2</sup>, M Chandradasa<sup>3</sup>

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**Introduction:** Child and adolescent psychiatry services in Sri Lanka are at rudimentary levels with only 11 board-certified child and adolescent psychiatrists in the country. A substantial proportion of the child and adolescent psychiatry services are provided by general adult psychiatrists. We aimed to assess the current status of the child and mental health services in the country in order to plan future services.

**Methods:** A specifically designed Google form was emailed to all consultant psychiatrists and child and adolescent psychiatrists to report the common presentations, availability of services, and challenges faced when providing services. Data was analysed using SPSS version 22.

**Results:** A total of 61 psychiatrists from 24 districts completed the survey. A majority (83.6%) conducted child and adolescent outpatient clinics. Inpatient services for children less than 12 years were provided by 45.9%, and 77% provided inpatient services to adolescents. The commonest presentations were hyperactivity (86.9%), poor school performance (86.9%) and irritability and aggression (65.6%). Attention deficit hyperactivity disorder (93.4%), intellectual disability (82%) and anxiety disorder (68.9%) were considered as common diagnoses by a majority. Eighty-two per cent reported that paediatricians were the commonest source of referral, followed by the outpatient's department (63.9%). More than half (57.4%) of the mental health services had an occupational therapist and a psychiatric social worker (54.1%), whereas only 4.9% (i.e., 3 units) had a psychologist. Lack of infrastructure (86.9%), limited human resources (72.1%), low public awareness (54.1%), lack of validated screening instruments (42.6%), and limited time dedicated to children and adolescents while catering to the needs of the adult psychiatry services (41%) were the major challenges faced.

**Conclusions:** Developing infrastructure, human resources, and increasing public awareness about child and adolescent psychiatry are important steps in developing mental health services for children and adolescents in Sri Lanka.

**Keywords:** Child and adolescent psychiatry, services, challenges

**OP-28: Efficacy of multimodal psychosocial therapy compared to standard treatment in treating alcohol use disorders: Findings of a randomised controlled trial**

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**Introduction:** This paper analyses the effectiveness of multimodal psychosocial therapy (MPT) in patients with alcohol use disorders compared to the usual treatment package (UTP) using the findings of the randomised clinical trial ETAT (Efficacy of two alcohol treatment strategies). This novel MPT is a therapist-patient-family combined exploration of barriers to changing behaviour of the patient and others including myths, industry-tactics and alcohol stereotypes.

**Methods:** ETAT assessed efficacy of two new treatments, MPT and modified disulfiram therapy (MDT) against UTP. All patients aged 14 years and above meeting diagnostic criteria for alcohol harmful use or dependence were recruited (n=108). Participants were randomised under a fully concealed method into the three arms (MDT, MPT or UTP). Alcohol Use Disorder Identification Test (AUDIT; measures quantity, quality and impact of alcohol consumption) and Quality of Life Enjoyment and Satisfaction-Questionnaire-Short Form (Q-LES-Q-SF, measures level of life's enjoyment and satisfaction) were administered at the recruitment (T<sub>0</sub>) and post-treatment at 12 months (T<sub>12</sub>). The findings were analysed using mixed ANOVA by general linear model with an intention to treat.

**Results:** AUDIT mean score in the MPT and UTP arms reduced from 28.9 (SD=5.4) and 29.6 (SD=5.2) at T<sub>0</sub> to 15.8 (SD=11.9) and 16.5 (SD=10.8) at T<sub>12</sub> respectively. Although both decreases were significant (F=44.2, 49.9; p=0.001, 0.001), the difference between the two arms was insignificant (F[1,73]=.03, p=0.207). The Q-LES-Q-SF mean score in the MPT arm increased significantly (F=6.86; p=0.004) from 44.54 (SD=9.37) at T<sub>0</sub> to 49.84 (SD=5.29) at T<sub>12</sub>. The same in the UTP arm increased insignificantly (F=2.95; p=0.059) from 45.74 (SD=9.27) to 47.05 (SD=5.03). However, the difference between the interventions was insignificant (F=0.033, p=0.85).

**Conclusion:** Both treatments affected the quantity, quality and impact of alcohol consumption in a favourable manner, while only the MPT was able to effect a meaningful improvement in quality of life.

**Key words:** multimodal psychosocial therapy, treatments for alcohol use disorders, alcohol consumption, quality of life

**OP-29: The ‘virtual’ grand teaching ward round during COVID-19: The new normal or a better normal?**

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**Introduction:** Grand ward rounds are an integral component of undergraduate medical education. Despite a gradual transformation of pedagogy clinical learning remains a bedside learning process. The emergence of COVID-19 prevented the conduct of conventional grand ward rounds (CWR). The University Vascular Unit embraced this challenge by piloting a ‘virtual’ grand ward round (VWR) within the restrictions of available technology. This study aims to explore the student’s perception of the VWR.

**Methods:** Eight final year medical students are attached to our unit on a weekly rotational basis. The Wednesday CWR was converted to a VWR from May,2021 using a Zoom-based online platform, with one member sharing audio-visuals whilst another presented patient information to the remote participants towards the clinical discussion. Participation was through invitation only and patients provided informed consent. An online anonymised feedback survey (based on open ended questions and Likert scales) was conducted at the completion of appointment. All students had previously experienced a ‘non-virtual’ grand ward round.

**Results:** Response rate for student perceptions was 72%. 80 unique responses were received during the study period. Mean duration of VWR was 132 minutes. 82% felt that the VWR provides a more ‘ideal’ grand ward round (providing holistic, evidence-based patient management whilst enhancing trainee education of knowledge, application, and soft skills). The VWR was considered more advantageous owing to absence from space restrictions (81%), more effective teaching (76%), improved audibility/clarity of discussions (86%) and better opportunity to engage in discussions (75%). Survey results showed a preference towards VWR across safety (92%), efficacy (72%), communication (85%), information availability (84%) and training opportunity (73%). 80% preferred future ward rounds to be virtual.

**Conclusion:** VWR is an innovative approach. The VWR appears to be safe, advantageous and efficient. Majority of the medical students are satisfied with the virtual ward round format.

**Keywords:** Virtual, Medical education, Ward round, COVID, Undergraduate

**OP-30: Changes in satisfaction levels of victims undergoing Sexual Assault Forensic Examinations following the introduction of a forensic nurse within a university forensic department in Colombo**

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**Introduction:** Sexual assault forensic examinations (SAFE) are an extremely sensitive and challenging process for victims. During SAFE examinations, investigators need to collect forensic evidence, provide appropriate information, ensure overall wellbeing within a victim-friendly environment. The Department of Forensic Medicine and Toxicology (DFMT), Colombo introduced the concept of a forensic nurse in March 2018 whose primary role is to provide information and explain the procedure as required for obtaining informed consent, develop a rapport and assist the victim during the entire SAFE process. Since 2015 May, DFMT obtains feedback from SAFE victims regarding their perceptions on the medicolegal service provided. This study compares victim feedback before and after the introduction of forensic nursing within DFMT.

**Method:** Data was obtained through interviewer-administered questionnaires. Of seventy-nine SAFE examinations conducted from May 2015 to February 2020, twenty SAFE examinations were conducted since provision of the forensic nurse. Perceptions of victims before and after introduction of a forensic nurse were compared.

**Results:** Age range was 3-43 years with majority < 23 years and F:M=71:8. With the introduction of the nurse, a significant proportion of victims felt relieved after the examination ( $p=0.015$ ). Similarly, the proportion of victims rating the medicolegal examination as excellent, increased from 27.1% to 45% after the introduction of forensic nurse ( $p=0.137$ ). 90% of the victims examined after the introduction of the nurse declined the need for further psychological counselling.

**Conclusion:** There appears to be a significant increase in the proportion of relieved victims following SAFE with fewer people needing psychological support, as well as an increase in excellent ratings for the service provided following the introduction of the nursing service.

**Key words:** victims of sexual assault, response, perceptions, medico-legal services, Forensic nursing

## POSTER PRESENTATIONS

### PP-01: The psychological impact of the COVID-19 pandemic on physiotherapists in Sri Lanka

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**Introduction:** The COVID-19 pandemic is currently a severe challenge for healthcare workers, with a considerable impact on their mental health. Physiotherapy is one of the healthcare professions on the frontline of managing this pandemic and is directly exposed to the virus. This study aimed at finding the impact of this pandemic on psychological health of physiotherapists in Sri Lanka.

**Methods:** A descriptive cross-sectional study was conducted among physiotherapists who were recruited from government and private hospitals via purposive sampling. The English version of the Depression-Anxiety-Stress Scale was distributed online to assess psychological health. We assumed all physiotherapists are fluent in English since their professional language is English.

**Results:** The sample comprised of 48 participants (males=33.3%; females=66.7%; age=30.2±3.8 years). There were 4.8% of physiotherapists with extremely severe stress, 33.3% with severe stress, 35.7% with moderate stress, 16.7% with mild stress and 9.5% with no stress. No physiotherapists were found in normal or mild anxiety categories. Moderate, severe and extremely severe anxiety levels were found in 9.5%, 28.6% and 61.9% of physiotherapists respectively. No physiotherapists were identified in normal or mild depression categories. There were 28.6% of physiotherapists with extremely severe depression, 19.0% with severe depression and 52.4% with moderate depression.

There was a positive correlation and a significant association of stress with depression ( $r=0.876$ ,  $p<0.001$ ), stress with anxiety ( $r=0.780$ ,  $p<0.001$ ) and anxiety with depression ( $r=0.752$ ,  $p<0.001$ ). Stress, anxiety and depression had no significant associations with age and gender ( $p>0.05$ ). Fear of infecting family members was found as the main cause of stress (81%).

**Conclusion:** Physiotherapists had elevated levels of anxiety, depression, and stress, highlighting the significance of systematically monitoring physiotherapists' mental health and implementing supportive measures to improve their well-being during the crisis. The main limitation was the small sample size, due to the low response rate attributed to hectic schedules and stressed minds of physiotherapists.

**Keywords:** COVID-19, stress, anxiety, depression, physiotherapists



**PP-02: Direct costs of managing in-ward dengue patients in Sri Lanka: A prospective single-center study**

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**Introduction:** The cost in managing hospitalized dengue patients vary across countries depending on access to healthcare, management guidelines, availability of diagnostic tests and state sponsored subsidies. Hence for health budget planning and cost reduction, locally relevant, accurate costing data from prospective studies is essential.

**Methods:** This is a prospective single center cohort study in Sri Lanka that recruits hospitalized acute dengue patients and follows them up until death / discharge. The cohort also have non-dengue fever patients with a phenotypically similar illness, managed as dengue while in hospital. The direct costs of hospital admission (base and investigation costs, excluding medication) were calculated for all recruited patients and compared between dengue (DF) and non-dengue fever (NDF) patients as well as other subgroups based on demographic, clinical or temporal characteristics.

**Results:** Over 29 months, a total of 431 (males – 285, 66.1%, mean age: 31.4 years) confirmed DF patients and 256 NDF patients (males –176, 68.8%, mean age: 37.7 years) were recruited between October 2017 to February 2020. The standardized hospitalization costs were USD 18.02 (SD: 4.42) and USD 17.55 (SD: 4.09) per patient per day for DF and NDF patients respectively. There was no significant difference of daily cost or for the cost of total stay (based on the average duration of stay) between these groups ( $p>0.05$ ). Investigations accounted for more than 50% of the total cost. The costs were also largely homogenous in all subgroups within or across DF and NDF categories.

**Conclusions:** This prospective study conducted over two and half years (2017 – 2020) demonstrates NDF patients incur the same cost as DF patients. The costs were largely homogenous across different subgroups based on demographic, clinical and temporal characteristics.

**Keywords:** Cost, Dengue, Diagnostic tests

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**PP-03: Respiratory function in healthy long-term meditators: a systematic review**

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**Introduction:** Given its prominent role in formal meditation and centrality in the body's physiological processes, respiration has been an important target of study in meditation research. Whether distinctive respiratory function changes occur in long-term meditators (LTMs) as a consequence of their long-term meditation (LTM) practice remains unclear. Evidence on benefits of meditation on respiratory function would be invaluable in developing meditation interventions for those with compromised respiratory function.

**Methods:** A systematic search of PubMed, MEDLINE, CENTRAL and Google Scholar electronic databases was performed from the first available date until August 31<sup>st</sup>, 2021. Search included "long-term meditation" and keywords related to respiratory function (respiratory/ pulmonary/lung function and spirometry). Controlled trials, observational studies explored on respiratory function of healthy LTMs and published in English were included. Two independent reviewers selected the studies, extracted the data and assessed the quality of evidence. This review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

**Results:** Nine studies involving 443 participants that met the eligibility criteria were included. The majority of the included studies looked at the rate of respiration (RR) and reported decreased RR in LTMs during meditation relative to baseline and decreased baseline RR compared to age-sex matched controls. Decreased baseline RR among healthy LTMs was associated with greater practice experience and intensive retreat practice experience. Vital capacity, tidal volume and breath holding were significantly higher in LTMs. No studies reported on spirometry parameters in LTMs.

**Conclusions:** Long-term meditation is associated with better respiratory function in healthy individuals, with improvement in some respiratory function parameters with greater practice experience amplifying the effect. Further studies are recommended to discover the effect of LTM on respiratory function in association with specifics of meditation (type of meditation, frequency, practice experience etc.)

**Keywords:** long-term meditation, healthy long-term meditators, respiratory function, pulmonary function

**PP-04: Cardiorespiratory and cardiovascular autonomic function in healthy long-term meditators: a study protocol**

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**Introduction:** Long-term meditation (LTM) is associated with physiological benefits. No study to date has evaluated cardiorespiratory and autonomic function in Sri Lankan long-term meditators (LTMs). This study aims to describe and compare resting cardiorespiratory parameters, oxygen consumption during submaximal exercise testing and selected autonomic function parameters in healthy LTMs and non-meditators.

**Methods:** This cross-sectional, comparative study will include healthy Sri Lankan adults of either sex, aged between 18-65 years. Individuals who are unhealthy, pregnant or breast feeding, engaged in athletics and extensive sports, current smokers and who have smoked during last 12 months will be excluded. Thirty LTMs practicing Buddhist meditation consistently >3 years selected through an interviewer-administrated intake interview questionnaire (validated screening tool) and 30 age-sex matched non-meditators will be recruited. Educational level, dietary habits and other confounding factors along with physical activity level (International Physical Activity Questionnaire -long form) will be recorded. Participants need to abstain from vigorous exercise, caffeine consumption and have a light meal 2 hours prior to testing. Resting cardiorespiratory measurements (heart rate, blood pressure, ECG, respiratory rate, oxygen saturation) and spirometry parameters (FEV<sub>1</sub>/FVC, FVC, PEF, FEF<sub>25-50</sub>, FEF<sub>75</sub>) will be recorded using a Fitmate-Med PRO cardiopulmonary assessor. Oxygen consumption will be estimated using 6MWT. Cardiovascular autonomic functions will be assessed by heart rate response to deep breathing, orthostatic test, Valsalva maneuver, blood pressure response to standing and isometric hand grip test using power lab (AD Instruments P Ltd, Australia). Data will be checked for normality and an appropriate significance test of comparison will be used for analysis.

**Discussion:** This study with an adequate sample size falling within the range of sample sizes of published studies and standardized battery of tests to assess selected physiological changes in LTMs compared to matched controls will provide evidence for future research and clinical use.

**Key words:** Long-term meditation, Autonomic function tests, Cardiorespiratory, Spirometry, Oxygen consumption

**P-05: Assessment of the knowledge, attitudes, and practices (KAP) on COVID -19 among the general public in Western Province**

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**Introduction:** Western Province is worst affected by corona virus disease with its high infection rate and associated fatalities. Behaviour change interventions are needed for the prevention and control of the disease. The objective of this study was to assess the knowledge, attitude, and practices on COVID -19 among the general public in Western Province.

**Method:** A cross-sectional study was conducted and participants, (n=1100) were selected by multistage cluster sampling, following calculations of the required sample using a scientific formula. A pretested, content validated, onsite self-administrated questionnaire was used. Multiple-choice questions were used to assess knowledge and the Likert scale was applied to assess attitudes and practices. Descriptive statistics and chi-square test was used and  $P \leq 0.05$  was considered as a statistically significant difference.

**Result:** With a 96% response rate, 53.9% (n=566) were females and 62% were between the ages of 31-50 years. Television (98.1%) and radio (70.5%) were the main sources of information while public announcing (57.1%) and Facebook (53.4%) too were important sources. The mean scores for knowledge and attitudes were 62.3% and 80.2% respectively. Fewer participants indicated gastrointestinal symptoms as features of COVID 19 (abdominal pain – 19.6%, diarrhea - 14.9%). Knowledge of the participants was significantly different according to the level of education ( $P=0.01$  95% CI) and private sector people have higher level of knowledge. 69% of participants disagree with imposing curfew and it was different according to occupations ( $P=0.01$  95% CI) (daily paid employee- 91%). Regarding the practices, 98.8% of the people used the face mask and 88.1% has good respiratory etiquettes. Work from home was done by 56.7% government and 33% private-sector employees. Roster basis work was done by 56% of government and 44% of private-sector workers.

**Conclusion:** The attitudes towards COVID 19 among the general public were good, but the knowledge and practices warranted more public health interventions. The significant differences in knowledge and practices in different socioeconomic strata should be given serious consideration. The practices were determined by questions rather than by observations due to limitation of resource.

**Key words:** Knowledge, Attitude, Practices, KAP, COVID -19

**PP-06: Reliable anatomical landmarks for ankle block: A Sri Lankan cadaveric study**

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**Introduction:** Five peripheral nerves at the level of ankle are infiltrated to accomplish anaesthesia of the foot in “ankle block”. The purpose of this study was to describe anatomical landmarks to accurately locate these nerves.

**Methods:** Twenty-four formaldehyde-fixed cadaveric ankles (10-left; 14-right) were studied. Photographs of cross sections of the frozen legs, cut at a horizontal plane across the most prominent points of the medial malleolus (MM) and lateral malleolus (LM) were analysed using Fiji (v1.53). The curvilinear distance from the most prominent point of the closest malleolus to each of the five cutaneous nerves and their depth from the skin surface were measured.

**Results:** Sural, tibial, deep peroneal, saphenous and medial dorsal cutaneous nerves were located 5.2±1.3, 9.2±2.4, 7.4±1.9, 2.8±1.1, 2.1±0.6 mm deep to the skin surface. The curvilinear distances from MM to tibial, deep peroneal and saphenous nerves were 32.5±8.9, 62.8±11.1 and 24.4±7.9 mm, respectively. The curvilinear distances from LM to sural and medial dorsal cutaneous branch of superficial peroneal nerves were 27.9±6.3 and 52.7±7.3 mm, respectively. Only the distance between LM and sural nerve showed a significant association with the calf circumference ( $r=0.6$ ,  $p=0.002$ ). Independent sample t-tests showed no associations of the side of the leg with the abovementioned measurements ( $p>.05$ ). The deep peroneal nerve was found between the tendons of the extensor hallucis longus and the extensor digitorum longus (EDL) in the majority of specimens, while the medial dorsal cutaneous nerve was almost exclusively found on the EDL tendon. The sural and tibial nerves were located around halfway between the most prominent point of the relevant malleolus and the posterior border of the Achilles tendon.

**Conclusion:** This study describes easily identifiable, palpable bony and soft tissue landmarks that could be used to locate the nerves around the ankle with a high degree of accuracy.

**Keywords:** Ankle block, Anatomical landmarks

**PP-07: Surface anatomy and dimensions of distal great saphenous vein: an aid to peripheral venous access**

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**Introduction:** Distal great saphenous vein is a popular site for venous access by means of percutaneous cannulation or venous cut down in a haemodynamically unstable patient. Aim of this study was to precisely define surface anatomy and dimensions of the distal part of the great saphenous vein to facilitate the aforementioned procedures.

**Method:** Cross-sectional anatomy of the distal saphenous vein was studied in 24 cadaveric ankles sectioned at a horizontal plane across the most prominent points of medial malleolus (MM) and lateral malleolus. Photographs of the cross-sections were analyzed using Fiji(v1.53), an image processing software. The curvilinear distance from the most prominent point of MM to the great saphenous vein, its widest collapsed diameter and skin depth were obtained. Calf circumference was obtained as an anthropometric measurement.

**Results:** The great saphenous vein was located at a mean distance of  $24.4 \pm 7.9$  mm anterior to the MM. The mean widest collapsed diameter was  $3.8 \pm 1.5$  mm. The mean distance from skin surface to the vein was  $4.1 \pm 1.2$  mm. Independent-sample t-test showed no statistically significant difference of the abovementioned measurements with the side of the ankle ( $p > 0.05$ ). The calf circumference had a statistically significant negative correlation with the diameter of the saphenous vein ( $p = 0.045$ ,  $r = -0.441$ ) meaning that the large calf circumferences were associated with smaller saphenous veins. The curvilinear distance from MM to the saphenous vein had a statistically significant positive correlation with the skin depth ( $p = 0.043$ ,  $r = 0.425$ ) indicating that the saphenous veins which are located more distant from the MM are located deeper in the superficial plane.

**Conclusions:** The mean distance from the MM, mean skin depth and the widest collapsed diameter could be used to locate the saphenous vein accurately, particularly in haemodynamically unstable patients with visually indiscernible veins specially in resource poor settings where conventional venous access procedures are mostly in use.

**Keywords:** Great saphenous vein, Venous access

**PP-08: Effect of coconut oil consumption on body weight: a systematic review and meta-analysis**

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**Introduction:** Due to the constituents of coconut oil and their biological properties and subsequent beneficial effects on the management of obesity, there is still debate regarding the specific impact of coconut oil on bodyweight reduction. This systematic review and meta-analysis of clinical trials aim to assess the impact of coconut oil on body weight reduction in comparison to other oils and fats.

**Methods:** The databases, PubMed®, Web of Science®, EMBASE®, and SciVerse Scopus® were systematically searched. A combination of medical subject headings and words linked to coconut oil and obesity parameters were utilized. Any clinical trials comparing coconut oil to any other form of oil or fat, with more than one month feeding period among adults were considered.

**Results:** From the 540 possibly relevant papers, 9 papers were included. The period of coconut oil intake was varying from four to twelve weeks, apart from one long-term trial where in coconut oil was taken for two years. When compared to other oils and fats, coconut oil substantially decreased BW (n=546), body mass index (BMI) (n=551), and percentage of fat mass (FM%) (n=491) by 0.75 kg (95% CI, -1.48 to -0.02, p=0.04; I<sup>2</sup> = 84% (p<0.001), 0.28 kg/m<sup>2</sup> (95% CI, -0.55 to -0.02, p=0.03; I<sup>2</sup>= 87%, p<0.001), and 0.35 % (95 % CI, -0.62 to -0.09, p=0.00; I<sup>2</sup>= 54%, p= 0.02). Coconut oil consumption did not result in any significant alteration in waist circumference (WC) (n=385) (-0.61 cm; 95% CI, -1.76 to 0.55, p=0.30; I<sup>2</sup>=90%, p< 0.001), waist-to-hip ratio (WHR) (n=330) (-0.01; 95% CI, -0.02 to 0.01, p=0.39; I<sup>2</sup>=98%, p< 0.001) and FM (n=86) (-0.25 kg; 95% CI, -0.72 to 0.22, p=0.29; I<sup>2</sup>=0%, p=0.97).

**Conclusion:** The results indicate a small statistically significant reduction in BW, BMI, and FM% in the coconut oil group. But, coconut oil had no statistically significant effect on WC, WHR, or FM.

**Keywords:** Body weight; Coconut oil; Obesity; Weight reduction; Systematic review and meta-analysis

**PP-09: Knowledge, Attitudes and Practices on Solid Waste Management Among Advanced Level Biology Students**

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**Introduction:** Mismanagement of solid waste has a significant adverse impact on human health and the environment. Responsibility for solid waste management (SWM) comes with proper knowledge and attitudes. This is crucial for sustaining correct practices and health especially among students. Assessing knowledge, attitudes and practices (KAP) on SWM among a selected group of students was aimed. Relationship between KAP and factors associated with KAP on SWM were assessed.

**Methods:** A descriptive cross-sectional study was carried out among Advanced Level (A/L) biology students attending a private institution (n=119) using stratified sampling method according to A/L batch. A self-administered questionnaire was used to assess KAP. Total scores for KAP were calculated and the mean scores were used as the cut off to define KAP as ‘satisfactory’ ( $\geq$ mean) and (<mean) ‘unsatisfactory’.

**Results:** Mean knowledge score on SWM was 26.5 (range=0-76) and knowledge was satisfactory among 50.4%. Mean attitudes score was 43.5 (range= 0-55) and 57.1% had satisfactory attitudes. Mean practices score was 32 (range= 0-45) and practices were satisfactory among 54.6%. Only 37 (31.1%) knew that number 3 plastics were unsuitable for food storage. Thirty eight (32.2%) and 32 (27.1%) strongly agreed on the importance of reducing solid wastes and re-using respectively. Practices were significantly higher in females (p=0.02) due to higher usage of alternatives. Although the knowledge was positively correlated with practices (p<0.01, r=0.321), there was no direct correlation between knowledge and attitudes or attitudes and practices.

**Conclusions:** Although overall knowledge and practices on SWM were satisfactory in approximately half of the population studied, knowledge on food-related plastic usage and attitudes related to ‘reduce and re-use’ were inadequate among 2/3 of the population. Attention is needed in promoting correct attitudes and education on SWM.

**Keywords:** Solid waste management, Institutional waste, Students



**PP-10: Psychological distress and mindfulness: a preliminary cross-sectional analysis between Buddhist-based meditation practitioners and non-meditators from Sri Lanka**

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**Introduction:** Meditation is a well-known concept among Sri Lankans. This cross-sectional study explored self-reported differences in mindfulness and psychological distress (namely depression, anxiety and stress) between long-term meditators (LTM) following mainstream Buddhist-based meditation practiced in Sri Lanka and their age and gender matched non-meditating controls (NMC).

**Methods:** A purposive sample of LTM (n=25) who meditated for three or more years and followed practices taught at Sri Lankan Buddhist meditation centers/temples/monasteries and a purposive, community sample of NMC (n=15) who had never or rarely meditated were recruited. Individuals below the age of 18, experiencing brain damage and receiving psychiatric and/or psychological treatment or had been in the past three years were excluded. Participants completed a demographic information sheet, the judgmentally validated Sinhala Five Facet Mindfulness Questionnaire (FFMQ-39-SIN) and the Sinhala Depression, Anxiety and Stress Scale (DASS-21). Data was analyzed using IBM SPSS at an alpha level of 0.05. A cross sectional analysis between the two aforementioned groups (LTM; n=15, NMC; n=15) and a subsequent correlational analysis with the LTM group (n=25) was conducted.

**Results:** In terms of psychological distress, NMC reported greater levels of anxiety, stress and total DASS-21 scores compared to LTM. The LTM group scored significantly higher in four of the five FFMQ-39-SIN subscales: *describing*, *acting-with-awareness*, *non-judging of inner experience* and *non-reactivity to inner experience*. Meditation experience of the LTM in terms of years of practice was significantly associated with *acting-with-awareness* and *non-reactivity to inner experiences*.

**Conclusion:** Buddhist-based meditation as practiced in a Sri Lankan context may alleviate psychological distress, especially in terms of anxiety and stress while enhancing mindfulness skills in regular practitioners. Further studies will be conducted to examine if these findings are replicated in a larger sample. We believe these findings to be promising in an era where masses report psychological distress due to a global pandemic.

**Keywords:** Buddhist-based meditation, mindfulness, anxiety, stress, Sri Lanka

**Acknowledgement:** AHEAD grant of the World Bank

**PP-11: The effects of Pyridoxine (vitamin B6) supplementation in nausea and vomiting during pregnancy: A systematic review and meta-analysis**

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**Introduction:** Nausea and vomiting during pregnancy (NVP) is a common symptom in pregnancy. Although no definitive treatment option for NVP, pyridoxine (Vitamin B6) supplementation has been used widely. The present study aims to systematically evaluate the current evidence regarding pyridoxine for the treatment of NVP.

**Methods:** A systematic review of studies reporting the effect of pyridoxine supplementation in NVP was undertaken in accordance with PRISMA guidelines. Data were obtained using a stepwise search process using keywords in the following online medical databases; PubMed®, Web of Science®, and Scopus® for studies published before 1st May 2021. The following keywords were used: "nausea" OR "vomiting" OR "hyperemesis gravidarum" AND Vitamin B6" OR "pyridoxine" AND "pregnancy" OR "pregnant". Studies reporting intervention with pyridoxine supplementation alone and/or with other active substances were included. A meta-analysis was performed on PUQE score and Rhode's score for nausea and vomiting.

**Results:** Initial database searching indicated 548 potentially eligible articles, of which 18 studies satisfying the inclusion criteria were selected. Eight studies showed beneficial effects with pyridoxine alone as the supplementation, while six others found that supplementation of pyridoxine in combination with another active substance (Metoclopramide, Doxylamine, etc.) had favourable effects. The number of participants per group ranged from 18 to 295. Duration of intervention ranged from 3 days to 60 days among the studies. The pyridoxine doses ranged from 0.64 mg bi-daily (BD) to 50 mg BD. Supplementation of pyridoxine alone as well as combined treatment of pyridoxine with an active ingredient as the intervention significantly improved the symptoms of nausea according to Rhode's score [0.78 [95% CI: 0.26, 1.31; p=0.003; I2=57%, p =0.10)] and PUQE score [0.75 (95% CI: 0.28, 1.22; p=0.002; I2=0%, p =0.51)] respectively.

**Conclusions:** Supplementation of pyridoxine alone as well as with an active ingredient demonstrated beneficial effects for women suffering from NVP

**Key words:** Nausea; pregnancy; pyridoxine; supplementation; vitamin B6; vomiting

**PP-12: Effects of meditation on physiological and metabolic parameters in patients with type 2 diabetes mellitus: Study protocol for a randomized controlled trial.**

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**Introduction:** Sri Lanka is faced with the challenge of managing a high population with diabetes mellitus by 2030. Psychological stress plays a major role in disease outcome. Meditation-based interventions have positive effects on management of stress, mediated via modulation of neuro-humoral mechanisms and autonomic functions and are considered to be through reduction of stress hormones, improvement of insulin resistance and improvement of autonomic function.

**Methods:** Open label randomized controlled clinical trial will be conducted to investigate effects of meditation on glycemic control, and possible mechanisms of how meditation affects glycaemic control in patients with type 2 diabetes. Study is approved by Ethics Review Committee of Faculty of Medicine, University of Colombo (ERC/2019/094). Patients attending professorial unit medical clinic with type 2 diabetes (86 in each arm) is recruited based on inclusion exclusion criteria. Patients who have never or rarely meditated (less than once in three months) will be randomized using block randomization to meditation and waitlisted arms (1:1 allocation ratio). Meditation arm will undergo mindfulness meditation programme (selected after studying several methods) by a qualified instructor, weekly for of 12 weeks in addition to usual care while waitlisted arm will receive usual care. Daily meditation practices will be recorded in a diary. Primary outcome measures are fasting blood sugar, fructosamine and HbA1c. Secondary outcome measures are insulin resistance (calculated using fasting serum insulin), fasting serum cortisol, body mass index, cardiac autonomic reflex testing (Ewing's battery of tests) and oro-caecal transit time using hydrogen breath analysis. All assessments are done prior to commencement of intervention and after 3 months in both arms. Data will be analysed using SPSS V-23. Trial is registered at Sri Lanka Clinical Trial Registry (SLCTR/2021/015). Universal Trial Number (UTN) U1111-1266-8640.

**Discussion:** This study aims to identify the effect of mindfulness meditation on glycaemic control and the possible mechanisms (neuro humoral and autonomic functions) by which beneficial effects are mediated.

**Keywords:** Mindfulness meditation, diabetes mellitus, mechanisms of metabolic control

**PP-13: Lipid profile in long term meditators: comparative cross sectional study**

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**Introduction:** Cardio metabolic health is a key determinant of health. Less expensive interventions such as meditation has come into research limelight as part of primary preventive strategy. Previous studies revealed beneficial effects of meditation on lowering triglyceride levels and serum cholesterol levels.

**Methods:** A comparative cross-sectional study was conducted to assess metabolic parameters in healthy long term skilled meditators and compare with age, sex and education matched healthy controls. Meditators were selected using intake interview (duration and details of meditation, heightened peripheral awareness, stable attention, alertness and emotional stability). Face and content validity of intake interview was assessed through literature review, focus groups & Delphi interviews. Demographic data was collected using interviewer administered questionnaire. Fasting lipids: total cholesterol (TC), low density lipoprotein (LDL), high density lipoprotein (HDL), triglyceride (TG), fasting blood glucose (FBS), HbA1c and body mass index (BMI) were measured.

**Results:** Each group: n=22. Male: female = 1:1. Two groups were comparable in average exercise (2 hours per week), number of hours slept (6 hours/day) & alcohol /smoking habits (non-smokers, none/ occasional alcohol use). In long term meditators (LM) mean $\pm$  SD duration of meditation was 6.5  $\pm$  4.4 years. Eighteen LM had desirable LDL levels (<160mg/dL) compared to 13 Non-meditators(NM) (p=0.049). No difference in mean LDL level (p=0.286) or mean TC (p=0.3). The number of participants having desirable levels of HDL (males=40mg/dL, females=50mg/dL), (males: p=0.64, females: p=0.66) was not different in the two groups. Although 17 NM had desirable triglyceride levels(<150mg/dL) compared to 14 LM it was not statistically significant (p=0.32). The mean FBS, HbA1c or BMI was not different between the two groups (p=0.41, p=0.87, p=0.73 respectively).

**Conclusions:** Long term meditators had favourable LDL levels compared to non-meditators achieving statistically significant level. However, no differences were observed in TG and HDL levels. Large scale studies are needed to confirm these findings as there are many confounders not being assessed.

**Key words:** lipid profile, long term meditation

**Acknowledgements:** World bank AHEAD grant scheme

**PP-14: The prevalence of computer vision syndrome (CVS) among a cohort of medical undergraduates: an eye opener in the virtual learning environment**

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**Introduction:** Computer vision syndrome is a common condition among digital screen users and is increasing among undergraduates with online learning spiked by the COVID-19 pandemic. The symptoms include eye pain, tearing, blurring, headache, as well as neck pain and back pain etc. The aim of the study was to assess the prevalence of computer vision syndrome, its associated factors and practices among medical undergraduates in University of Colombo, Sri Lanka.

**Methods:** A preliminary descriptive cross-sectional study was conducted among 215 first year medical undergraduates of University of Colombo. Data was collected using a self-administered questionnaire sent via a google form. Descriptive statistics were generated and analyzed using binary logistic regression and other statistical tests.

**Results:** Mean age of the population was 20.95 (SD: 0.916) years. The prevalence of CVS (taken as 4 or more symptoms) was 82.5%. The most reported symptom was headache (78.6%) followed by neck pain (71.1%). Female students had a significantly higher risk of CVS ( $p=0.036$ , OR 2.19). Female gender, increased duration between two breaks and pre-existing eye disease were factors associated significantly with the severity of CVS ( $p<0.05$ ). Adjusting the brightness of the screen was the commonest method practiced to relieve symptoms (87.4%), while taking frequent breaks (74.9%) was the next.

**Conclusions:** The prevalence of CVS was high among the medical undergraduates. This can be a hindrance to the success of virtual learning, given the duration of time the students are exposed to the digital screen during their learning activities. It is timely to raise awareness of CVS and factors associated significantly with it, among medical undergraduates, their teachers and policy makers to improve the overall success of learning programmes as well as to maintain optimum eye health among the students.

**Keywords:** Computer vision syndrome, Medical undergraduates

## PP-15: Profile of mortality amongst women in reproductive age in Northern and Eastern provinces

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**Introduction:** Women in reproductive age (WRA) are presumed to be healthy. An insight into their mortality profile would identify possible preventable deaths. Northern (NP) and Eastern (EP) provinces are known to report higher WRA mortality.

**Methods:** A team of trained pre-intern medical officers visited government hospitals of NP (n=11) and EP (n=18). Bed head tickets of all reported WRA (15–49 years) deaths during 01.01.2015–31.12.2015 were traced and variables were extracted into a data format. Details of probable maternal deaths (during pregnancy period & 1 year after delivery) reported from two provinces in 2015 to national maternal death surveillance (MDSR) system were obtained and cross-referenced. A mortality profile of WRA was constructed.

**Results:** Total WRA deaths reported was 392 (EP: n=281,72%; NP: n=111,28%). Majority (n=342,87%) were married and of Tamil ethnicity (n=251,64%). Mean age was 34.7 (95% CI:33.7-35.8, Range: 15-49, median 36.5, mode 48 years). Cause of death (COD) was not available for many (n=109,28%) while the commonest cause was sepsis (n=64, 16%). Others were respiratory diseases (n=37,9%), malignancies and accidental causes (8.2%), myocardial infarction (n=31,7.9%) and suicides (n=29,7.4%). MDSR system received 29 probable maternal deaths (NP -11, EP -18) with mean 29.9 years (95% CI : 27.5 -32.2). Majority (69%) were married. Causes of maternal deaths (n=21) included; heart disease (n=05,24%), suicides (n=03,14%) and respiratory diseases (n=03,14%). Causes for non-maternal deaths (n=8) were found only for 4 deaths (Cerebrovascular disease, carcinoma, burns, road traffic accidents).

**Conclusions:** A valid COD was not available for many. A significant number of WRA deaths are due to potentially preventable causes like sepsis and pneumonia. Objective determination of COD at level of data origin is crucial for comparability and preventive actions. Coordinated mortality preventive strategies and targeted capacity-building for data originators on ICD-classification should be contemplated.

**Keywords:** Reproductive Age Female Deaths, Maternal Deaths

**PP-16: Impact of coconut and palm oils on cardio-metabolic risk factors: study protocol for a human study**

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**Introduction:** Although, the traditional Sri Lankan diet is low in fat content, the incidence of cardiovascular diseases is high. This study will be conducted to investigate the impact of coconut and palm oil, which are the primary dietary saturated fat sources among Sri Lankans, on cardio-metabolic risk factors. This study aims to investigate and compare the effects of daily consumption of coconut and palm oil on cardio-metabolic health in healthy adults in Sri Lanka

**Methods:** The study will be conducted as a sequential feeding clinical trial. The study has been approved by the Ethics Review Committee of Faculty of Medicine, University of Colombo (EC/19/046). A total of 40 healthy adults (>18 years old and both male and female) from the general community will be recruited. The study will be divided into two feeding periods of 8 weeks each for coconut oil and palm oil. Participants will be provided the first test oil for the first feeding period and then, the second test oil will be continued for another 8 weeks keeping 4 weeks of washout period in between. The anthropometric and biochemical investigation will be done at the beginning and end of the each feeding periods of the study. The primary outcome index will be the difference of the change in serum low-density lipoprotein cholesterol concentration between the two feeding periods. Secondary outcome measures include the serum concentrations of, Total Cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), TC/HDL-C ratio, triglycerides, very-low-density lipoprotein cholesterol, fasting plasma glucose, liver enzymes, anthropometry, blood pressure, dietary and physical activity assessment. Data will be analyzed using SPSS v 22. This trial has been registered with the Sri Lankan Clinical Trial Registry: SLCTR/2019/034. (<https://slctr.lk/trials/slctr-2019-034>).

**Discussion:** The expected outcome of the study is an improved understanding of the differences in cardio-metabolic risk factors between the consumption of coconut oil and palm oil.

**Keywords:** Cardio-metabolic risk; Coconut oil; Palm oil; Sri Lanka, Healthy adults



## **PP-17: Audit on pathways to care among attendees of a specialized child psychiatry unit in Sri Lanka**

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**Introduction:** Help-seeking behaviours for psychiatric illnesses vary across cultures, influenced by stigma and various beliefs. Aim of this audit was to identify pathways to care among attendees of a specialized child psychiatry unit. This will aid in planning awareness programmes and reducing the treatment gap.

**Methods:** An audit using paper-based clinic records of new registrants at university psychiatry unit of Lady Ridgeway Hospital for Children, Colombo, from October to December 2020, was conducted.

**Results:** Sixty-four records were included. Mean age at presentation was 9.3 years ranging from 2 to 14 years. Majority (59.4%) were boys. Most (64.1%) resided in Colombo district with 82.8% living in nuclear family environments. Majority (89.1%) have initially sought help from Western Medical Practitioners with 4.7% first seeing a Consultant Psychiatrist. Three per cent have initially seen alternative practitioners. First contact with a psychiatrist was in the private sector for 14.1%. Majority (51.6%) were referred to this clinic by the out-patient department following presentation by concerned parents, while 28.1% and 15.6% were referred by paediatricians and neurologists respectively. Judicial referrals accounted for 3.1%. Two children were brought within one day of occurrence of symptoms, with one child presenting to the service 7.67 years after onset. Average time between onset of symptoms and presentation was 14.15 months. Fifty-three (82.8%) received a psychiatric diagnosis with 48.4% having a primary externalizing disorder, 21.9% developmental disorders and 12.5% emotional disorders with 31.3% having a co-morbid medical diagnosis. Non-pharmacological management was prescribed for 73.4%. Planned follow-up was not attended by 37.5%.

**Conclusions:** Despite the majority seeking help from allopathic practitioners, there is a substantial delay in presenting to psychiatric services similar to observations in other South Asian countries. These delays and non-attendance to follow-up, need further study to determine the underlying factors and identify strategies to minimize them.

**Key words:** pathways to care, child psychiatry



**PP-18: Students' views on blended learning in Family Medicine**

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**Introduction:** Clinical training in Family Medicine is usually done onsite during the 4<sup>th</sup> year of medical training. Onsite clinical training in Family Medicine has been delayed due to the COVID-19 pandemic. A pilot blended learning programme employing the electronic Health Information Management System (HIMS) currently deployed in government hospitals and the Zoom platform was deployed to engage students in Family Medicine practice in their home and neighbourhood environments. The objective of this study was to find out the student's view on the programme.

**Methods:** Two batches of students participated in the programme over a period of one month. Students were trained to perform first contact care consultations using family medicine principles and applying first contact care skills, knowledge, and attitudes with a patient at home or in the neighbourhood adhering to health guidelines and enter details to the HIMS. These cases were discussed using family medicine concepts on Zoom, while displaying patient information on the HIMS. An online survey was conducted after the conclusion of the programme.

**Results:** Response rate was 87.3% (n=344/394). Regarding data entry to the HIMS, 204 (60.9%) found it very easy/easy and 231(69%) found it extremely helpful/helpful to organise and analyse case information. Two hundred and twenty seven (68.1%) strongly agreed/agreed that they were able to participate better in case discussions as the case details were displayed in the HIMS through Zoom. Regarding case discussions on Zoom, 242 (72.4%) strongly agreed/agreed that they were able to actively follow and 224 (67.8%) strongly agreed/agreed that they were able to actively participate in the case discussions. Two hundred and three (60.9%) strongly agreed/agreed that Zoom is a good platform to discuss cases and 215 (65.3%) stated that they were able to improve their knowledge and skills through the new blended teaching/learning method; 184 (55.8%) said that it is an excellent/good method and 197 (59.3%) stated that they would recommend this type of training in the future as well.

**Conclusion:** The majority of students reported positive views on using blended learning in Family Medicine. This method of blended learning should be incorporated into the clinical training programs in Family Medicine and its feasibility tested through pilot projects in other specialties.

**Key words:** clinical training, family medicine, HIMS, Zoom, blended learning

**PP-19: Factors relevant to safe medication use in Sri Lanka: a systematic review**I.P. Weliwatte<sup>1</sup>, N.R. Samaranayake<sup>2</sup>, P. Jayawardane<sup>1</sup>, P. Galappaththy<sup>3</sup>

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**Introduction:** Unsafe medication use leads to severe patient harm globally. We performed the first systematic review on Sri Lankan studies to identify factors relevant to safe medication use in Sri Lanka. Results could be used to develop indicators on medication safety and to prioritize activities for a national action plan on safe medication use.

**Methods:** Selected databases were systematically searched up to 20<sup>th</sup> September 2020, using keywords and according to PRISMA guideline.

**Results:** The search identified 1171 studies (Pubmed/Medline-710, Google Scholar-228, Scopus-99, Cinahl-07, Embase-107, Web of Science-20), of which 1020 studies were excluded (91- duplications, 929-contents irrelevant). From the studies related to medication safety, 77 were excluded (27-review articles and 50-full paper not published). Final analysis included 74 articles categorized as studies mostly related to registration (n=9, 12.2%) procurement (n=2, 2.7%), storage/distribution (n=1, 1.4%), prescribing (n=30, 40.5%), dispensing (n=20, 27.0%), administration (n=10, 13.5%), and monitoring (n=2, 2.7%). Poor processes during registration/procurement were highlighted in five studies. Prevalence rates of medication errors at different stages of medication use were 20.0%-99.0%. Poor legibility of prescriptions (0.0%-74.0%), varied generic prescribing (11.0%-90.1%), high antibiotic prescription rates (20.0%-59.1%), using unapproved abbreviations (36.5%-69.0%), potential drug interactions (0.3%-52.5%), omission of indicated medicines (4.3%-61.8%), dispensing without prescriptions (35.6%-86.9%), drug duplications (4.7%-6.0%), inadequate knowledge of patients on dosing instructions (4.0%-46.0%), poor labeling of dispensed medicines (33.0%-99.7%), and self-medication of medicines (33.9%-35.3%), specially antibiotics (6.8%-16.0%) were the key safety issues identified.

**Conclusions:** High prevalence of medication errors and high rates of factors that could lead to medication errors were identified from Sri Lankan studies. Prescribing (40.5%) and dispensing (27.0%) were studied more while procurement and storage/distribution were studied less. These results could be used to develop indicators for medication safety and in planning a national action plan on medication safety for Sri Lanka.

**Keywords:** Medication safety, Errors, prescribing, dispensing, Sri Lanka

**Acknowledgement:** University Research Grant (ASP/01/RE/MED/2019/51), USJ

**PP-20: Outcomes of bilio-enteric anastomoses in a single, low volume hepato-pancreato biliary surgery unit**

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**Introduction:** Hepaticojejunostomies (HJ) establish bilio-enteric continuity after resections for malignant and benign HPB disorders. The leak rates of HJs range from 2.2-12.4% and contribute to morbidity and mortality. This study looks at the outcomes of patients who had a HJ in a low volume HPB surgical unit.

**Methodology:** Retrospective analysis of a patient database and records of HJs done at a single HPB surgical unit from 2011-21 was done. HJs were performed with a retro-colic Roux loop or single jejunal loop using single layer interrupted 4-0 or 5-0 polydioxanone. Right subhepatic drains were placed.

**Results:** Of the 97 patients, mean age was 51.86 years with a M:F ratio of 1:1.4. 64.9% (n=63) of HJs were for malignancies while 35.1% (n=34) were benign conditions. 56.7% (n=55) had a HJ during a pancreaticoduodenectomy, 12.4% (n=12) after extrahepatic bile duct resection and hepatectomy, 11.3% (n=11) after choledochal cyst excision, 4.1% (n=4) as palliative bypass procedures and 4.1% (n=4) for repair of iatrogenic bile duct injuries. Bile leaks occurred in 3.1% (n=3). Two occurred in HJs after hilar cholangiocarcinoma resections, where one persisted for 3 months – and the other led to mortality on the 15th postoperative day. The 3rd leak following choledochal cyst excision resolved in a day.

**Conclusions:** Our results demonstrate excellent outcomes in terms of leak rates for HJs despite being a low volume HPB surgical centre. This is probably the result of meticulous surgical technique and peri-procedural care.

**PP-21: A systematic review and meta-analysis of the prevalence of skeletal dysplasias at birth**Y.D. Kolambage<sup>1</sup>, D.S. Ediriweera<sup>2</sup>, D. Hettiarachchi<sup>3</sup>, V.H.W. Dissanayake<sup>3</sup>

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**Introduction:** Skeletal dysplasias (SD) or osteochondrodysplasias are a heterogenous group of rare disorders that have generalized abnormalities in bone and cartilage. A number of studies have estimated the prevalence rate at birth of SD in different study populations and settings. The objective of this systematic review and meta-analysis was to determine the overall prevalence of SD at birth.

**Methods:** A systematic review was conducted in accordance with PRISMA guidelines, with no regional or language restrictions. PubMed (MEDLINE) was searched using MeSH terms, along with manual searching of reference lists, for peer-reviewed articles published from January 1975 to August 2021. Predefined eligibility criteria were used to select articles. The number of cases among the population of interest was extracted to conduct a meta-analysis using the inverse variance method. Random effects models were used to obtain the pooled estimates and to compare the rates in different study settings.

**Results:** The search identified 677 unique articles. Thirty-seven full-text articles were assessed and 13 were eligible for the review (n=12,754,418 births). The pooled estimate of overall prevalence of SD at birth was 3.8 (95% Confidence interval [CI] 2.9-4.9) per 10 000 births. Studies were categorized into 3 subgroups according to their study setting: hospital-based (5, 38.5%), multicentric (4, 30.8%), population-based (4, 30.8%). The birth prevalence rates of each subgroup were 4.4 (95% CI 2.3-7.1), 3.1 (95% CI 1.8-4.6) and 3.9 (95% CI 2.9-5.0) per 10 000 births, respectively. There were no significant differences between the subgroups (P = 0.53).

**Conclusion:** Though larger multicentric and population-based studies showed relatively lower birth prevalence rates, they were comparable to the results of hospital-based studies. The variability in considered pregnancy outcome and period of ascertainment used in each study is a limitation. These results provide a basis for policymaking and allocation of health resources in SD care globally.

**Keywords:** Skeletal dysplasia, Osteochondrodysplasia, Prevalence, Systematic review, Meta-analysis

**PP-22: The prevalence and associated factors for mental health problems among children and adolescents (aged 6 – 14 years) diagnosed with Type 1 Diabetes Mellitus attending an outpatient clinic at Lady Ridgeway Hospital, Colombo**

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**Introduction:** Type 1 Diabetes Mellitus (T1DM) is a common paediatric illness with significant long-term complications and adverse psychosocial outcomes. These impact quality of life and glycaemic control, which in turn worsens psychological difficulties. There are no published studies from Sri Lanka on prevalence of psychological problems in childhood T1DM. The resulting lack of awareness cause poor identification and delayed referrals for psychological support, worsening outcomes. This study aims to determine the prevalence of and associated factors for psychological problems among children with T1DM attending a specialized children's hospital in Sri Lanka.

**Methods:** A descriptive cross-sectional study among children/adolescents aged 6-14 years with T1DM attending the Endocrinology Clinic at Lady Ridgeway Hospital is planned. Minimum sample size calculated considering the expected proportion with a mental health diagnosis was 248. Initial screening would be done for emotional/behavioural problems, learning difficulties and eating disorders. Mental health disorders would be classified according to International Classification of Disease 10th edition. The association between occurrence of mental health problems and demographics (age, sex, ethnicity, religion, parental education/occupation, income, area of residence), disease and child associated factors (duration of diagnosis and insulin use, treatment adherence, glycaemic control, activity limitation, self-esteem, peer pressure/bullying, weight/shape dissatisfaction, body-mass-index) and family factors (parental stress, family cohesion, support and adaptability, diabetes-specific conflict, maternal depression) will be explored.

Prevalence of mental health problems will be presented as percentages and presence of associations will be explored using Chi-Square Tests at significance level of  $p < 0.05$ . Strengths of associations between mental health problems, psychosocial and clinical variables will be assessed using logistic regression analysis and presented as Odds Ratios.

**Conclusions:** Determining the prevalence and factors associated with mental health problems in this population will increase awareness and identify high risk cohorts of children needing psychological support and pave the path for further study in the field.

**Key words:** Type 1 Diabetes Mellitus, mental health issues, psychosocial factors

**PP-23: The association between shift work and metabolic syndrome among employees in a hospital setting: protocol for a comparative cross-sectional study**

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**Introduction:** There exists strong evidence supporting the notion of shift workers being more vulnerable to metabolic syndrome (MetS). Although a majority of such evidence were found from Western countries, South Asians also exhibit an inherently higher risk for metabolic derangements due to their unique body composition and other lifestyle factors. The aim of this study is to determine the association between shift work and MetS and assess whether their lifestyle behaviours and body composition have an additional detrimental effect on the disease.

**Methods:** The study will be conducted as a comparative cross-sectional study at the Nawaloka Hospital, Colombo, Sri Lanka. A sample of 66 regular day workers and shift workers will be recruited for the study. Firstly, the shift workers group (n=33) are to be selected using the stratified random sampling technique. Then a comparison group of day workers (n=33) will be selected after matching for age and gender in a 1:1 ratio. The data will be collected through blood tests, anthropometric measures, and an interviewer-administered set of questionnaires. The MetS will be diagnosed based on the International Diabetes Federation (IDF) criteria. The difference in the prevalence of MetS between day and shift workers will be evaluated as the primary outcome. Secondary measures are the differences in anthropometric, clinical, biochemical parameters and other lifestyle behaviours between the day workers and shift workers. Data will be analyzed using SPSS version 23.0

**Discussion:** The article presents the protocol to investigate the association between shift working behaviour and MetS. The result of the present study will be useful in formulating occupational policies, as well as a starting point for future research on shift work and the risk for other chronic diseases.

**Keywords:** metabolic syndrome; shift work; day work; South Asians

**PP-24: Association between shift work and the risk for dysglycaemia in a hospital setting**

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**Introduction:** Shift work is common among employees working in hospital settings. Shift work often leads to metabolic derangements that facilitate the development and progression of chronic diseases including diabetes. This study compared the glycemic parameters and prevalence of dysglycemia between shift-workers and non-shift workers.

**Methods:** A cross-sectional study was carried out among a sample of health workers aged  $\geq 18$  years at Nawaloka Hospital, Colombo. A sample of both shift and non-shift workers were recruited by stratified random sampling. The data were collected by questionnaires and collecting blood samples. Fasting blood sugar (FBS) and HbA1c tests were used to diagnose diabetes (FSG  $\geq 126$  mg/dL or HbA1c  $\geq 6.5\%$ ) and dysglycemia (FSG  $\geq 100$  mg/dL or HbA1c  $> 5.7\%$ ) in accordance with American Diabetes Association (ADA) criteria. The independent t-test and Chi-square test were used.

**Results:** This study consisted of 36 (M:17; F:19) non-shift workers and 40 (M:19; F:21) shift workers. Mean ages for the non-shift and shift work groups were  $36.9 \pm 10.9$  and  $39.1 \pm 12.0$  years, respectively ( $P=0.85$ ). In non-shift and shift workers groups, the mean FBS and HbA1c levels were (FBS,  $94.03 \text{ mg/dL} \pm 21.59$  vs  $109.75 \text{ mg/dL} \pm 41.84$ ;  $P=0.001$ ) and (HbA1c,  $5.48\% \pm 0.88$  vs  $6.28\% \pm 1.79$ ;  $P<0.001$ ). Dysglycemia was prevalent in 16.7 % (6/36) of non-shift workers and 45.0% (18/40) of shift workers ( $P=0.008$ ). In comparison to the non-shift workers, the prevalence of diabetes was significantly associated with shift workers (8.3% (3/36) vs 27.5% (11/40);  $P=0.031$ ) (OR 4.17; 95% CI, 1.06–16.43).

**Conclusion:** Shift workers were associated with a high risk of developing increased blood glucose parameters compared to day workers in this hospital setting. Since our sample size was limited, large-scale future studies are recommended for stronger evidence.

**Key words:** shift work; non-shift work; diabetes; dysglycemia; blood sugar



**PP-25: Survey on experience and needs for a formal mentoring program in a selected group of professionals in Sri Lanka**

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**Introduction:** Formal academic mentoring is a relatively new concept in the Sri Lankan setting. The academic mentoring program of the Faculty of Medicine, University of Colombo (AMP-UCFM) is the first formal mentoring program to be established in a local government university. AMP-UCFM was started with a pilot program in the Faculty of Medicine, and it was subsequently extended to the University in 2018. This survey was carried out to understand the need for formal programs in mentoring to design a training support program for professionals in a wider academic setting in Sri Lanka.

**Method:** A self-administered online survey was distributed to all the participants of Mentoring Day 2021, which was held in January 2021 at the Medical Faculty, University of Colombo. The survey assessed the experiences and needs of the participants regarding formal mentoring.

**Results:** 108 academics participated. Majority (n=83/108, 76.8%) were females. Eighty-three (76.8%) have either completed their postgraduate studies or enrolled in a PG program. Forty-four (40.7%) participants have experienced formal mentoring, while 78 (72.2%) have experienced informal mentoring. A higher number of participants had 1-3 years of experience in either formal (n=30/108, 27.8%) and informal (n=37/108, 34.2%) mentoring methods. Forty-two (38.9%) were from institutions without any formal mentoring program. One hundred and four (96.3%) desired to be a part of formal academic mentoring. Participants expected support from AMP UCFM on developing their career in mentoring (n=78/108, 72.2%), learn theory on mentoring (n=66/108, 61.1%), establish formal mentoring in their institutions (n=58/108, 53.7%) and assistance for institutions to improve ranking through mentoring (n=59/108, 49.1%).

**Conclusions:** Many institutions do not have an established formal mentoring program. Most academics are not experienced in formal mentoring but are willing to be a part of a formal program. Understanding their needs is vital for planning the future activities of AMP UCFM and offer a tailor-made program for service recipients.

**Keywords:** academic mentoring, mentoring program.



**PP-26: Knowledge and awareness of patients on aspects relevant to safe medication use among patients attending two state sector hospitals in Sri Lanka**

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**Introduction:** Patients are important stakeholders in improving medication safety (MS). This study assessed patients' knowledge and practices relevant to MS in two hospitals to help develop a MS practice package.

**Methods:** A cross-sectional study was done among adult patients, dispensed medicines from out-patient pharmacies in Colombo South Teaching Hospital (CSTH) and National Hospital of Sri Lanka (NHSL). Systematic sampling technique was used. Prescription details, knowledge and safe practices on medication use were assessed using an interviewer-administered questionnaire (developed in-house) after patients received medications from the pharmacy. Data were analysed descriptively.

**Results:** Patients (n=100) from medical, surgical clinics, and discharged from wards were 55%, 21%, and 24% respectively which included 85% repeat and 15% new prescriptions. Name and strength of medicines written/typed in English on packaging couldn't be read/understood by 43% and awareness of drug name (27%), indication (23%), strength (28%), dose (14%), and side effects (27%) were in the given percentages. Most patients recognized medicines by the appearance (66%). Patients bought medicines without prescriptions (36%) and most common was chlopheniramine (58%) and antibiotics by 16%. Complexity of drug regimen was a problem for 36%, and 44% prescriptions contained more than 4 drugs (polypharmacy). Only 38.4% knew what to do on missing a dose. Only 12% informed their allergies to pharmacist/doctor, 4.3% kept written records on allergies, 56.6% knew how to identify allergies, and 40% did not inform about other prescribed medications. Patients checked for correct medication (80%), patient's name (80%), strength (35%), dose (66%) before taking medicines. Few patients (6%) have been contacted by hospital for an error in dispensed medications, and 3% have been admitted to a hospital due to a drug related problem. Only 9% had participated for educational programs/workshop on MS.

**Conclusions:** Patients' knowledge on medicines was inadequate. There is a need for appropriate patient education and counselling on safe use of medicines.

**Key words-** Patients knowledge, medication safety (MS), drug allergy, drug related problems

**PP-27: Introduction of a mechanical chest compression device (Dilshan's MCPR) for in-hospital / ETU cardiac arrest during the Covid-19 Pandemic**

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**Introduction:** Cardiopulmonary resuscitation (CPR) for hospitalized patients during the COVID-19 pandemic presents unique challenges to resuscitation teams, including a potentially increased risk from virus aerosolization. As such, the American Heart Association has published a guideline, which includes suggestions to use mechanical chest compression devices if available. We herein describe the experience gained after doing the mannequin study with a frugal MCPR device<sup>3</sup> developed in-house.

**Methods:** Dilshan's MCPR device is a locally developed low-cost alternative of the commercially available MCPR devices. In September 2020, 2 versions of Dilshan's MCPR devices (GEN 4/6) were presented to the College of Anesthesiologists & Intensivists of Sri Lanka in order to ensure the proper outcome of the basic objectives of distal mechanical Cardiopulmonary resuscitation. The assessment guidelines were prepared by an expert team appointed by the National Medicines Regulatory Authority including a panel of subject matter experts along with the NMRA Bio Medical Engineering teams. The rate of compression, depth of compression, 30:2 function, continuous function, mechanical safety button accuracy and battery backup time were assessed during the study.

**Results:** The rate of compression was calculated manually and by an inbuilt photoelectric sensor and the rate was 110-120. The depth of compression was found to be constant at 5 cm. The two basic functions were assessed by switching by the basic controls of the circuit. Battery backup was sufficient for 20-30 minutes. The expert team suggested to assess the clinical safety profile in further clinical evaluation.

**Conclusion:** Rapid deployment of mechanical chest compression devices during the COVID-19 pandemic is feasible with the low cost alternatives like Dilshan's MCPR. Although there are substantial technical challenges, results revealed more controlled resuscitation experience, better compression quality, and need of fewer individuals in the resuscitation room. Additional staff training may be necessary to achieve optimal results.

**PP-28: A Qualitative Study on the Perceived Impact of Mindfulness Meditation on Teacher Immunity to Workplace Stressors**

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**Introduction:** The profession of teaching is considered to involve constant exposure to stressors on a daily basis. L2 teacher immunity is a theoretical construct that encompasses aspects such as teaching self-efficacy, burnout, resilience, attitudes to teaching, openness to change, classroom affectivity and coping; it provides insight into the question of how teachers survive and thrive despite experiences of emotional upheaval and threats to psychological well-being. This study sought to explore the impact of mindfulness meditation on ‘teacher immunity to workplace stressors.’

**Methods:** This qualitative research inquiry utilized a blend of narrative and case study methodologies, which allowed the researchers to co-construct, with the participants, a ‘storied’ understanding of the impact of mindfulness meditation in shaping their teacher immunity to workplace stressors. Five participants were recruited followed by an intake interview to screen skilled meditators. Other selection criteria were being teachers with a minimum of two years of experience working on permanent basis in Sri Lankan government schools, and not being on long-term leave when data were collected. Data generation was done through an in-depth interview with each participant.

**Results:** Results of the study indicate that the participants responded to stressful events at work through problem-focused coping strategies such as defining the problem, weighing alternatives in terms of their cost and benefits and taking suitable remedial action. They perceived regular practice of meditation to have improved their ability to regulate their emotions, address career challenges, and treat students with sympathy and loving kindness. They also experienced that, as a result of practising mindfulness meditation, they were able to face stressful events at work with equanimity and tolerance, and concentrate on their work despite the stressor.

**Conclusions:** Regular practice of mindfulness meditation has the potential to help teachers to respond to workplace stressors in ways that would benefit their psychological well-being.

**Keywords:** teacher immunity to workplace stressors, narrative case study, mindfulness meditation

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## UNDERGRADUATE STUDENT PRESENTATIONS

### **SOP-1: Attitudes and practices among students of University of Colombo School of Computing on consumption of fast food and sugary food through mobile application delivery**

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**Introduction:** In this lockdown era, the increasing popularity of mobile food delivery applications has made it surprisingly easy to get any meal you want, even from closed restaurants. This has led to fast food and sugary food being made even more accessible. With the ever-growing pandemic of non-communicable diseases in mind, this study was done to investigate the effects of mobile applications on unhealthy food habits among the youth, who inevitably turn to this when they are stuck at campus.

**Methods:** This was a descriptive cross-sectional study of 109 undergraduate students. With ethics approval, the study was conducted when the students had on-site activities. Sample was obtained by random sampling and a self-administered on-site questionnaire was used to assess the association between frequency of food delivery application usage and fast food and sugary food consumption. The frequency of food item was analysed as food groups and a score was given according to the frequency of consumption. The mean values were taken as the cutoff between high and low usage, and this was used to compare the consumption frequency between application users and non-users.

**Results:** 73.4% of the students used food delivery applications. 83.8% thought that the usage of these applications was expensive but majority thought that it was effective and less time consuming (90%). Majority of the application users frequently consumed fast food (58.8%) but not sugary food (48.8%). Short eats and Fried rice were popular fast foods. Ice Cream and Carbonated drinks were popular sugary foods.

**Conclusions:** Majority of the students used food delivery applications and thought that they are effective. Also, majority of the application users consumed fast food frequently. This draws attention to the significance of consuming fast food and sugary food, its impact on non-communicable diseases and the importance of health education.

**Key words:** Food Delivery Applications, Undergraduates, Fast Food

**SOP-2: Knowledge, attitudes about physical fitness and exercise, and the barriers to perform exercise and physical activities in a selected group of visually disabled teenagers: A descriptive study**

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**Introduction:** Perception regarding physical fitness and exercise in visually disabled teenagers has been poorly researched the world-over, neglecting the design, development and implementation of suitable exercise and physical activity (E/PA) programs for them. The purpose of the study is to determine knowledge, attitudes about physical fitness and exercise, concerns and preference for different types of exercise and barriers to perform exercises and physical activities.

**Method:** A descriptive cross-sectional study was done on 55 visually disabled teenagers of the School for the Blind and Deaf, Dowa, Badulla. Ethical clearance was obtained from the Ethics Review Committee, Faculty of Medicine, University of Colombo. An interviewer-administered questionnaire was used for data collection. Knowledge and attitudes were assessed by Likert scales, concerns and preference were assessed by multiple response questions and barriers were assessed by a Likert scale. The data was analyzed using SPSS version 23.0.

**Results:** Among 55 participants aged 13 to 17 years, 58.2% were males. 81.8% had incomplete understanding about meaning of physical fitness. Self-perceived physical fitness level was higher in males ( $p$  value = 0.003); 70.3% had positive attitudes regarding physical fitness and exercise. 35.95% preferred aerobic exercises while none of them preferred dancing. Not knowing where to go for exercise, lack of a place to exercise with individuals having similar disabilities, lack of adapted exercise equipment, lack of learn-to-exercise programs and not knowing what kind of exercises were the best for them were the common barriers disclosed by them.

**Conclusion:** Visually disabled teenagers had gaps in knowledge, concerns, preferences regarding physical fitness and exercise. However, they had positive attitudes in this regard with barriers. Programs at school level to improve their knowledge on physical fitness and suitable exercises and to address the identified issues should be developed and implemented while improving accessibility to exercises and removing identified barriers.

**Keywords:** Visually disabled teenagers, Physical fitness, Exercise, Physical activities

### **SOP-3: Relationship between BMI, waist circumference and knee extensor strength among healthy female teachers in two selected schools in Galle District**

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**Introduction:** Knee extensor muscle strength constitutes an essential role of an individuals' general functional capacity. It is clinically evident that the weakness of knee extensors and obesity leads to knee osteoarthritis in later life. The influence of obesity on knee muscular strength has not been deeply explored in Sri Lankan context. Hence, this study is aimed to identify the relationship between BMI, waist circumference (WC), and knee extensor strength (KES) in healthy female teachers in two selected schools in Galle District.

**Methods:** A cross-sectional analytical study was carried out on 2 selected schools, consisting of randomly selected 105 female teachers aged between 30-50 years. Isometric knee extensor strength (digital hand-held dynamometer), WC (stretch-resistant tape), height and weight were measured. BMI and WC were categorized according to the WHO cut off points. The validated International Physical Activity Questionnaire short form and a socio-demographic questionnaire were used for data collection. Data was analyzed using SPSS version 20.

**Results:** The mean values of isometric KES, BMI and WC of the sample were  $21.48 \pm 1.87$  kg,  $24.62 \pm 3.75$  kg/m<sup>2</sup> and  $82.28 \pm 9.11$  cm respectively. Category percentages were as follows; underweight (5%), normal (36.2%), overweight (35.2%) and obese (23.8%). Most of the population (59%) were above the normal BMI range and 51.4% were centrally obese. Significant positive correlations were found between BMI and KES ( $p < 0.01$ ) ( $r = 0.340^{**}$ ), WC and KES ( $p = 0.002$ ) ( $r = 0.304^{**}$ ) and physical activity level and KES ( $p < 0.01$ ) ( $r = 0.488^{**}$ ).

**Conclusion:** Increased BMI and WC levels were associated with increased KES in healthy middle-aged women. However, no significant KES difference showed when comparing normal and overweight groups. Moreover, KES increased with the increment of physical activity levels.

**Keywords:** Knee extensor strength, Body Mass Index, Waist circumference, Osteoarthritis, Women

**SOP-4: Awareness of zoonotic infections and preventive measures and the practice of those measures among farm workers in a livestock farm, Galle**

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**Introduction:** Most zoonotic infections are identified as emerging and re-emerging. Livestock farm workers are the most vulnerable population. Most studies done in Sri Lanka were focused on knowledge, attitude and practices on one zoonotic infection among general population. Our main objective was to assess the awareness of zoonotic infections and preventive measures and the practice of those measures among farm workers.

**Methods:** A cross sectional study was carried out among 108 farm workers of a selected farm using stratified random sampling. Awareness of existence of zoonotic infections, disease specific knowledge and practice of preventive measures at their work setting (i.e., hand washing, usage of personal protective equipment, usage of disinfectants for cleaning) were assessed using an interviewer administered questionnaire. Disease specific questions were on 'leptospirosis', 'rabies', 'brucellosis', 'swine and avian influenza'. Knowledge was classified as must know, good to know, nice to know and practices as essential, and appropriate. Scores were given according to a predetermined scoring system. Knowledge and practices against socio-demographic factors were investigated using Chi-square test.

**Results:** Response rate was 100%. Leptospirosis, rabies and swine & avian influenza were known diseases to majority (99.1%, 97.2% and 86.1% respectively) of participants. Most of them had good knowledge on disease specific questions – leptospirosis 98.2%, rabies 88.9% and swine & avian influenza 70.4%. But brucellosis was known by 4.6% while only 0.9% were having good knowledge about brucellosis. With regards to the practices of preventive measures, majority (92.6%) displayed good practices. Statistically significant associations between socio demographic factors (i.e., level of education, time spent with animals in a day, monthly income) and awareness of zoonotic infections or practices of preventive methods could not be found ( $p=0.05$ ).

**Conclusion:** Awareness and practices of farm workers on zoonotic infections were satisfactory and can be further enhanced.

**Key words:** farm workers, Leptospirosis, Rabies, Influenza, Brucellosis

**SOP-5: Factors affecting public health midwives' attitudes, role perceptions and interest on autism and its management in selected medical officer of health areas**

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**Introduction:** Public Health Midwives (PHMs) who should play a role in early detection and management of autism which include detecting developmental delays and early referral, have poor knowledge on autism, which may hinder its timely detection and referral for intervention. Positive attitudes towards children with autism are vital to provide non-stigmatizing, empathetic care. This study was carried out to determine factors affecting PHMs' attitudes, role perceptions and interest on autism and its management, in selected Medical Officer of Health (MOH) areas in Colombo district.

**Methods:** A cross-sectional analytical study was conducted in selected MOH offices in the Colombo district, on a convenient sample of 114 PHMs. Self-administered tools used for data collection including 5-point Likert scales tested PHMs' attitudes towards children with autism, their role perceptions on the management of autism and interests in receiving training on autism. The 'Knowledge about Childhood Autism among Health Workers' (KCAHW) questionnaire tested their knowledge on autism.

**Results:** Majority of PHMs had positive attitudes towards children with autism (n=80, 74.1%), were aware of their role in the management of autism (n=102, 89.5%) and were receptive towards receiving training (n=108, 96.4%). Positive attitudes towards children with autism was associated with better role perception (p<0.05, Cramer's V=0.280), as was higher interest towards receiving training (p<0.05, Cramer's V=0.347). There was a weak negative correlation between interest and age ( $r_s = -0.219$ , p<0.05). PHMs scored a mean of 12.94/19 in the KCAHW questionnaire, reflecting poor knowledge. However, knowledge on autism, past contact with children with autism or prior training on autism did not affect attitudes, role perceptions or interests.

**Conclusions:** Positive attitudes and higher interest were associated with better role perception. Interest in receiving training declines with age. Thus, implementing measures that highlight PHMs' roles in autism management, especially targeting senior PHMs, are recommended in order to generate more positive attitudes and interest.

**Keywords:** Autism, Attitudes, Role perceptions, Interest, Public Health Midwives



**SOP-6: Knowledge, attitudes, and prevalence of alcohol dependence and alcohol withdrawal among male patients who use harmful amounts of alcohol in the medical and surgical wards at National Hospital of Sri Lanka (NHSL)**

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**Introduction:** Excess consumption of alcohol results in a state of dependence in an individual. The subsequent burden of morbidity and mortality has a significant impact on healthcare and socio-economic status of the country. This study aimed to assess knowledge about alcohol dependence, alcohol withdrawal, attitudes and prevalence of alcohol dependence among male patients who use harmful amounts of alcohol in the medical and surgical wards of NHSL.

**Methods:** In this cross-sectional study among male patients, 120 harmful users of alcohol (who scored >8) were chosen by administering AUDIT. Socio-demographic details, knowledge about alcohol dependence and withdrawal, attitudes about dependence and toward alcohol dependent populations were obtained via interviewer-administered questionnaires. Knowledge was graded as adequate, moderate and inadequate. Attitudes were classified as positive and negative. Prevalence was found from the scores in AUDIT. Chi square tests were done to test for statistical association of prevalence with demographic factors.

**Results:** Most patients were middle aged (54.2%, n=65) and from Colombo district (61.7%, n=74). Majority had moderate level of knowledge (score of 50%-74%) regarding dependence and withdrawal (66.7%, n=80). Regarding attitudes about alcohol dependence (5 statements), most number of statements had a mean revealing positive attitudes (60%, n=3). Regarding attitudes toward other alcohol dependent populations (7 statements), most number of statements had a mean revealing negative attitudes (71.43%, n=5). From the AUDIT scores, prevalence of alcohol dependence (score of >15) had a rate of 39.2% (n=47). A significant association (p<0.05) between education and alcohol dependence was established.

**Conclusions:** Most subjects had moderate levels of knowledge on alcohol dependence and withdrawal. They had non-favoring attitudes towards alcohol dependence which could be expected in this population, and surprisingly, negative attitudes towards alcohol dependent populations. A significant correlation between alcohol dependence and lower educational status was seen. The dependency rate was significantly high. Further research should focus on complications of harmful alcohol use in this particular population.

**Key words:** Alcohol dependence, Inward patients, Knowledge, Attitudes, Prevalence

**SOP-7: Knowledge and practices related to Ponseti method of treatment of congenital clubfoot among patients' parents in Sri Lanka**

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**Introduction:** Congenital clubfoot is a deformity where the foot is deformed at birth in three planes. It is one of the most common musculoskeletal deformities at birth. Ponseti method is the most widely accepted non-surgical treatment of clubfoot, which consists of correction of deformity with serial casts followed by a foot abduction brace. Compliance is essential for successful treatment outcomes, aided by the knowledge and attitudes of parents. The objective of this study was to evaluate knowledge, practices and attitudes of parents of children undergoing Ponseti method of treatment for congenital clubfoot and to describe the correlation between knowledge, compliance and recurrence.

**Method:** A descriptive cross-sectional study was conducted at the clubfoot clinic at Lady Ridgeway Hospital with participation of 120 parents of children from birth up-to 5 years. Systematic sampling was used. Data was obtained via an interviewer-administered questionnaire. Analysis was based on the scores and cut-offs, determined by the consultant orthopedic surgeon for each section in the questionnaire. Chi-square test was used to identify associations.

**Results:** Of 120 parents, 85.83 % (95% CL) were aware of the disease and its treatment. Of the 98 parents of children prescribed with braces, 77.6 % (95% CL) were compliant to the treatment. Compliance of parents of children with over 3 years and less than 3 of treatment were 89.29% and 72.86% respectively. There was no statistically significant association between compliance and duration of treatment. ( $P=0.078$ ) There was no statistically significant association between level of awareness or recurrence with compliance.

**Conclusions:** Awareness and compliance among patients' parents was high. A higher percentage of awareness was found in parents of children with over 3 years of treatment period. Health education for further improvements in awareness is recommended particularly at the initial stages of treatment.

**Keywords:** Knowledge, Practices, Ponseti method, Clubfoot, Parents

**SOP-8: Screen use behaviour, screen overuse and associated factors among preschool children –  
A cross-sectional study**

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**Background:** The influence of screen use on preschool children, their social interactions and active learning is undeniable. In the absence of local guidelines for sedentary screen time, understanding the patterns and associations of screen use will help development of interventions necessary to prevent screen overuse. The study aimed to assess the screen use behaviour, screen overuse and its associated factors among preschool children in Galle municipal area.

**Method:** A cross-sectional study was carried out among 118 preschool children from three selected preschools from the Galle municipality, between July and August 2020. Children were selected using stratified sampling method from age four- and five-year-olds. An interviewer administered questionnaire was used to collect data from their parents. Chi-Square test was done to assess associations with screen overuse.

**Results:** The screen overuse (defined as daily screen time >1 hour by the WHO) was prevalent in 87.3% (n=103) of the study sample. The most used devices were the mobile phone and television and 58.5% (n=69) used digital devices for educational purposes, 52.5% (n=62) for child to rest, and 72.9% (n=86) for watching cartoons. Parental supervision of child's screen use was present in majority and accessing devices was done with parental permission. Restriction of screen use was done by 79.7% (n=94) of parents but had a significant association with screen overuse (p=0.043). Child's screen overuse was associated with parental screen overuse (p=0.006). Children aged five showed significantly higher proportion of screen overuse (p=0.023) compared to four-year-olds. Gender of child, behaviour assessed by Strengths and Difficulties Questionnaire, child's overweight or obesity, parental employment, monthly income, educational status failed to show any statistically significant association with screen overuse.

**Conclusion:** Prevalence of screen overuse was high in the sample and showed significant associations with parental screen overuse, restriction of screen use and child's age. Reducing parental and children's screen time is recommended.

**Key words:** Screen overuse, preschool children, digital devices, obesity, child behaviour

**SPP-01: Self-esteem and its correlates among Sinhala medium ordinary level students from three selected tuition classes in Colombo district**

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**Introduction:** Self-esteem is a critical component of wellbeing and adaptation in adolescents. Therefore, identifying the correlates of self-esteem in adolescents is necessary to plan suitable interventions in this regard. We sought to assess the self-esteem levels and its correlates among Sinhala medium O/L students from three selected tuition classes in Colombo district.

**Methods:** A descriptive cross-sectional study was done with systematic sampling at three selected tuition classes in Colombo district among 115 Sinhala medium ordinary level students, aged 15-16 years. The self-administered questionnaire included the Rosenberg self-esteem scale. A formal validation of the scale was not done. Data gathered included self-esteem level, family members' employment state, number of siblings, academic performance, engagement in sports, social media usage and their own suggestions to improve their self-esteem.

**Results:** The majority of students (n=103;89.6%) were found to have an average self-esteem. 4.3% (n=5) showed high self-esteem and 6.1% (n=7) showed low self-esteem. The scores ranged from 10 to 30 and mean score was 19.65. There was a positive correlation between self-esteem and marks obtained for English language ( $r=0.245$ ;  $df=112$ ;  $p\leq 0.05$ ). A higher proportion of students who didn't use social media had low self-esteem ( $p\leq 0.05$ ). Having sisters was negatively related to self-esteem ( $p\leq 0.05$ ). Out of 131 total suggestions given by the participants on ways to improve their own self-esteem, most suggestions were regarding sports and physical activities (n=36, 27.48%). The most popular suggestions given by participants were allocating time for sports and morning exercises, making sports compulsory and introducing new sports.

**Conclusions:** The majority of the participants had average self-esteem and compared to foreign researchers mean self-esteem of the present study population was considerably low. Therefore, measures should be taken to improve their self-esteem. These results support the need for further research to explore how individual and contextual factors affect the self-esteem in this age group.

**Key words:** Self-esteem, adolescent, tuition

**SPP-02: Nutrition related knowledge, attitudes and practices among primary school teachers in Colombo educational zone**

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**Introduction:** Inculcation of proper nutrition related knowledge and practices in a child's formative years is vital towards achieving optimum health in the population. Primary school teachers have an important role to play in this. Therefore, this study is aimed at exploring the current level of knowledge, attitudes and practices among these teachers and the factors related to them.

**Methods:** A descriptive cross-sectional study was carried out among primary school teachers in four schools in Colombo educational zone. Schools were selected by simple random sampling and teachers by convenient sampling. Knowledge, attitudes and practices related to nutrition were assessed by an unvalidated, self-administered questionnaire consisting of 43 questions. Knowledge scores were categorised into three groups as "Poor" (<mean - 1 SD), "Average" and "Good" (> Mean+1SD).

**Results:** Of the 101 participants, 87 (86.1%) were females and 59% were (60/101) above 40 years. Mean scores obtained for knowledge and attitudes were 52.3% and 76.5% respectively. Awareness of the referral systems to hospitals was high (93%), whereas the knowledge on mebendazole, vitamin and mineral supplementation was the lowest (19%). Having a child of school going age was associated with a good nutrition related knowledge among teachers (P=0.03). However, receiving tertiary level education did not have a significant impact on the level of knowledge (P=0.086). Ninety two participants (91%) were willing to gain additional knowledge regarding nutrition mostly via mass media (80%) and seminars (76%). All teachers inquired about breakfasts from their students, the majority (98%, n=99) routinely taught the value of proper nutrition. Fifty seven (56.4%) of the participants have attended at least one nutrition related programme.

**Conclusions:** The preschool teachers in this cohort had average nutrition related knowledge and most had positive attitudes. Therefore, effective programs could be arranged via mass media and seminars to improve their knowledge.

**Key Words:** Attitudes, Knowledge, Practices, Nutrition, Primary school teachers

**SPP-03: Knowledge, attitudes and practices related to leptospirosis and factors associated with knowledge in sewage workers of the Colombo Municipal Council**

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**Introduction:** Leptospirosis is a potentially fatal zoonotic disease endemic to Sri Lanka. Despite increasing trends in the past decade involving both urban and rural areas, it is often neglected by the vulnerable populations due to lack of awareness, including sewage workers who are regularly exposed to potentially contaminated sources. Aim of this study was to describe the knowledge, attitudes, and practices regarding leptospirosis and determine the factors associated with knowledge regarding leptospirosis among sewage workers of the Colombo Municipal Council.

**Methods:** This descriptive cross-sectional study was conducted among 110 sewage workers using cluster sampling method. A pre-tested, interviewer-administered questionnaire was used. Knowledge, attitudes, practices were described using frequency tables and a scoring system. Mean scores of knowledge, attitudes and practices were taken as cut off values for satisfactory performance in each domain. Data analysis was done using the Statistical Package for Social Sciences, version 23.0.

**Results:** Almost everyone (96.4%) had heard about leptospirosis. A satisfactory level of knowledge, attitudes and practices were found in 52.8%, 69.8% and 49.0% respectively. Awareness on disease transmission, clinical features and practices in using personal protective equipment and public health services were inadequate among 51.0%, 51.0%, 63.2% and 95.3% respectively. The level of education had a significant association with the level of knowledge on leptospirosis ( $\chi^2 = 4.244$ ,  $df=1$ ,  $p<0.05$ ). Age category, area of residence or work experience did not have a significant association with the level of knowledge. Majority (98.1%) considered using personal protective equipment during work as an important preventive strategy. Majority did not use gloves (63.2%) or boots (56.6%) regularly during work.

**Conclusions:** The levels of knowledge and attitudes regarding leptospirosis were satisfactory among the majority while the level of practices was unsatisfactory. Further studies on reasons for poor practices should be conducted and practices should be improved among this population.

**Keywords:** leptospirosis, knowledge, practices, sewage workers

**SPP-04: Assessing perspectives, knowledge and attitudes to Chronic Obstructive Pulmonary Disease (COPD) among patients attending the Central Chest Clinic, Colombo.**

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**Introduction:** COPD is an irreversible airway disease having a decreased quality of life. Evidence shows that knowledge and attitudes to COPD are poor among patients worldwide.

**Methods:** A descriptive cross-sectional study was conducted among 105 COPD patients attending the Central Chest Clinic, Colombo over sixteen weeks, using the consecutive sampling method with an interview administered content validated questionnaire. Knowledge which was subcategorised into common knowledge, risk factors, investigations, and management, and attitudes regarding COPD were assessed and was classified as 'good' vs 'poor' using mean knowledge score. The significance of associations was proven via the Chi-Square test, taking the p-value as <0.05. Attitude scores were calculated using participants' responses to 15 statements, with scores categorised as positive or negative using mean attitude score.

**Results:** The majority (89.5%) were males with 78.1% being  $\geq 60$  years. A monthly income of over Rs 20,000/- was the only factor found to be significantly associated with having 'good' knowledge of COPD ( $p < 0.05$ ) while the education level, duration of COPD, period of clinic attendance, and symptom severity were not. The mean score was 18.12 out of 30. 51.4% of participants had 'poor' knowledge, with the weakest scores (60%) in disease 'management'. Although 81.9% of patients had a history of smoking, the vast majority (90.7%) had stopped smoking with 61.5% attributing this to doctors' advice. The vast majority (98.1%) agreed that they would have taken medication regularly if they were educated on its importance. 54.3% had a negative attitude towards COPD.

**Conclusion:** A higher monthly income was significantly associated with good overall knowledge of COPD. Half of the patients surveyed had 'poor' knowledge. The vast majority had been smokers, who had stopped on their doctors' advice. Although the overall attitude towards the disease was negative, continuing patient education regarding treatment appeared to contribute to a positive attitude.

**Key words:** COPD, Knowledge, Attitudes, Smoking

**SPP-05: Association between prevalence of anaemia and dietary iron intake in female garment workers in a selected garment factory in Colombo district**

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**Introduction:** Anaemia is a moderate public health issue in Sri Lanka. The workforce in the apparel industry is mainly comprised of women of reproductive age and are at an increased risk due to higher nutritional demand, poor nutrient intake, and dietary habits. Objective of this study was to see the association between prevalence of anaemia and dietary iron intake in a selected group of female garment factory workers.

**Methods:** This was a descriptive cross-sectional study conducted among randomly selected 120 female garment workers of 18-49 years age at garment factory in the Colombo district. An interviewer administered questionnaire was used to retrieve information regarding sociodemographic background, menstrual and medical history. Semi-quantitative seven-day food frequency questionnaire were used to assess the dietary practices. Haemoglobin level was measured using HemoCue Hb 201+ system.

**Results:** Majority were between 20-29 years (n=69,57.5%). Anaemia was present in 48.3%(n=58) of the population. Mean haemoglobin level of the population was 12.03g/dL [95% CI (11.6,12.28)]. Out of all workers 13.3 % (n=16) were underweight according to BMI value. A majority consumed pulses at least six times per week (n=81,67.5%). 44.1%(n=53) consumed fish 4-5 times per week. Majority consumed green leaves and vegetables (77.6%), eggs (71.7%), and meat (65.9%) at a frequency of 1-3 times per week. Contribution to dietary iron from pulses, fish, green leaves and vegetables, meat and eggs were 81.2%, 10.3%, 4.7%, 2.5% and 1.1%, respectively. Mean dietary iron intake among anaemic participants (11.87 ±6.8) mg/day was significantly lower than that of non-anemic participants (17.82±6.4) mg/day (p<0.05). There was a strong positive correlation between the haemoglobin level and the dietary iron intake per day (r=0.8, n=120, p<0.05). Only 14.2% (n=17) were on iron containing vitamin supplements.

**Conclusions:** Consumption of many nutritious food items were below the recommended level. Presence of anaemia was significantly associated with dietary iron intake, therefore promotion of foods which are cheap and high in iron content could reduce the high prevalence of anaemia seen among this group of workers.

**Key words:** anaemia, haemoglobin, dietary iron, female garment workers



**SPP-06: The relationship between musculoskeletal pain and level of stress among final year students of University of Colombo.**

R.A.M.D. Ranathunga<sup>1</sup> and M. Rajasuriya<sup>2</sup>

<sup>1</sup> Department of Allied Health Sciences, Faculty of Medicine, University of Colombo, Sri Lanka,

<sup>2</sup>Department of Psychiatry, Faculty of Medicine, University of Colombo, Sri Lanka

**Introduction:** Stress leads to various adverse health effects among students. Musculoskeletal (MSK) pain is a common cause for long term disabilities. The association between MSK pain and stress level has not been deeply explored in Sri Lankan context. Hence, this study was aimed to determine the relationship between MSK pain and level of stress among final-year students of University of Colombo.

**Methods:** A descriptive cross-sectional study was conducted among 300 final-year students of University of Colombo using convenience sampling. MSK pain and level of stress were assessed using self-administered Standardized Nordic Musculoskeletal Questionnaire and Modified Students Life Stress Inventory, respectively. Data was analyzed by descriptive statistics, Chi square test and Pearson correlation test in SPSS version 21.

**Results:** The mean age was 26.4±0.9 years and 66% of participants were females. The prevalence of MSK pain was statistically significant in females(p=0.03). The 12-month and 7-day point prevalence of MSK pain were 75.66% and 61.60%, respectively. Neck (38.36%) and upper back (31.91%) were most common affected sites in 12 months and 7-day point prevalence, respectively. Prevalence of stress was higher among females than males and 35.10% of students were within high stress category. There was a significant relationship (p<0.05) between the level of stress and MSK pain in the neck, shoulders, lower back and hips. A negative correlation(r=-0.21), although not statistically significant (p=0.76) was observed between level of stress and elbow MSK pain.

**Conclusion:** There was a significant positive correlation between MSK pain in neck, shoulders, lower back, hips and the level of stress among final year students of University of Colombo with a high prevalence of musculoskeletal pain.

**Key words:** Musculoskeletal pain, Stress level, Questionnaire

**SPP-07: Knowledge, attitudes and preventive practices regarding dengue among grade 7, 8 and 9 students in an urban school in the Colombo municipal council area**

H. A. N. Y. Hulathduwa, P. P. S. Himansa, H. M. Y. R. Herath<sup>1</sup>, Y. Hettiarachchi<sup>2</sup>

<sup>1</sup>Faculty of Medicine, University of Colombo, Sri Lanka, <sup>2</sup>Department of Pediatrics, Faculty of Medicine, University of Colombo, Sri Lanka

**Introduction:** Dengue is a vector borne disease which has become a global pandemic. Health education and preventive measures regarding dengue is important for school children. This study aimed at describing knowledge, attitudes, and preventive practices regarding dengue among school children.

**Methods:** A cross sectional descriptive study was conducted among 105 male and female students of grade 7, 8 and 9 students in a randomly selected school in the CMC area. In stratified sampling method, strata and subgroups were the grades and classes respectively and a sample proportionate to the population was selected. A self-administered questionnaire containing yes or no, and dropdown questions was used. Data evaluation was done using SPSS, version 26.0. The level of knowledge was categorized as “Good” and “Poor” by a cut-off mark for seven “must know” questions which assessed basic knowledge of dengue. The rest was analyzed using frequency distributions.

**Results:** The existing level of knowledge in majority was below the cut-off mark (59.0%, n=62). Yet, most students knew that dengue breeds in dirty stored water (51.4%, n=54). Most agreed with the attitudes that dengue is an important public health problem (93.3%, n=98), responsibility regarding dengue control is with both government and people (79%, n=83) and healthy people also can be infected (89.5%, n = 94). The majority regularly check for breeding sites (93.3%, n=98) and do not allow water to collect (89.8%, n=88). Majority use personal protective measures against mosquitoes (82.9%, n=87) and use repellent cream (75.9%, n=66). Most agreed with getting plenty of rest after getting infected (86.7%, n=91).

**Conclusions:** The existing level of knowledge regarding dengue in majority of the students was poor, based on the responses for ‘must know’ questions. However, most believed that there is a possibility for patients to recover with treatment. The attitude among the majority was that dengue is an important public health problem which could be prevented and controlled. Preventive practices regarding dengue among the students were satisfactory.

**Key words:** Dengue, Students, Knowledge, Attitudes, Practices

**SPP-08: Prevalence, knowledge, factors preventing health seeking behavior related to menstrual problems among adolescent girls of age group 15-18 years in a school in Borella educational division**

H. Anantharajah<sup>1</sup>, U.K.V.I. Gunawardane<sup>1</sup>, U.H.G.K. Gunawardhane<sup>1</sup>, Dr. A. Marasinghe<sup>2</sup>

<sup>1</sup>Faculty of Medicine, University of Colombo, Sri Lanka, <sup>2</sup>Department of Community Medicine, Faculty of Medicine, University of Colombo, Sri Lanka

**Introduction:** Menstruation is a physiological process occurring in women of reproductive age as a part of their menstrual cycle. This process can be affected by various factors and cause problems such as dysmenorrhea, menorrhagia, oligomenorrhea, and irregular menstruation. Menstrual problems can affect the lifestyle and performance level of women, especially adolescent girls. In regional countries, though menstruation-related problems were found to be commonly encountered by adolescent girls, their knowledge level and health-seeking behavior were found to be inadequate. This study aimed to determine the prevalence, knowledge level regarding menstruation-related problems among adolescent girls and identify potential reasons preventing them from seeking health care support.

**Methods:** A descriptive cross-sectional study had been carried out in Colombo Rathnawali Balika Maha Vidyalaya, which had been selected randomly among the female schools in Borella educational division. A cluster sampling was employed inside the school to form a core of study participants from grades 10, 11, 12, and 13. A self-administered questionnaire was used as the study tool.

**Results:** 115 participants who gave assent and parental consent were included. The observed prevalence of dysmenorrhea, menorrhagia, oligomenorrhea, and irregular menstruation were 17.4%, 20.2%, 15.7%, and 27.1%, respectively. The knowledge level is estimated to be adequate only among 36.52%. 60.0% of the students understand menstruation as a physiological process. The doctor's gender (58.3%), feeling embarrassed about clinical examination (42.6%), and embarrassing private questions (35.7%) have been founded as the main reasons preventing seeking health care.

**Conclusions:** Prevalence of all the menstrual problems followed the previous global, regional and local research findings. The knowledge level of the study population regarding menstrual problems was unsatisfactory among the majority of the study population. The gender of the doctor and feeling of embarrassment over the consultation procedures were identified as the main factors preventing adolescent girls from seeking medical care.

**Keywords:** Dysmenorrhea, Menorrhagia, Oligomenorrhea, Irregular-menstruation, Prevalence

**SPP-09: Practice and associated factors of complementary feeding among mothers and its association with growth of children aged between 6 months to 2 years**

J. P. A. S. Peries<sup>1</sup>, K. W. T. Perera<sup>1</sup>, L. U. A. Perera<sup>1</sup>, N. Samaranyake<sup>2</sup>

<sup>1</sup>Faculty of Medicine, University of Colombo, Sri Lanka <sup>2</sup>Department of Parasitology, Faculty of Medicine, University of Colombo, Sri Lanka

**Introduction:** Growth of children between 6 months and 2 years is determined by proper complementary feeding. Its practices can be influenced by various socio demographic factors. Inappropriate complementary feeding can contribute to negative consequences immediately as well as in adulthood. This study aims to assess the practice and associated factors of complementary feeding among mothers and its association with growth of the children aged between 6 months to 2 years.

**Methods:** A descriptive cross-sectional study was conducted among 112 mothers of children aged 6 months to 2 years, who were attending the child welfare clinics in Kolonnawa MOH area. An interviewer administered questionnaire compiled based on Sri Lankan infant and young child feeding guidelines including a 24-hour dietary recall, was used as data collection tool, together with a data record sheet that documented the growth parameters from CHDR. Descriptive statistics were generated and analysed with chi-square distribution test.

**Results:** 67% of children were started on complementary feeding at 6 months. 62.5% of children received age-appropriate texture and amount of complementary food. Frequency was age appropriate in 74.1%. Minimum Meal Frequency (MMF) was received by 99.2%, Minimum Dietary Diversity (MDD) and Minimum Acceptable Diet (MAD) by 76.8% and 75.9% respectively. Recent episode of respiratory tract infection (RTI) was significantly associated with MDD ( $p=0.006$ ) and MAD ( $p=0.01$ ). Prevalence of underweight, wasting and stunting were 12.5%, 2.7% and 3.6 % respectively. Children in whom the complementary feeding was started earlier than 6 months were seen to have more incidences of underweight ( $p=0.008$ ) and stunting ( $p=0.005$ ).

**Conclusion:** Complementary feeding is practiced satisfactorily. Majority of children have adequate growth. When children get RTI, complementary feeding is given more appropriately. An association is seen between growth and age of starting complementary feeding.

**Keywords:** Complementary feeding, growth, 6 months to 2 years

**SPP-10: Association between knowledge and preventive behaviors regarding osteoporosis among adult patients visiting the Neurology Clinic of the Epilepsy Unit in the National Hospital of Sri Lanka**

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<sup>1</sup>Faculty of Medicine, University of Colombo, Sri Lanka, <sup>2</sup>Department of Medical Education, Faculty of Medicine, University of Colombo, Sri Lanka

**Introduction:** Osteoporosis is increasingly diagnosed among patients with epilepsy, due to the effect of anti-epileptic drugs on bone density. Owing to this, there is a need to assess the awareness of and adherence to preventive measures of osteoporosis among these patients who constitute a high-risk group. This study was conducted to determine the association between knowledge and preventive behaviors regarding osteoporosis among patients aged over 18 years visiting the Neurology Clinic of the Epilepsy Unit in NHSL. All participants were previously diagnosed of epilepsy and on anti-epileptic drugs, with no hearing, speech and cognitive disabilities.

**Methods:** A descriptive cross-sectional study with an analytical component was conducted among 120 participants chosen using random sampling. The sample size was conveniently decided based on available time and resources. An interviewer administered questionnaire with 25 questions on knowledge regarding osteoporosis and eight particular preventive behaviours including dietary habits, supplement use and exercise was used. The knowledge score was graded as “poor” (<40%), “average” (41-60%) and “good” (>60%). Chi-squared test was used to determine associations between engagement of each preventive behaviour and knowledge levels. A p value of less than 0.05 determined the significance.

**Results:** The response rate was 100% and a majority (58.3%) were female. Most participants (n=65, 54.2%) had poor knowledge with a mean score of 37.77% (SD=±18.67). The majority engaged in 6 out of the 8 preventive behaviours regardless of awareness. The only significant association was between “good” knowledge and consumption of milk/cheese/yoghurt at least once every 2 days. (p<0.05).

**Conclusion:** The study shows that the majority of the participants engaged in preventive behaviors with a lack of knowledge regarding osteoporosis. Such preventive behaviors without awareness may result with noncompliance and inconsistency. Thus, this study shows the need of implementing measures to increase the awareness in the prevention of osteoporosis.

**Keywords:** Epilepsy, Knowledge, Osteoporosis, Preventive behavior

**SPP-11: Assessment of the general attitude about nutrition and healthy foods, acceptability, and perceived effectiveness about traffic light food labelling, among women attending multiple clinics at a selected MOH office in Colombo district**

Dhanawardhana G.A.T.C<sup>1</sup>, Deshapriya T.B.M<sup>1</sup>, Deshapriya V.G.R<sup>1</sup>, Rajasuriya M<sup>2</sup>

<sup>1</sup>Faculty of Medicine, University of Colombo, Sri Lanka, <sup>2</sup>Department of Psychiatry, Faculty of Medicine, University of Colombo, Sri Lanka

**Introduction:** Dietary factors play a key role as a modifiable risk factor for prevention of non-communicable disease. As a public health measure, traffic light food labelling was introduced in many countries which indicates fat, sugar, and salt content with a specific colour as green, amber, or red corresponding to, low, medium, and high level of that specific nutrient. This study was carried out to assess the general attitude about nutrition and healthy foods, the acceptability, and the perceived effectiveness of traffic light food labelling, among women aged between 20-50 years attending multiple clinics at a selected MOH office in Colombo district.

**Method:** This was a descriptive cross-sectional study carried out in 110 participants, who were attending multiple clinics at the MOH office. Sample was selected using a systematic sampling method. The first unit was chosen randomly, and then other units were selected as every other person seated on the clinic bench. Following giving them a general idea of about traffic light food labels using sample packages the responses were collected through an interviewer administered questionnaire. The Chi square test was used for analysis.

**Results:** Out of the participants, most of them (n=35,31.8%) were between 25-29 years women. Majority of the participants were married (n=99,90%) and equal percentages were recorded for highest level of education, ordinary and advanced level (n=41,37.3%). Two-thirds (n=74,67.3%) of participants had a positive attitude towards nutrition and healthy food. There was a statistically significant association between attitude towards nutrition and healthy food and the highest education level (p=0.040). Among the participants, 85.5%(n=94) showed a positive acceptability towards the traffic light food labelling system. Majority (n=76,57.3%) of the participants perceived traffic light labels as an

**Key words:** traffic light food label, healthy food, perceived effectiveness

**SPP-12: Level of happiness and the factors affecting it among grade 12 students in two selected schools in Colombo**

S. U. Liyanage<sup>1</sup>, S. Logeeswaran<sup>1</sup>, P. Logendrarajah<sup>1</sup>, R. Seneviratne<sup>2</sup>

<sup>1</sup>Faculty of Medicine, University of Colombo, Sri Lanka <sup>2</sup>Postgraduate Institute of Medicine, University of Colombo, Sri Lanka

**Introduction:** Happiness is important for a well-rounded life. Grade 12 students are at the beginning of their Advanced level education which determines his/her entrance into a university. Hence, these students are known to have high levels of stress which significantly influence their level of happiness. This in turn will impact their future and health. This study's objectives are to describe and assess the factors affecting the level of happiness among grade 12 students of two selected schools in Colombo.

**Methods:** This was a descriptive cross-sectional study among 126 grade 12 students selected using cluster sampling. A self-administered questionnaire was used to assess the level of happiness and the factors associated with happiness. Happiness was assessed by adapting the Oxford Happiness Questionnaire. The factors assessed were family background, social support, academic performance, extracurricular activities' participation, presence of chronic illnesses, stress levels and methods of coping with stress. The analysis was done using Chi square test.

**Results:** Majority were male (n=77, 61.1%) with a mean age of 17.5 years (SD=0.27) and 69.8% considered themselves as 'happy' (n=88). Long-term illnesses were present in 7.9% (n=10). The factors that showed a statistically significant relationship with level of happiness were monthly family income (p=0.02), parental marital status (p=0.04), social support (p=0.01), support from family (p=0.01) and significant others (p=0.02), stress (p<0.001), planning as a method of coping (p<0.001) and long-term illnesses (p<0.001). Sex, presence/absence of siblings, parental education level, friends' support, academic performance, extra-curricular activities' participation (p=0.05) and active coping were not significant (p>0.05).

**Conclusions:** Although the majority were 'happy', 38.9% were 'neutral' and 'unhappy'. Stress and long-term illnesses significantly influenced happiness rather than academic performance. Family support, parental income and marital status were also significant factors. Therefore, creating supportive environments for students, teaching coping techniques and managing psychological aspects of long-term illnesses is recommended.

**Key words:** Happiness, Student, Academic performance, Stress

**SPP-13: Factors associated with delay in presentation of patients to rheumatology clinics at the National Hospital of Sri Lanka.**

Yasara Randoombage<sup>1</sup>, Risira Randula<sup>1</sup>, Jayani Rathnayake<sup>1</sup>, Sanjeeva Seneviratne<sup>2</sup>

<sup>1</sup>Faculty of Medicine, University of Colombo, Sri Lanka, <sup>2</sup>Department of Surgery, Faculty of Medicine, University of Colombo, Sri Lanka

**Introduction:** Literature suggests that there is a delay in diagnosis of rheumatic diseases which is associated with less favourable therapeutic outcomes. This study was conducted to determine and analyse patient related factors which are associated with this delay in presentation.

**Methods:** A descriptive cross-sectional study with an analytical component was conducted at three rheumatology clinics at the National Hospital of Sri Lanka (NHSL) during the period between 07/01/2020 and 14/01/2020. Total of 120 patients whose first presentation to the clinics was within 6 weeks to the date of data collection were recruited using systematic sampling. Data was collected using an interviewer administered questionnaire.

**Results:** The median total delay in presentation was 12 months (SD=28.42 months); patient delay 6 months and healthcare delay 6 months. Patient delay was the time taken by a patient to consult a medical officer after symptom onset, healthcare delay was the time taken for a patient to be seen by a rheumatologist after a primary care consultation and total delay was time taken for a patient to be seen by a rheumatologist.

Increasing age ( $p=0.013$ ), low monthly income ( $p=0.007$ ) and presence of diagnoses like rheumatoid arthritis ( $p=0.018$ ) showed significant positive association with delay in presentation. Diagnoses including mechanical backache ( $p=0.022$ ), neck pain ( $p=0.044$ ) and systemic lupus erythematosus ( $p=0.044$ ) showed negative association with delay in presentation. Gender, education level, pattern of joint involvement and health seeking behaviours were not associated with delay.

**Conclusions:** Substantial delays in presentation were observed among patients presenting to rheumatology clinics at the NHSL. Further studies are needed to identify reasons for long delays and methods that would help shorten time to presentation among these patients.

**Keywords:** Delay in presentation, factors associated, rheumatology



**Faculty of Nursing  
University of Colombo**



***New Dimensions in Nursing: Creating a Sustainable  
Healthcare and Safety Net for All***

15<sup>th</sup> December 2021

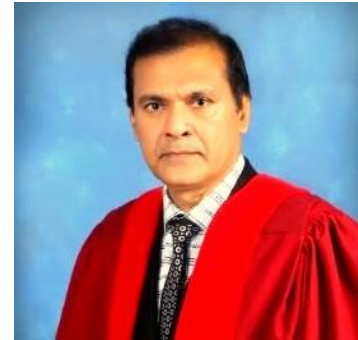
## MESSAGE FROM DEAN

**Prof. Sudath Warnakulasuriya**

Dean

Faculty of Nursing

University of Colombo



Annual research symposium is a significant much forward event of the Faculty of Nursing, University of Colombo. This year annual research symposium is held for the fourth time under the theme of “*New Dimensions in Nursing: Creating a Sustainable Healthcare and Safety Net for All*” that was especially adopted in order to emphasis and communicate the importance of exploring new dimensions for nursing that contribute to a sustainable health care safety network for nursing especially, considering the contemporary global health challenges. Today, all healthcare systems are strengthened by integrating new knowledge, technology, and innovations. Considering the current trends in nursing and the future health care challenges, we all nursing stakeholders have an inescapable responsibility to take initiatives to strengthen the nursing profession to face the present and future challenges by identifying sustainable evidence-based solutions for present and emerging problems thorough research and innovations. One significant area of focus today in the health care arena is safety in the health care systems. This issue has been further highlighted with the existing covid pandemic. Therefore, annul research symposium 2021 in the Faculty of Nursing would be an ideal flatform to deeply discuss the theme new dimensions of nursing with regards to create sustainable health care and safety network for all. I hope Vice chancellor, University of Colombo, senior professor Chandrika N Wijeratne, chief guest of the symposium, Keynote speaker Professor Martin Jens Persson and the other plenary speakers would enlighten the nursing community on this important area and have an effective scientific discussion on the same topic at the end. Therefore, this symposium would be a wonderful learning experience for all the participants.

I take this oppportunity to congratulate all the presenters, and thank the Vice Chancellor, keynote speaker and other speakers for their great contribution to this research symposium. I also thank conference chair and his dynamic team and all the other academic and nonacademic staff of the Faculty of Nursing for their contribution for the annual research symposium 2021. I wish 4<sup>th</sup> annual research symposium 2021 would be a great success!

## MESSAGE FROM SYMPOSIUM CHAIR

### **Dr. G. Kisokanth**

Head/ Senior Lecturer

Department of Clinical Nursing,

Faculty of Nursing

University of Colombo



First of all, I am happy to be a Chairperson of the Annual Research Symposium, Faculty of Nursing for the second time. As the chairperson of the Annual Research Symposium – 2021 of the Faculty of Nursing, I take this opportunity to extend my warm welcome to you all to the 4<sup>th</sup> Annual Research Symposium.

Faculty of Nursing annually conducts the research symposium for disseminating the research activities of academics of the Faculty of Nursing, their students, nursing academics from other universities as well as the staff nurses. I am sure that Annual Research Symposium will provide a good platform for authors and the participants for sharing their research findings related to all areas of health especially non-communicable diseases, mental health, maternal and child health, nutrition, sexual health, and elderly care, with research experts, colleagues as well as with the stakeholders.

I thank all team members for their consistent effort to make this Annual Research Symposium - 2021 of the Faculty of Nursing an enormous success. I extend my sincere thanks to the Vice-Chancellor, University of Colombo for initiating and encouraging the Annual Research Symposium in the faculty. Also, I sincerely express my gratitude to the Dean, Faculty of Nursing for his appreciation and encouragement for conducting a successful symposium.

I hope that the Annual Research Symposium – 2021 of the Faculty of Nursing, will deliberate and discuss the health-related issues which would help to improve the health of our community as well as the stepping for further research.

I wish the Annual Research Symposium – 2021 of Faculty of Nursing, a great success. I wish good luck to all the presenters.

## **ORGANIZING COMMITTEE**

### **Symposium Chair**

Dr. G. Kisokanth

### **Symposium Secretary**

Dr. Thanuja Asurakkody

### **Symposium Co-secretaries**

Mr. Thimira Amarasinghe

Ms. Ayesha Madagedara

Ms. Nirmla Priyadarshani

### **Ceremonial Committee**

### **Audio Visual and IT Committee**

### **Logistics and Refreshments Committee**

### **Invitation Committee**

**4<sup>th</sup> Annual Research Symposium**  
**Faculty of Nursing – University of Colombo**  
**15<sup>th</sup> December 2021 from 8.00 am – 3.00 pm**

<b>8.00am- 8.15am</b>	Inauguration of the 4 <sup>th</sup> Annual Research Symposium 2021
<b>8.15am- 8.30am</b>	<b>Welcome Address</b> Prof. S.S.P. Warnakulasuriya Dean, Faculty of Nursing
<b>8.30am- 8.45am</b>	<b>Address by the Chief Guest</b> Senior Professor Chandrika N. Wijeyaratne, Vice-Chancellor, University of Colombo
<b>8.45am- 8.50am</b>	<b>Introduction to Keynote Speaker</b>
<b>8.50am- 9.20am</b>	<b>Keynote Speech – “An innovative training approach for healthcare professionals towards body image dissatisfaction”</b> Prof. Martin Jens Persson, Kristianstad University, Sweden
<b>9.20am- 9.50am</b>	<b>Plenary Speech 1 - “Role of the Nurse in Health Care Safety”</b> Prof. S.S.P. Warnakulasuriya Dean, Faculty of Nursing
<b>9.50am- 10.05am</b>	<b>Vote of Thanks</b> Dr. Thanuja Asurakkody Secretary, ARS 2021
<b>10.05am- 10.20 am</b>	<b>Refreshments</b>
<b>10.20am- 10.45am</b>	<b>Plenary Speech 2 - “Effectiveness of Nurse Case Management in Improving Health Outcomes in Non-communicable diseases”</b> Dr. G Kisokanth Head, Department of Clinical Nursing, Faculty of Nursing
<b>10.45am- 12.45pm</b>	<b>Technical Session 1</b>
<b>12.45pm- 1.30pm</b>	<b>Lunch</b>
<b>1.30pm- 2.30pm</b>	<b>Technical Session 2</b>
<b>2.30pm- 3.00pm</b>	<b>Awarding of Certificates for the presenters and closing the event</b>

## INTRODUCTION TO KEYNOTE SPEAKER

### **Prof. Martin Jens Persson**

Professor of Health Sciences  
Faculty of Health Sciences  
Kristianstad University  
Sweden



Prof. Martin Jens Persson is a professor of health sciences at Kristianstad University, Sweden. He is a scientist, a practitioner, and a credentialed expert in the field of the delivery of social and psychological care to people with changes of appearance and negative body image. His specialization is methodological and methodical development of the training courses intended for doctors, psychologists, and social workers in appearance psychology.

Prof. Martin obtained his master's degree in psychology in 2002, Master's degree in public health and PhD in medical science in year 2007. In 2018, he became an Associate Professor in Health Sciences and then became Professor in Health Sciences in 2019. Prof. Martin is a Board member of the European Cleft Organization (2013) and a member of Smile Train Research and Innovation Advisory Council (STRIAC) (2020). He is also the chairman of cost-action (CA16234) European Cleft and Craniofacial Initiative for Equality in Care.

He has extensive knowledge of working with socially disadvantaged groups across Europe as well as specializing in the methodological and pedagogical development of courses ranging from basic to advance level in psychology, public health, and health education. He has considerable experience in coordinating and managing over 40 international projects and has attracted over €11 million in funding to support activities in psychosocial, health and educational areas. Over the past years, prof. Martin has facilitated a variety of keynotes, lectures, workshops and symposiums for professionals, students, and users in his areas of expertise in Asia, Australia, Europe, North America and South America. His research experience over the last 2 decades includes epidemiological and population-based studies together with large national multicenter observational and cohort studies.

Prof. Martin is collaboratively working with Faculty of Nursing, University of Colombo through “nEUROcare project; a European initiative for capacity building to meet the challenges of caring for people with neurodegenerative disorders in Sri Lanka”

## KEYNOTE ADDRESS

### **Prof. Martin Jens Persson**

Body image dissatisfaction, resulting from disfigurement or the consequence of perceived social pressure to conform to unrealistic and narrow beauty (and ageist) ideals, indiscriminately affects the mental and physical health of a significant and growing proportion in the world. Those with disfigurement also experience social discrimination that negatively impacts personal aspirations, education, and work opportunities. As medical advances improve the survival rates of those born with or who acquire a disfigurement, and the demand for cosmetic interventions and psychological support increases, professionals from diverse health and social care areas, such as nurses, for example, are increasingly being exposed to the challenges of identifying and addressing the needs of patients burdened by complex and unique psychosocial issues. These professionals are ideally placed to ameliorate these issues but report that they often lack the necessary expertise to help, and therefore, patient access to expert support is inadequate. At the same time, healthcare professionals express an interest in being trained to support patients with body dissatisfaction. A study that involved 718 healthcare professionals from five European countries found that 87% (n=706) wanted to know more about how to provide psychosocial support, and 70% (n=669) stated that they would, especially if the course focused on evidence-based best practice and practical skills rather than theory and models of care, attend a course in this area.

This lecture will highlight the complexity of these problems in a global context and introduce an innovative training approach for healthcare professionals that can be implemented in various settings – both clinical and educational.



**Knowledge, attitude and influencing socio demographic factors towards childhood attention deficit hyperactivity disorder among primary school teachers in Jaffna education zone**

R.P.H.A. Udeshika<sup>1#</sup>, D. Thabotharan<sup>1</sup>, S. Sivathas<sup>2</sup>, P.A.D. Coonghe<sup>3</sup>

<sup>1</sup> Department of Nursing, Faculty of Allied Health Sciences, University of Jaffna

<sup>2</sup>Teaching Hospital, Jaffna.

<sup>3</sup>Department of Community & Family Medicine, Faculty of Medicine, University of Jaffna.

**Introduction:** Attention deficit hyperactivity disorder (ADHD) is a commonly studied neurodevelopmental disorder in children. Teachers are the first to identify children with ADHD and help to manage them.

**Objective:** To assess the level of knowledge and attitude on ADHD and its influencing socio-demographic factors among primary school teachers in Jaffna Education Zone.

**Methods:** Institutional based descriptive cross-sectional study was carried out among primary school teachers in Jaffna Education Zone. A self-administered questionnaire was used to collect data. The sample of 250 primary school teachers working in 29 government schools were selected by stratified random sampling technique. Data analysis was done using SPSS version 23. Chi-square test was performed to identify the relationship of the factors. Ethical clearance was obtained from the Faculty of Medicine, University of Jaffna.

**Results:** A total of 231 questionnaires of 250 distributed were returned (response rate 92%). The mean age of participants was 42 years. The majority had completed post basic diploma and more than sixteen years of working experience (48.0%). The total score of knowledge classified by taking percentages as less than 50.0% unsatisfactory and 50.0% and more were satisfactory. Results revealed that knowledge of teachers regarding childhood ADHD was unsatisfactory (44.2%) particularly regarding treatment and management. Their attitude was more favorable (90.0%). There was a statistically significant relationship between the knowledge and the highest level of educational qualification ( $p < 0.05$ ). The attitude was significantly influenced by age and the working experience.

**Conclusions:** Participated teachers' knowledge was inadequate, and it was influenced by their level of education. Results suggest greater efforts must be made to provide teacher training specifically in the identification and management of children with ADHD with the combination and participation of health care and education professionals.

**Keywords:** Attention deficit hyperactivity disorder, Attitude, Jaffna Education Zone, Knowledge, Primary school teacher



**Rapid review of the literature on nursing students' perception and experience during COVID-19 pandemic**

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**Introduction:** COVID-19 pandemic driven the world to a global emergency and fighting against the pandemic made an overwhelming demand for the health sector. As numerous impacts of the crisis, nursing students tried to view, justify and adapt to the pandemic on their perception.

**Objective:** To identify and synthesize available evidence on the nursing students' perceptions and experiences regarding the COVID-19 pandemic.

**Methods:** Rapid literature review was performed from 18<sup>th</sup> to 21<sup>st</sup> June 2021 on four databases; Google Scholar, Science Direct, PubMed, and Web of Science to identify the publications between 2019 and 2021. Findings were categorized under the five levels of Bronfenbrenner's ecological model.

**Results:** Thirty-five articles were eligible from the initial search strategy of 1076 studies. Of these, the USA has the highest contribution (17.14%). Upon the organization of evidence into levels, major and subcategories; intrapersonal level included knowledge (COVID-19), health distress (anxiety, nervousness, fear, physical discomfort), experiences (clinical, online learning), skills (confidence), and attitudes (pride of profession). Family burden and teamwork were categorized under the interpersonal level. The institutional level consisted of classroom and clinical learning. Social relationships and policy development subsisted under the community and public policy levels respectively. Findings revealed that positive experience ([40%] confidence, pride of the profession) strengthens as frontline health care workers. Negative experiences ([77.14%] increased anxiety, physical discomfort, isolation, and fear of descendants' contamination) have adversely affected. Reformation of academics to online and continuing clinical learning were devastating factors during the pandemic.

**Conclusions:** Nursing students have both positive and negative perceptions and experiences towards the COVID-19 pandemic. University administration, Deans, Department heads had gained a chance to prepare an advanced crisis plan that could be rapidly and effectively implemented, considering new trends in nursing education. Further, enhance knowledge on pandemics and computer literacy among nursing students are vital mechanisms during a pandemic.

**Keywords:** Nursing students, Education, Perceptions, Experiences, COVID-19 pandemic

**Perceptions of life among women after hysterectomy in Kandy District Sri Lanka**

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**Introduction:** Hysterectomy remains as the most commonly performed gynecological surgery in the world. It is a stressful and unpleasant experience for women which can critically influence on their physical, psychological and sexual life.

**Objective:** To explore the experiences of patients who had hysterectomy in Teaching Hospital, Kandy.

**Methods:** In this quantitative descriptive study, 192 women who had hysterectomy during the year 2000 to 2018 at the Teaching Hospital, Kandy were conveniently recruited. Data were collected over the phone using a validated interviewer-administered questionnaire. Ethical approval was obtained from the same hospital. Data were analyzed by descriptive statistics using SPSS 22 version.

**Results:** About two thirds of the participants (118) were belonged to the 41-50 years age category and 75% of the study participants were married. About half of the participants (102) knew very little or merely not known about hormonal therapies. Around 60% of the women indicated that their body weight dramatically increased after the surgery and 30% reported that it took 1-4 months to commence day to day activities after hysterectomy. Majority (about 90%) believed that a womb is needed for the completeness of a woman, and they are worrying about the loss of the womb. Among the participants, approximately one fourth expressed their displeasure of the inability of having children hereafter. About 78% of the participants reported increased vaginal dryness after hysterectomy. Furthermore, about half of them (96) mentioned that more than six months were taken for resume their sexual activities and about 40% reported notable reduction in the number of times of sexual activity after hysterectomy.

**Conclusions:** The presence of psychological and emotional stress was evident in this study. Therefore, exploring patient's experience immediately after hysterectomy can be used to arrange tailored post-operative interventions for the patients to cope with their discomforts thus patients will enable to live a quality life after recovery.

**Keywords:** Hysterectomy, Physical effects, Psychological disturbances, Sexual impairments

**Perceptions and experiences of stakeholders on effectiveness of the psychiatric nursing training program of the College of Nursing Mulleriyawa**

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**Introduction:** The psychiatric nursing training program conducted in the College of Nursing Mulleriyawa (CNM) is the only training available in Psychiatry for the student nurses in Colleges of Nursing, Ministry of Health in Sri Lanka. There is no previous research study conducted to explore the effectiveness of this program.

**Objective:** To explore the effectiveness of the psychiatric nursing training program conducted in CNM.

**Methods:** Descriptive qualitative research was conducted using focus group (FG) discussions among nursing tutors of CNM (N=06), nursing officers and nurse managers (N=07) of the National Institute of Mental Health (NIMH). The participants with more than 05 years of experience in the field were included in the study using purposive sampling. A topic guide prepared using the CIPP model (Context, Input, Process, and Product) was used to collect data. Qualitative content analysis was used to analyze data. Ethical approval was obtained from the NIMH, Sri Lanka.

**Results:** The study participants perceived the following concerns. The theme 'Context' -The program will be more effective if the revised curriculum includes the country's community needs and social changes. The theme 'Input' - Inadequacy of human and physical resources are the main barriers to the smooth process of the program to have effective outcomes. The theme 'Process' -The program will be more effective if the duration of the program is extended. The theme 'Product' - The nursing students get a considerable change in their attitudes and skills for caring the Psychiatric patients due to this training.

**Conclusions:** Stakeholders have perceived that the psychiatric training program at CNM is beneficial and effective for the nursing students in Sri Lanka for caring for psychiatric patients. The policymakers should initiate strategies to revise the curriculum and fulfil the physical and human resources to improve the program's effectiveness.

**Keywords:** Context, Curriculum, Input, Nursing, Evaluation

**Assertiveness among the nursing undergraduates in a Defence University, Sri Lanka**W.G.C. Kumara<sup>1#</sup>, S.S.P. Warnakulasuriya<sup>2</sup><sup>1</sup>Department of Nursing & Midwifery, Faculty of Allied Health Sciences, Kotelawala Defence University<sup>2</sup>Faculty of Nursing, University of Colombo

**Introduction:** Assertiveness is considered a valuable skill in the nursing profession as it contributes to Strengthen inter-professional relationships, preventing workplace violence, reducing occupational stresses, minimizing negligence, and improving nurses' leadership ability, job satisfaction, professional autonomy, and professional efficacy. Therefore, assertiveness is an important skill that should be developed from the beginning of nursing studentship. However, there is a dearth of studies conducted on assertiveness among nursing students in Sri Lanka.

**Objective:** To assess the assertiveness and its relationship with the socio-demographic variables among the BSc. Nursing undergraduates at the Kotelawala Defence University (KDU), Sri Lanka.

**Methods:** The study was conducted as a descriptive cross-sectional study among all (n=147) nursing undergraduates of KDU. A pretested self-administered questionnaire was used to assess socio-demographic data and validated Sinhalese version of the assertiveness scale developed by Begley and Glacken, 2004 to measure the level of assertiveness. The study instruments were shared online once informed consent was obtained. The data were analyzed using SPSS 23.0, using the descriptive statistics followed by the independent sample t-test and the one-way ANOVA test.

**Results:** The mean assertiveness of the study population was  $81.35 \pm 6.51$ . The majority (74.8%) of the study participants was females. Many participants have revealed that they had attended leadership programmes (85.7%) and assertiveness training programmes (19.7%) conducted by the University and other institutes. It was observed that the assertiveness is not significantly different within the associated factors such as gender, marital status, nationality, parents' assertiveness, age group, number in the family, academic year, English proficiency, childhood trauma, the assertiveness of closed peers, interest in the nursing profession and other course work ( $P > 0.05$ ).

**Conclusions:** The results showed a greater assertiveness score among the nursing undergraduates enrolled to KDU. However, there were no statistically significant mean differences found on assertiveness among socio-demographic variables.

**Keywords:** Assertiveness, Nursing undergraduates, Sri Lanka

**Undergraduate nursing students' perception and barriers towards online learning in a state university, Sri Lanka: a quantitative study**

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**Introduction:** Nursing is a skill-based discipline. The effectiveness of online learning methodologies has not been well examined prior to adoption at many institutions. The sudden transition of physical classes into online classes may have an impact on nursing students' usual learning process. To get a better understanding of how these learning technologies impact students' learning, it is essential to assess the students' perceptions and barriers towards effective online learning for nursing education.

**Objective:** To determine the undergraduate nursing students' perception and barriers towards online learning studying in a state university, Sri Lanka

**Methods:** The study was conducted as a quantitative, descriptive cross-sectional study using researcher-developed validated Google form circulated via social media and email groups. One hundred seventeen (117) nursing undergraduates registered for all academic years at the University of Peradeniya participated in the study. Data were analyzed for percentages, frequencies and associations.

**Results:** Among total participants 30.8% were males. The number of students in 1st, 2nd, 3rd, and 4th years was 45, 36, 16 and 20 respectively. Students who had a positive perception (52.13%) towards online learning seemed to accept and adapt to online learning. The majority were perceived lack of motivation in online classes (53.8%), lack of interaction with the lecturer (54.7%), and lack of peer interaction (55.6%). The majority of participants (51.3%) preferred physical classes over online classes. A significant association was not identified with gender, year of study, and monthly income of the family. Of the total participants, 62.4% were disagreed with conducting exams online. Troubles with the internet connection (79.5%), computer literacy (63.2%), physical discomforts (59.8%), and getting distracted (51.3%) were the major drawbacks reported.

**Conclusions:** Even though students were faced with several issues, the perception of online learning was relatively good. However, there should be frequent assessments to evaluate adoption levels among students to online nursing education.

**Keywords:** Online learning, Undergraduates, Nursing Students, Perception, Barriers

## Anti-covid 19 drug candidates from Sri Lankan natural products: in-silico approach to identify inhibitors of SARS COV 2

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**Introduction:** The development of potent antiviral drugs against COVID-19 is of utmost importance. In this context, computational pharmacology may play a lead role. This study aimed on in-silico screening of Sri Lankan natural products by molecular docking (MD) and molecular dynamics studies against SARS-CoV-2 main protease Mpro responsible for multiplication.

**Objective:** To identify plant-derived compounds of Sri Lankan flora as antiviral agents with protease inhibitory potential against SARS-CoV-2 pandemic.

**Methods:** Four hundred & eighty molecules isolated from Sri Lankan natural resources were virtually screened for anti-viral activities against SARS-CoV-2 main protease Mpro. Binding energies were calculated using Auto Dock Vina and the active site of SARS-CoV-2 was defined using data from literature studies. The results were compared with that of a synthetic construct of N3, a peptidomimetic inhibitor of coronavirus main protease. The complexes with favorable binding interactions were filtered and subjected to molecular dynamic studies using AMBER with GPU acceleration where the dynamic behavior of protein-ligand complex at different time scales was determined. Visual Molecular Dynamic (VMD, version 1.9.4) was used to study the atom trajectories and the Root Mean Square Deviation (RMSD) of each of the protein ligand complex. The RMSD of the SARS-CoV-2 and drug complex was analyzed through a 100ns trajectory and results were compared with that of N3. Further, the ADME parameters, pharmacokinetic properties and the druglike nature of identified compounds were studied.

**Results:** One of the natural products, SLNP\_012, showed favorable interactions with the binding pocket of Mpro as compared to that of N3. SLNP\_012 showed up to 5 possible H-bond with the active site residues. It also showed favorable physiochemical properties for oral bio availability with a very high gastrointestinal absorption and blood brain barrier permeation.

**Conclusions:** Sri Lankan plant derive natural product SLNP\_012 could be a potential anti-viral agent for SARS-CoV-2 infection.

**Keywords:** SARS-CoV-2, Molecular docking, Molecular dynamics, Sri Lankan Natural Products

**Prevalence and factors associated with masked and white coat hypertension among the residents in Sri Jayewardenepura Kotte municipality area – a cross sectional study**

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**Introduction:** Masked hypertension (MH) and white coat hypertension (WCH) are clinically misdiagnosed as Sustained Normotension (SN) and Sustained Hypertension (SH), respectively, only relying on clinical BP values of the patients. This practice leads to overmedicate and under medicate the people suffering from WCH and MH respectively, triggering many clinical issues.

**Objective:** To analyze the prevalence and associated factors of WCH and MH among people who use public primary care facilities in Sri Jayewardenepura municipal area (SJMA).

**Methods:** Participants (102) were randomly selected from regular patients of The National Center for Primary Care and Allergy Research, Faculty of Medical Sciences, University of Sri Jayewardenepura, reside in SJMA. Data was collected using an investigator-administered questionnaire. Clinical BP and 24-hour ambulatory blood pressure (AMBP) were measured using a validated single mercury sphygmomanometer and AMBP monitoring devices, respectively. MH was defined as clinical <BP, 140/90 mmHg and daytime ambulatory BP >135/85 mmHg. WCH was defined as clinical BP >140/90 mmHg and daytime ambulatory BP <135/85 mmHg. A multinomial logistic regression was performed to identify the significant factors associated with WCH and MH.

**Results:** Among 102 patients, 80% were normotensive, 9.8% had WCH, 5.9% had MH, and 3.9% had SH. The majority (55.1%) was females. Mean age was 42.1 ( $\pm 15.7$ ) years. WCH was significantly ( $p < 0.05$ ) associated with older age, employment (occupied), presence of diabetes, marital status (married), less time expenditure for working, sleeping and physical activity and drug intake, compared to SN. MH was significantly ( $p < 0.05$ ) associated with older age, employment (occupied), presence of diabetes, marital status (married), time expenditure for working, higher physical activity and drug intake, compared to SN.

**Conclusions:** Finding of the study suggest the use of AMBP monitoring on the current management of hypertension in terms of diagnosis and evaluation of BP control, considering the observed associations of MH and WCH in the study.

**Keywords:** Clinical BP, AMBP, Masked hypertension, White coat hypertension, Association



## Relationship among the socio-demographic factors and the self-esteem of the undergraduates in Sri Lanka

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**Introduction:** Undergraduates of a country are the future leaders in that society. Therefore, the mental health of undergraduates is important to make a better country for all. Self-esteem is one of the main indicators of the mental health of students.

**Objective:** To determine how the self-esteem of Sri Lankan undergraduates is changed according to socio-demographic factors.

**Methods:** Duration of the research was 3 months in first half of year 2021, and approval of the ERC committee of KIU was taken before the beginning of the study. The sample was 164 students representing various state and private universities and degree awarding institutes of Sri Lanka and diversity of the sample contributed to generalize the results. The data was collected through a self-administrated questionnaire (in google form format) created by the researcher and translated, locally validated Rosenberg self-esteem scale. The convenient sampling method was used for the study. The collected data from a cyber space was analyzed using SPSS software.

**Results:** When the obtained data was examined, it was found that many socio-demographic factors are not influencing significantly to the self-esteem of the undergraduate students of Sri Lanka. However, the self-esteem of the students showed a significant correlation ( $p < 0.05$ ) to their satisfaction over academic performances. Gender, Income level of families, employments, religious affiliations and ethnicities did not show a significant correlation with the self-esteem level of the students.

**Conclusions:** Many socio-demographic factors are not positively correlated with the self-esteem level of the undergraduates. However, academic performances are correlated with the self-esteem. Future studies are needed to confirm or neglect the results.

**Keywords:** Mental health, Self-esteem, Undergraduates, Socio-demographics, Rosenberg self-esteem scale



**Artistic and scientific components of nursing: a review and evaluation of evidence**

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**Introduction:** The state of nursing is subjecting to contemporary changes with health care advancements. Nursing is identified as a profession with a broad knowledge base affirming scientific and artistic principles.

**Objective:** To develop a comprehensive understanding of scientific and artistic components of nursing with relevance to ongoing professional developments.

**Methods:** The literature was searched from 1977 to June 2021 based on a keyword combination in the databases: Web of Science, PubMed, Science Direct, and Google Scholar. The articles were categorized using a literature matrix and analyzed using content analysis.

**Results:** Forty-eight studies were identified and categorized into three themes; nursing as an art (35%), science (25%), and both science and art (40%). Nursing as science is supported with determinants; critical thinking, evidence-based practice, reflection, paradigm, academic and professional qualifications. Nursing as art is attested with compassion, effective communication, sympathy, empathy, and holistic care. Nursing presence and the therapeutic relationship are supported with both artistic and scientific components. Articles were subjected to decade-wise analysis in which a drastic change was observed in nursing researchers' perception. Before 1989 (8.34%), research development was viewed as a turning point in the nursing profession. From 1990 to 1999 (35.41%), mild criticism was developed based on increasing trends and interest towards research and theory neglecting patient care prioritization. The importance of counterbalance between research and patient care was highlighted from 2000 to 2009 (43.75%), the decade with the maximum available literature. From 2010 to 2021 (12.5%), criticism was observed to reach a settlement affirming the significance of research for nursing career development.

**Conclusions:** Findings suggest that nursing is a science with artistic components requiring both research and practice for professional developments. Research evidence highlights the importance of simultaneous application of treatment based on scientific data and patient-centered care which essentially requires an artistic approach.

**Keywords:** Nursing, Science, Art, Review

**Attitude of police officers towards dealing with individuals with psychological problems: A sample from selected police stations in Colombo district**

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**Introduction:** Sri Lanka's Mental Diseases Ordinance gives discretion to police officers to make decisions concerning mentally ill without prior clinical training. Recognition of officers' attitude towards individuals with psychological problems (IPPs) is important as these influences officers' responses to situations involving IPPs.

**Objective:** To identify the attitude of officers using the Mental Health Attitude Survey for Police (MHASP) and explore which demographic factors and experiences would predict their attitude.

**Methods:** The survey was distributed amongst 17 police stations and 77 officers volunteered on site. The MHASP included 33 statements officers rated on their level of agreement. MHASP consists of four subscales, three of which measures police officers' attitudes towards; IPPs in general, community responsibility for IPPs, and IPPs living in the community and gives a total score of 180. Fourth subscale calculated separately, assessed officers' perceived level of adequate preparedness to deal with IPPs. A multiple regression analysis was conducted to identify which officer characteristic predicted the scores of the subscales.

**Results:** The MHASP total ( $M=132.67$ ,  $SD=17.55$ ) indicated a more positive attitude towards IPPs. Despite most officers (84%) reported of not receiving any specialized training, results suggested they were nonetheless confident to deal with IPPs. However, 88% of the officers agreed on the need for such training. Regression analysis showed no demographic factor predicted officers' attitude except for gender in relation to community responsibility ( $p=0.047$ ). The level of education ( $p=0.088$ ), while not significant, was more associated with the total MHASP than the individual subscales.

**Conclusions:** Although a positive attitude towards IPPs was observed, considering majority were confident to deal with IPPs without formal training, a similar study can be conducted with a larger sample that could also investigate current practices amongst police officers in dealing with IPPs and to recommend the incorporation of specialized training to the police academy curriculum and for existing police officers.

**Keywords:** Police, Law enforcement, Attitude, Mental health, Psychological problems

**Job-related burnout during the period of COVID-19 pandemic among nurses at National Institute of Infectious Diseases; Sri Lanka**

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**Introduction:** Nurses are under persistent psychological pressure since they are promptly exposed to COVID 19, as frontline healthcare workers. Burnout is a prolonged response to chronic emotional and interpersonal stressors. The persistent psychological pressure due to worsening COVID 19 situation in the country, could lead to burnout among nurses.

**Objective:** To assess the job-related burnout and its' associated factors during the period of COVID-19 Pandemic among nurses at the National Institute of Infectious Diseases (NIID); Sri Lanka

**Methods:** A descriptive cross-sectional study was conducted among randomly selected 160 nurses at NIID. Data were collected by using a pretested self-administered questionnaire which included "Maslach Burnout Inventory for Medical Personnel" to assess job-related burnout. Data were analyzed using descriptive statistics and inferential statistics. IBM SPSS version 25.0 was used as the data analysis tool.

**Results:** The majority (84%) of the participants were females with a mean age of 30±5 years. Nearly half (56%) of the participants were married and the average working hours per day was 13±4 hours. When considering burnout, the mean values of emotional exhaustion (EE), depersonalization (DP), and personal achievement (PA) were 29.82±11.17, 13.61±5.45, and 32.29±9.04 respectively. The study participants reported high levels of EE (61%), high levels of DP (54%), and low levels of PA (39%) during COVID-19 Pandemic. Educational status ( $p=0.03$ ) and working at COVID unit ( $p=0.03$ ) were associated with EE. Working hours per day ( $p=0.02$ ), number of night shifts ( $p=0.003$ ) and working at COVID unit ( $p=0.001$ ) were associated with DP. Marital status ( $p=0.05$ ) and covid training ( $p=0.01$ ) were associated with PA.

**Conclusions:** Nurses encounter high levels of burnout during the COVID-19 pandemic, while several factors significantly associated with the burnout. The study findings emphasized the necessity of interventions for early detection, reduction, and prevention of burnout among nurses.

**Keywords:** Nurses, COVID 19, Burnout

## Comparison of peripartum maternal and fetal outcomes in cervical ripening using foley catheter and prostaglandin: a systematic review

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**Introduction:** Globally, the rate of induction of labour is on the rise for variety of reasons. There are several methods available in general with no one method being superior to another.

**Objective:** To critically appraise the current literature on the effectiveness and peripartum maternal and fetal outcomes in cervical ripening and induction of labour when using Foley catheter and prostaglandin (dinoprostone gel; PGE2 and vaginal misoprostol; PGE1).

**Methods:** A literature search was performed using Discover, Science direct, PubMed and Google Scholar databases using specific keywords related to the aims. Of the 78157 studies found, a total of six quantitative randomized control trials (RCT's) of uncomplicated single gravidae who are asymptomatic at full term with a viable fetus and intact membranes that required elective induction of labour were included in the review. Mothers with previous caesarean section, rupture of membranes, non-vertex presentations, multiple pregnancies, known fetal anomalies and hypersensitivity to PG were excluded. Systematic Reviews and Meta-Analysis (PRISMA) statement was followed and data analysis was conducted using narrative format. The study consisted of 1893 uncomplicated, full-term mothers.

**Results:** Three studies showed efficacy had been equal in the cervical ripening and the induction of labour with Foley catheter and prostaglandin. However, PGE1 is superior in one study and Foley catheter was prominent in another study. Further, the combination of the two methods did not show any additional efficacy. Neither improvement in the rate of vaginal delivery was not noted, nor was there any difference found in the interval from induction to delivery in most of the studies. There was also a higher incidence of chorioamnionitis in the combination group ( $P = 0.07$ ). The Secondary efficacy outcomes of both methods were differing from each other. In terms of safety, almost all the studies interpreted there was no difference in the risk of neonatal or maternal complications among them after the delivery.

**Conclusions:** Although there is no significant difference in both methods in all terms, overall, the use of the Foley catheter appears to be more effective and a safer method than prostaglandin in cervical ripening and the induction of labour.

**Keywords:** Induction of labour, Foley catheter, Prostaglandin, Cervical ripening

**A quantitative study determining the contribution factors and impact on social media addiction towards depression among adolescent in Gampaha district-Sri Lanka**

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**Introduction:** Mental health conditions account for 16% of the global burden of disease and injury in people aged 10-19 years globally, depression is one of the leading causes of illness and disability among adolescents.

**Objective:** To determine the contributing factors on social media addiction towards depression among adolescents (13-17years) in Gampaha District.

**Methods:** A quantitative study was conducted among 200 school children aged 13-17 in the Gampaha district using a self-administered questionnaire, validated by a Pre-test including the depression scale (Depression level was measured by Mood and Feeling Score (MFQ) range from 0 to 26. Scoring a 12 or higher indicates the presence of depression of the respondent. The convenience sampling technique was used. Data were analyzed using Statistical Package for Social Science (SPSS 22) and the findings were presented in a descriptive and inferential manner.

**Results:** The response rate of the study is 87% where 174 students participated. It was found that one-fourth of the sample (24.9%) had depression. The highest of the sample responded on "Internet addiction" as negative impact (61.85 %) and a minority of the sample responded on "Suicide; Self Self-harm content" (20.8 1%). There is no association between personal factors and depression ( $p=0.329$ ) and between social media factors and depression ( $p=0.865$ ). Among students who were categorized as having depression, 65.1% mentioned that they do not have mental or health problems and they use social media more than 15 times in a week.

**Conclusions:** According to the finding, one-fourth of the population is experiencing considerable mental health issues. Addressing adolescent mental health conditions extend to adulthood, improve both physical and mental health and enhancing opportunities to lead fulfilling lives as adults.

**Keywords:** Depression, Social media addiction, Adolescents



**Faculty of Science**  
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## MESSAGE FROM THE DEAN

**Prof. Upul Sonnadara**

Dean

Faculty of Science

University of Colombo



The Annual Research Symposium of the University of Colombo is the inaugural event of the symposia/technical sessions held by individual faculties and institutions. In the past, many academics and postgraduate students of the Faculty of Science contributed to the technical sessions by presenting papers related to the research work carried out by them. This year's technical sessions of the Faculty of Science of the University of Colombo is scheduled from November 24-26, 2021, as a part of an international conference organized by the faculty to promote multidisciplinary approaches in sciences (ICMAS 2021).

This year is a very special year for the Faculty of Science, University of Colombo as we celebrate 100 years of contribution to Arts and Sciences at university level. I am very happy to note that the faculty has an excellent postgraduate education system in place with doctoral programs focusing on 7 subject disciplines and masters programs in approximately 15 disciplines. At any given time, approximately 500 postgraduate students pursue their studies in the faculty under the guidance of well-qualified academic staff members. The research conducted at the faculty is supported by the Colombo Science and Technology Cell which promotes research commercialization. Today, the Faculty of Science of the University of Colombo is one of the best faculties in which to pursue higher education related to Science in Sri Lanka, and I am proud to be a part of it.

I would like to take this opportunity to thank all the academics and postgraduate students for contributing to the enhancement of research in the faculty and sharing their research findings. On behalf of the Faculty of Science, I extend my sincere gratitude to the organizing committee of ARS 2021 for working under difficult conditions, to make this event a success.

## MESSAGE FROM THE CONFERENCE CHAIR

**Prof S. S. N. Perera**

Chairperson ICMAS-2021



On behalf of the organizing committee and the Faculty of Science, University of Colombo, I am honored to welcome you to the International Conference on Multidisciplinary Approaches in Science 2021 (ICMAS-2021). The conference is organized by the Faculty of Science, University of Colombo to celebrate the centenary of excellence in Science. The conference theme, *Basic Sciences: From silos to the cross disciplinary future world*, has been carefully chosen to mark the growth of interdisciplinary research in our society.

ICMAS 2021 consists of forums, workshops, mini symposiums and keynote speeches held on a virtual platform. The main objective of the conference is to update the recent developments of knowledge and practices in basic sciences and to promote multidisciplinary research as a tool to overcome challenges in the coming decade and beyond. More than 160 abstracts were received from all over the globe covering the different tracks of the conference: Modeling and Simulation in Sciences; Research and Innovation towards a Sustainable Future; Advances in Basic Sciences towards Technological Development; Science and Mathematics Education; Biodiversity, Conservation and Natural Resources; and Decision Sciences. The conference also includes symposia on Infectious Diseases Modeling, Quantum Computing, From Workbench to Practice and many workshops covering emerging fields in science. ICMAS 2021 includes more than 40 guest speeches by both local and foreign scholars providing a great opportunity for researchers to share their thoughts, exchange ideas and to explore current and future directions in research.

I would like to express my appreciation to all the reviewers for their professional reviews that helped us maintain the high quality of the conference publications. I would also like to thank all keynote and guests speakers, workshop organizers, track co-chairs, session chairs, co-chairs and authors for their contributions which are the foundation of the remarkable success of this conference.

Organizing a conference of this magnitude is not an easy task. The success of the conference ultimately depends on the people who worked hard in planning and organizing the conference. To this end, I would like to express my sincere gratitude to the organizing committee members who worked extremely hard for the details of the conference program and technical activities.

I wish you a productive and a memorable conference, ICMAS-2021.



## **ORGANIZING COMMITTEE**

### **Conference Chair**

Prof. S. S. Nishantha Perera (Department of Mathematics, Faculty of Science)

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# International Conference on Multidisciplinary Approaches in Science (ICMAS) - 2021

## Programme

**Day 1 - 24<sup>th</sup> November, 2021**

### Inauguration Ceremony

8.15 am	Arrival of the Guests
8.30 am	Lighting of the Traditional Oil Lamp and National Anthem
8.38 am	Video – 100 Years in 100 Seconds
8.40 am	<b>Welcome Address</b> Prof. Upul Sonnadara Dean of the Faculty of Science, University of Colombo
8.50 am	<b>Introduction to the ICMAS 2021</b> Prof. S. S. Nishantha Perera Conference Chair
9.00 am	<b>Launching of the Centenary Stamp and First Day Cover</b> Dr. Devanmini Halwatura Conference Co-Secretary
9.10 am	<b>Address by the Vice Chancellor, University of Colombo</b> Prof Chandrika N Wijeyaratne
9.20 am	<b>Address by the Guest of Honour</b> Hon. Minister of Mass Media Mr. Dullas Alahapperuma
9.30 am	<b>Address by the Chief Guest</b> Hon. Minister of Education and Leader of the House of Parliament Mr. Dinesh Gunawardena
9.40 am	<b>Vote of Thanks</b> Dr. Monika Madhavi Conference Co-Secretary

**Day 1 - 24<sup>th</sup> November, 2021**

**Morning Session**

10. 30 am      **Keynote Address**

*Human Capital, Employment and Economic Empowerment*

Dr. Harsha Aturupane

Lead Economist, Education Global Practice, The World Bank

**Afternoon Session**

01.00 pm      **Graduate Talks**

Research Applications for National Development

**Day 2 - 25<sup>th</sup> & Day 3 - 26<sup>th</sup> November, 2021**

**Technical Sessions**

Track A: Modeling & Simulations in Sciences

Track B: Research and Innovation towards a Sustainable future

Track C: Advances in Basic Sciences towards Technological Development, Science and

Track D: Mathematics Education: Challenges and Opportunities

Track E: Biodiversity, Conservation and Natural Resources

Track F: Decision Sciences

**Symposia**

International Symposium on Applied Mathematics, Modelling, Analysis and Simulations

Symposium on Infectious Diseases Modelling

Mini Symposium on "From Work Bench to Practice"

Mini Symposium on Quantum Computing

## INTRODUCTION TO THE KEYNOTE SPEAKER

### **Dr. Harsha Aturupane**

Lead Economist

The World Bank



Dr. Harsha Aturupane is a Lead Economist in the World Bank. He has worked and written extensively in the fields of human development, education economics, higher education, general education, labor economics, welfare economics, and poverty reduction. He has led teams in the preparation and supervision of World Bank projects and programs covering higher education, general education, health, social protection, economic reform, and strengthening governance processes. His work experience covers the East Asia, South Asia, Europe and Central Asia, Middle East and North Africa, East Africa, and West Africa regions of the World Bank. He has a Ph.D. and M.Phil. in Economics from the University of Cambridge and a B.A. in Economics and Diploma in Economic Development from the University of Colombo.

## KEYNOTE ADDRESS

Dr. Harsha Aturupane

### Human Capital, Employment and Economic Empowerment

#### Introduction

**The global economy is now experiencing the Fourth Industrial Revolution.** The first Industrial Revolution, from about 1760 onwards, was based on mechanical production and saw such revolutionary innovations as steam powered industrial production and railway-based transport. The second Industrial Revolution, from around the 1860 onwards, saw the widespread application of electricity, and the use of the assembly line and mass production in industry. The third Industrial Revolution, from about the 1960 onwards, saw increasingly automated production, and the widespread use of electronics and computers. The fourth industrial revolution is based on developments such as artificial intelligence, big data, robotics, biotechnologies and neuro-technologies. Just as the nature of economic production and jobs were transformed by the technological advances of the first, second and third Industrial Revolutions, the scope and content of economic production and jobs will be transformed by the fourth Industrial Revolution.

**Revolutionary changes in technology have a three-fold impact on jobs.** First, some jobs are lost as machines replace human beings. For instance, equipment such as tractors now perform many agricultural tasks that previously required manual labor in agriculture. Second, many jobs continue but need new skills for their full execution. As an example, university academics today routinely use computers and software relevant for their academic disciplines. Earlier generations of academics used pen and paper, and blackboards, for the same tasks. The productivity of jobs increases with the application of technology. Third, new jobs are created. Many jobs linked with modern internet-based services did not exist until late in the computer era. Among these, the transformation of jobs require new skills is usually the most common feature of economies. This is followed by the creation new jobs and then the loss of certain old jobs with obsolete skills.

**Human capital production and accumulation needs to be continuously transformed to meet the changes in skill needs.** The demand for advanced cognitive and socio-emotional skills is increasing, while that for less advanced skills that can be readily automated is decreasing. This requires adaptation in curricula, teaching and learning, and assessment, across education systems. Further, disruptive change is predicted to transform the skills needed in future careers multiple times. Education and training systems need to support children, youth and adults to make these changes.

**Technological development is skills based and thus investing more in human capital has higher returns, and now more than ever before in history.** From about the mid-1980s the rates of return to higher education have been rising. This process has accelerated with the advent of the fourth industrial revolution. Investment in human capital is a necessity for productive engagement with the global knowledge economy.

**Traditional education systems are increasingly struggling to produce the new skills needed.** The focus of education systems has been mainly on intelligence or initial cognitive ability and cognitive skills. However, these are not adequate in the era of the fourth industrial revolution. The focus of education systems needs to be broadened beyond intelligence as an education input and beyond cognitive skills as an education outcome. Fortunately, research and policy are advancing in these areas.

**Personality traits determine academic performance and skill formation.** The big five personality traits: openness to experience, conscientiousness or perseverance, extraversion, agreeableness, and emotional stability, matter for success in school, university and in the labor market. For instance, research shows that conscientiousness matters as much as intelligence for employment outcomes. Further, openness to experience is very important for innovation.

**Socio-emotional skills are analogous to personality traits, but with emphasis on malleability.** These skills are important determinant of economic outcomes. They have an indirect effect, through cognitive skills, on job performance. They also have a direct effect on earnings, for example through openness and conscientiousness. Both cognitive and socio-emotional skills contribute to productivity. What you know matters for creativity and cognitive skills are important. but socio-emotional skills too as shown in repeated labor market studies.

**The education system can promote socio-emotional skills.** There are several key dimensions of a high performing education system. First, good quality early children education is vital. The foundations of personality and learning are laid in the early years. Second, school systems need to be transformed to promote both cognitive learning and socio-emotional skills. This requires fresh approaches to curricula, teaching-learning, and assessment. Third, it is important to have well-timed and effective vocational training and technical education. Fourth, a high quality and widely accessible higher education system is needed. Fifthly and finally, these elements of education need to construct an efficient and productive life-long learning system.

**Economic policies can promote the creative use of all forms of human capital.** A pro-market economic environment is needed as it produces a variety and diversity of opportunities. A market-friendly environment also creates space and freedom and rewards for innovation. Policies that stifle markets, conversely, hamper the productive use of skills. A vital component of a pro-market economic environment is openness to international trade, with free cross-border flows of goods and ideas. This, in turn, provides exposure to new thinking and the creation of new opportunities.

**The broader ethical framework of society needs to be favorable to innovation and development.** Democracy is of central importance for economic prosperity. Democracy promotes innovation while authoritarianism suffocates innovation. Also, ethical teams are more productive than unethical groups. The social capital provided by shared values, norms and codes of good conduct are necessary to underpin a well-functioning economy based on productive and innovative human capital.

## **Joint Modelling of Dengue Data using a Semi Parametric Survival Response and a Parametric Count Response**

**H. H. M. Hettiarachchi<sup>1\*</sup>, M. R. Sooriyarachchi<sup>1</sup>**

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In Sri Lanka, dengue has become an increasing health concern in the recent past. The spread of Dengue is influenced by the living surroundings. Therefore the dengue data are related to the climate and also correlated within districts as the weather is similar within a district. The survival time of a patient and the incidences of the disease (count) are frequently encountered phenomenon in medical studies that can be related to each other. Therefore, it is important to give attention to Dengue survival time and Dengue count simultaneously, because these can provide interesting and improved results, rather than modelling survival time and count data separately, while considering the multilevel structure of a district cluster effect. The objective of this study is to perform a joint modeling of survival time and count. A semi-parametric method for modelling the survival data is preferred as it is often difficult to determine the survival distribution, and there is also censoring of the observations. Hence, a frailty piecewise constant proportional hazard semi-parametric model with approximated baseline hazard was preferred to model the survival response. As log of counts are normally distributed, the normal model is preferred as the count sub model. The literature does not contain joint modelling of survival time and the count using the above mentioned sub models, and therefore this is an added novelty of this study. For this study, data recordings on dengue patients all over Sri Lanka from 2006 to 2008 have been used. As explanatory variables, there were the climate variables rainfall, temperature, and humidity with their first and second lag values, as well as Year, Quarter, Outcome, Age, Sex, Classification and Expected Exposed. Districts are considered as clusters. The performance of the proposed joint models is compared with univariate fixed effect models that can be fitted separately for the two responses. According to the model fit statistics which are -2 log likelihood, AIC, AICC and BIC values, the performance of the joint model was superior to the separate univariate models.

**Keywords:** Survival Semi Parametric Modeling, Dengue, Piecewise Proportional Hazard

## Modulatory Role of TMPRSS6 (transmembrane serine protease 6) rs855791T>C Polymorphism on Iron Homeostasis: an *in-silico* Protein-protein Docking Model

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The molecular mechanisms of iron deficiency (ID), the most common global nutritional problem, are not yet fully understood. Regulatory messenger molecules like TMPRSS6 (transmembrane serine protease 6) play a vital role in systemic iron homeostasis. When iron levels are low TMPRSS6 cleaves membrane bound hemojuvelin (HJV) causing a negative regulation of BMP-SMAD (Bone morphogenetic proteins-sons of mothers against decapentaplegic) signaling to inhibit hepcidin, the master regulator of iron, and restore iron balance. Our previous study on TMPRSS6 gene among pregnant women, has shown rs855791T>C polymorphism in *TMPRSS6* gene to be associated with ID in the presence of T allele. rs855791T>C is a missense variant in the catalytic domain of TMPRSS6 protein and causes valine (V; by T allele) to alanine (A; by C allele) change at 736 position. Functional studies have demonstrated that, 736A variant inhibits hepcidin more than 736V variant. This may explain the high risk of ID in the presence of latter in our previous study, although the exact mechanism is not yet clarified. We attempted predicting possible molecular mechanisms of rs855791T>C polymorphism and ID using an *in-silico* protein-protein docking model. YASARA workplace was used to build the homology models of HJV and TMPRSS6 proteins. Amino acid changes corresponding to rs855791 SNP were introduced to TMPRSS6 protein using Schrödinger Maestro v 9.0 to obtain the two protein variants. The predicted protein models were validated with Ramachandran plots using RAMPAGE online server. Two protein-protein docking web servers, PatchDock and FireDock were used to predict the protein complexes made by HJV with the two TMPRSS6 protein variants. This was followed by a local docking carried out using Rosetta web server. Interface energy was calculated for these complexes through ROSIE. The complex made of TMPRSS6-736V and HJV generated an interface energy of -4.689 kJ/mol while the complex made of TMPRSS6-736A and HJV generated an interface energy of -7.934 kJ/mol. These results suggest that the TMPRSS6-736A: HJV complex to be thermodynamically more stable than the TMPRSS6-736V: HJV complex. This may explain the observed high risk of ID in the presence of 736V variant, favouring hepcidin action, in pregnant women studied, which warrant further exploration.

**Keywords:** Iron deficiency, Protein docking, Interface energy



## Analyzing the Early Stage of COVID-19 Transmission in Sri Lanka via a Multi-patch Compartmental Model

**Y. Jayathunga<sup>1\*</sup>, K. K. W. H. Erandi<sup>1</sup>, N. C. Ganegoda<sup>2</sup> and S. S. N. Perera<sup>1</sup>**

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The main focus of this work is modelling the spread of COVID-19 within a multi-patch environment. The proposed model incorporates the short-term mobility and a mobility matrix. A SQIHR model including close contact tracing combined with human mobility within patches is discussed. Different scenarios of the imposed mobility restrictions are illustrated with the numerical simulations for the early stage of disease spread in Sri Lanka. The spread of the disease from a hot-spot to the local areas with no initial disease is numerically illustrated. Furthermore, the effectiveness of the close contact tracing of an infected patient is also addressed.

**Keywords:** COVID-19, multi-patch compartmental model, mobility matrix, contact-tracing with mobility restrictions

**Joint Multilevel Discrete Competing Risk with Continuous Outcome via Bivariate Copula model – Application to a Dengue Epidemiology Study, Sri Lanka**

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The Competing risk is a special branch of medical research where multiple events can happen. It can encompass the joint modeling approach for dengue epidemiology to model the relationship in different destinations of the length of stay and platelet count. Also, the district effect is an inherent feature of dengue highly associated with climate change. Therefore, this leads to the joint multilevel approaches for analyzing the length of stay of a dengue patient and platelet count in different destinations. Here, length of stay is in discrete form and platelet count is in continuous form. The joint modeling is done through a copula model with the formation of multilevel utility models for discrete competing risk response (length of stay in different destinations) and a multilevel linear regression model for platelet count. The within and between-study variability models are joined through random effects. The fitted model indicated that the white blood cell (WBC) count, year, and sex are the only associated factors for the platelet count and time indicators, age, classification, temperature, and rainfall have a significant impact on the rate of a discharging patient, and only time indicators and classification were significant for death rate in the joint model. Moreover, the joint model yielded more precise results than the univariate model.

**Keywords:** Multilevel Competing risk, Utility models, Copula

**Protein-protein Interaction (PPI) Network Module Analysis for Detecting Sub-modules and Hub Proteins Associated in Root Development of *Oryza sativa*.**

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*Oryza sativa* (rice) is one of the main global staple foods, and improved varieties are required to enhance its yield to supply for the increasing population. It is essential to study the root system for plant improvement because it contributes immensely to plant growth and stress tolerance. When producing improved varieties, revealing the molecular mechanisms behind phenotypes, such as root development, is indispensable and requires the identification of associated genes and their interactions. Phenotypes are governed by multiple proteins forming complex interactions; hence, it is important to analyze these interactions rather than focusing on individual proteins. This is achieved via protein-protein interaction (PPI) network module analysis in bioinformatics. This also allows identifying the sub-modules within a particular module for a phenotype, which correspond to different biological pathways governing the final phenotype. Also, there are proteins with higher importance than others, i.e., hub proteins, which have a higher number of interactions compared to non-hub proteins. These hubs can be identified using network analysis. The efficiency of PPI network analysis has been proven in human disease research, but to our knowledge, this method has never been used on root development in rice. Therefore, to better understand the protein interactions involved with root development, PPI network analysis was used to analyze sub-modules and identify hub proteins. Rice PPI network from the STRING database was retrieved and genes with experimental evidence for their contribution to root development were extracted from the literature. These were used to predict 75 new gene candidates. Then, the PPI network module for the root development was extracted and visualized, and sub-modules and hubs were identified. Enrichment analysis was performed to detect the biological pathways related to sub-modules and those pathways and hubs were analyzed using the literature. Altogether, 6 sub-modules, 20 intramodular hubs, and 2 intermodular hubs (DRO1 and FH1) were identified and analyzed. They were mainly associated with root hair development, auxin regulation, cytokinin regulation, and cell wall organization, which are related to the root development, confirming the applicability of our approach.

**Keywords:** PPI, Rice, Root

## Joint Marginalized Multilevel Model for Study Program Completion and Performance of Students: The Case of Sri Lankan Open and Distance Learners in Management Studies

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When data with correlated responses are available, joint models may provide interesting and improved results than modeling the responses separately. Such models between those responses can be developed and their applicability in various fields is noteworthy. Though joint mixed models and joint population averaged models are popular and common in statistical literature, Joint Marginalized Multilevel Models (JMMM) is still a developing area. Thus, the main objective of the study is to model survival and count data jointly, utilizing MMM and applying it to data related to Distance Education in Sri Lanka. The data obtained for this study represents records of students who have registered for undergraduate study program in Management at a leading higher education institute in Sri Lanka through Open and Distance Learning (ODL), which conducts the program in all the regional/ study centers across the country. As the students are clustered in different regional/ study centers, the clustering effect is also present in the dataset. In this study, completion time of study programs by the students is considered as a survival response and the number of first time passes by students, which represents student performance, is considered as the count variable. The findings suggest that the time to completion of the study program and gender have a significant impact on completion of the study program and student performance in the said context.

**Keywords:** Joint modeling, Marginalized Multilevel Model, Open and Distance Learning

## Automorphisms of Latin Squares

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A Latin Square  $L$  of order  $n$  is an  $n \times n$  array containing  $n$  symbols from  $[n] = \{1, 2, \dots, n\}$  such that each element of  $[n]$  appears once in each row and each column of  $L$ . Rows and columns of  $L$  are indexed by elements of  $[n]$ .

An automorphism  $\alpha$  of a Latin square is a permutation such that the triple  $(\alpha, \alpha, \alpha)$  maps the Latin square  $L$  to itself by permuting its rows, columns and symbols by  $\alpha$ . Let  $Aut(n)$  be the set of all automorphisms of Latin squares of order  $n$ . Whether a permutation  $\alpha$  belongs to  $Aut(n)$  depends only on the cycle structure of  $\alpha$ . Stones *et al.* [1] characterized  $\alpha \in Aut(n)$  for which  $\alpha$  has at most three non-trivial cycles (that is, cycles other than fixed points). A notable feature of this characterisation is that the length of the longest cycle of  $\alpha$  is always divisible by the length of every other cycle of  $\alpha$ . In this research we prove a related result for automorphisms with four non-trivial cycles.

**Keywords:** Latin Square, Automorphism, Cycle Structure, Permutation.

### References

1. Stones, D.S., Vojtěchovský, P. and Wanless, I.M., 2012. Cycle structure of autotopisms of quasigroups and Latin squares. *Journal of Combinatorial Designs*, 20(5), pp.227-263.

## A Genetic Algorithm for University Timetabling

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Timetabling is the process of allocating time for planned activities orderly, to bring an optimum solution, without violating any hard constraints and with minimum soft constraint violations. It portrays a difficult optimization problem. There exist many commercial software with general features for this task. However, those cannot be adopted into The Open University of Sri Lanka (OUSL) due to its unique and complex requirements. This work presents the development of a genetic algorithm (GA) based MATLAB program, which automatically generates a semester-long, optimized timetable and eliminates the current, time consuming, manual process. The algorithm takes into account the number of levels in a degree program, credit hours, days and time slots in a semester, clash avoidance, fixed time slots, holidays, lecturer preferences, and workload distributions. The genetic algorithm consists of four main steps: initialization, validation, fitness calculation, and mutation. The solution space is represented by a four-dimensional matrix. Rows, columns, and planes represented slots per day, days in a semester, and levels (year 01,02 and 03 of degree program). The fourth dimension represents different solutions. To measure the performance of the algorithm, a point system was devised where violation of each constraint was penalized and vice versa. Based on this point system, a theoretical maximum was calculated without considering the feasibility of achieving all constraints simultaneously. In this study, the algorithm reached a maximum fitness value of 100 without violating any hard constraints, whereas the theoretical maximum was 126. Repair strategies were implemented to improve the performance resulting in reduction of execution time from 90 minutes to 14 minutes. The results show it is possible to generate an optimized timetable consistently using this method.

**Keywords:** Timetabling Problem, Genetic Algorithm, Optimization

## Validation of Geant4 Monte Carlo Model of $^{60}\text{Co}$ High Dose Rate BEBIG Brachytherapy Source

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The  $^{60}\text{Co}$  sources are widely used for high dose rate (HDR) brachytherapy treatments. The purpose of this study is to validate a Geant4 (version 10.7.1) computational model of the BEBIG  $^{60}\text{Co}$  HDR source. The Geant4 Monte Carlo (MC) model has been used in compliance with the standard TG-43 formalism. The air-kerma strength per unit source activity (Sk/A) was estimated by keeping the source at the center of the xyz coordinate system. The air-kerma was scored at 100 cm on the transverse axis in a spherical air volume of 1 cm radius. Histories of  $1 \times 10^9$  were used with an uncertainty below 0.4%. A cubic water phantom with dimensions 1 m x 1 m x 1 m was modeled to obtain the dose rate distribution. The radial dose distribution of the source was scored by placing the source at the center of a 40 cm radius water phantom. Histories of  $2 \times 10^8$  were simulated and the density and temperature were taken as recommended in TG-43. The calculated Sk/A in this work was  $2.944 \times 10^{-7} \text{ U Bq}^{-1}$ . Dose rate constant ( $\Lambda$ ) was measured at 1 cm on the transverse axis in water medium using 0.1 mm<sup>3</sup> cubic volume and the measured  $\Lambda$  was  $1.155 \text{ c Gy h}^{-1} \text{ U}^{-1}$ . The values Sk/A and  $\Lambda$  show good agreement with the previous simulation studies and has the ability to produce dose profiles. The dose rate per unit air kerma strength and the radial dose functions calculated in this study are consistent with the previous study data.

**Keywords:** High dose rate brachytherapy, Monte Carlo simulation, Cobalt-60

## Sensitivity Analysis of Simulating Rainfall over Sri Lanka Associated with the Cyclone Amphan using WRF

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The cyclone “Amphan” is reported from 16<sup>th</sup> to 21<sup>st</sup> May 2020. It has affected Sri Lanka during its initial stage and moved towards the “Bay of Bengal”. This study is to identify the best set of physics options in simulating the daily rain fall under the influence of the cyclone “Amphan” using Weather Research and Forecasting (WRF) model. The considered physics options are microphysics (MP), cumulus parameterization (CU) and planetary boundary layer (PBL). Twelve different combinations of those physics options are experimented. The best combination is identified by calculating the pattern correlation between the simulated and satellite measured rainfall obtained using Global Precipitation Measurement (GPM). GPM Level 3 dataset is used in this research with 0.1°x 0.1° resolution.

Pattern correlation is calculated by considering the rainfall of the entire simulation domain for a period of 24 hours. The total length of the simulation was six days and the average pattern correlation is calculated to identify the best physics option combination. The physics option combination which had the highest average pattern correlation was “Thompson Scheme” for MP, “new modified Tiedtke scheme” for CU and “University of Washington scheme” for PBL. In general the intensity of the simulated rainfall is comparatively lower but on the other hand the area and the pattern is accurately simulated by the identified set of physics options. We conclude that the use of such physics option combination with WRF has the potential in forecasting the rainfall in Sri Lanka under the influence of a cyclone.

**Keywords:** WRF, rainfall and cyclone Amphan



## **Risk Zone Modelling of Lake Ecosystem Using Multi-criteria Assessment to Determine the Ecosystem Degradation Levels of Selected Urban Lakes, Sri Lanka**

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Despite the great advances that have been made in freshwater ecosystem protection, anthropogenic effects on inland waters remain one of the most obvious and prevalent threats. Inland waters and surrounded wetlands in Colombo city play a major role in conserving urban biodiversity. Adverse effects of development activities and pollution on biodiversity of the ecosystem is a known fact. Identifying these external factors and demarcating the risk zones are critical to conserve and manage the wetland ecosystems. Thus, the objective of this study is to apply a multi-criteria assessment technique to model the risk zones in selected lake ecosystems and surrounding wetlands. Three lakes (Thalangama Lake, Boralesgamuwa Lake, and Kesbewa Lake) along with the surrounding wetlands were considered for the study. Remote sensed data extracted from Landsat satellite images and secondary data along with field observations were used. Urban vegetation, building density, population density, temperature, plant water content, lake area changes, the spread of invasive species and water quality were selected as the criterion to assess. GIS, remote sensing techniques (NDBI, NDVI, RVI, NDMI, NDWI, MNDWI, LST, elevation and population parameters as the criterion), and C map tools were used for the analysis. The multi-criteria assessment using the overlay and interpolation methods were used to model the risk zones. The risk zones were identified from the developed maps and the risk areas were categorized. The very high-risk severity indicates the low dense vegetation, high LST, plant water stress, building density, and land use and land cover changes. The very high-risk level was positioned around the lake ecosystems. The largest critical zone is found around Thalangama lake (10.80km<sup>2</sup>). As per the findings, all three urban lake ecosystems were degraded and are located at environmentally risk zones. Among them, being an Environmental Protection Area, the Thalangama lake is at a critical phase. Urban expansion, the transformation of vegetation to the synthetic environment and population expansion are lucid in these areas. The study recommends the application of modified DPSIR (drivers, pressures, state, impact, and response model of intervention) to further identify conservation measures to avoid or minimize the degradation process or root causes.

**Keywords:** Urban freshwater Lake degradation, Modified DPSIR, Multi-criteria assessment-risk zoning

## Resource Partitioning among Kingfishers in the Beddagana Wetland

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Resource partitioning is the division of limited resources by species to help avoid competition in an ecological niche by facilitating coexistence. This study investigates resource partitioning among three kingfisher species inhabiting the Beddagana wetland in Colombo. The wetland complex in Colombo has been collectively ascribed a Ramsar City in 2018, making this study of particular conservation importance. The kingfishers were enumerated along six transects bi-weekly, twice a day (0600 – 0900 h and 1530 – 1830 h) over six months from February to July 2020 (n= 16 days). Foraging microhabitats, perch height and prey type were recorded through focal animal observations. The three kingfishers recorded were – Common kingfisher [CK] (*Alcedo atthis*), White throated kingfisher [WTK] (*Halcyon smyrnensis*) and Stork billed kingfisher [SBK] (*Pelargopsis capensis*). A total of 116 observations of kingfishers were recorded which included *A.atthis* (n=60), *H. smyrnensis* (n=31) and *P. capensis* (n=25). The pied kingfisher (*Ceryle rudis*) was not observed during the study. Observations were greater in the morning ( $2.19 \pm 0.83$ ) than in the evening ( $1.56 \pm 0.73$ ). There were significant differences between the use of foraging microhabitats with greater usage of channels by *H. smyrnensis* (44 %), open water bodies by *A. atthis* (25%) and pools by *P. capensis* (38%). Perching heights also differed significantly with *P. capensis* using the highest perches ( $4.80 \text{ m} \pm 0.97$ ) and *H. smyrnensis* using the lowest ( $0.63 \pm 0.54$ ). All three species fed on a diversity of prey taxa, although predominantly on small fish. Overall, there was a significant difference in the frequency of the prey types consumed by each species ( $\chi^2_{16} = 27.97$ ,  $p < 0.05$ ). The study showed that, although there is some overlap, food resource partitioning in terms of prey type, foraging microhabitat and perch height, are evident between the three kingfisher species – the squared distance between each pair being CK-WTK (14.57) < SBK-WTK (42.46) < CK-SBK (91.99). The patterns of differentiation in foraging niches most likely reflect the disparity in the bill and body sizes of the three kingfisher species. Resource partitioning thus appears to serve as a mechanism of co-existence among the three considered kingfisher species within this urban wetland.

**Key Words:** Resource partitioning, foraging microhabitats

## A Study on Lichen Diversity in Two Different Agro-ecological Zones of Sri Lanka

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Sri Lanka is renowned for its unique biodiversity and high endemism. Among a variety of natural resources the country holds, lichens are hardly studied. However, lichens have been in use as therapeutics by several communities worldwide. Further, they have been identified as bio-indicators which can be used to monitor the quality of an environment. Studies on lichen identification can provide data on the diversity, abundance and distribution which are essential in lichen conservation and their sustainable use as natural sources for practical applications. Climate change is a global crisis leading to loss of biodiversity which emphasizes the study of lichens before extinction.

In the present study, a contrast in lichen diversity was observed between the two sampling sites: Nonpareil Estate (NE) and Samanalawewa Wilderness (SW) which represent two climatologically different areas of the country. A total of 36 lichen specimens were collected from the two locations. Lichen characterization based on morphology and chemistry could identify 22 lichen specimens from NE and 11 from SW, up to genus level. Six lichen specimens were identified up to species level: *Parmotrema tinctorum*, *Cladonia macilenta*, *Heterodermia leucomela*, *Teloschistes flavicans* and *Dirinaria picta*, out of which *P. tinctorum* was common to both sites.

**Keywords:** Lichen, Nonpareil Estate, Samanalawewa Wilderness

## Perspectives of modeling COVID-19 transmission via integral equations

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The ongoing COVID-19 pandemic has become a major threat to the entire globe. In order to support better understanding and controlling strategies, different modeling approaches can be utilized. Compartment models such as SIR and SEIR are the center of attention in many models. General concern on integral equation models in disease transmission is considerably low due to the intuitive temptation of modeling in terms of rate of change of response variables. This study expresses possibilities of modeling COVID-19 transmission in terms of integral equations catering accumulation effect that can be observed in several influencing factors. Both Volterra and Fredholm integral equations can be used to model this, since these influences can accumulate within constant, variable or fixed intervals. Several advantages of integral form over differential form arise via different types of kernels accommodating variety of behaviors. The accumulation of factors with time deferment effect can be modeled by difference kernel while causative factors which consist of cross-references in different platforms can be formulated by degenerated kernels. This study motivates to oversee integral equations as a modeling tool in the broader area of mathematical epidemiology.

**Keywords:** COVID-19, Integral Equations, Kernel, Accumulation and Mathematical Modelling

## Are Raptors Successful in Adopting to Urban Landscapes? A Case Study from Bolgoda North Lake, Sri Lanka

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Growth of human population and developmental pressure alter natural habitats. Birds are sensitive to environmental changes and respond to habitat alterations. Raptors usually occupy top levels of a food web and serve as important bioindicators. Yet, this important group of birds has not gained adequate attention in Sri Lanka. This study focuses on the abundance, species richness and the distribution of raptors in Bolgoda North Lake (BNL), the largest freshwater wetland in Sri Lanka which is situated in the highly populated Western Province. Bird survey was carried out in six study sites within the BNL representing three sites with human-alterations and the rest relatively undisturbed, focusing on three habitats in each site i.e., vegetated sites, edge habitats marking the interface between human-altered and natural habitats, and open water habitat. The study was carried out using the line-transect method from January to May 2021, two hours each in the morning and evenings using direct observations and bird calls. The frequency of occurrence, abundance, species richness, and Shannon diversity index were calculated. Raptor community in the study area comprised of 10 species belonging to two families. The *Haliastur indus indus* (brahmini kite) was the most abundant species while *Ictinaetus malayensis perniger* (black eagle) and *Pernis ptilorhynchus* (oriental honey buzzard) were rarely observed in all sites. One endangered (*Falco tinnunculus* – common kestrel) and two Near- threatened (*Ictinaetus malayensis* and *Pernis ptilorhynchus*) species were recorded. Twenty-two percent of species recorded were rare, 55% were common and 33% were very common. The highest raptor abundance (irrespective of species) and the species richness were recorded in the edge habitats in human-altered study sites with a significantly high species diversity compared to undisturbed study sites (One-way ANOVA;  $P < 0.001$ ). Raptors tend to use human-altered areas both as random sites and permanent sites for feeding, breeding, and nesting. Novel habitats created in human-altered sites because of human activities act as a positive factor for attraction of raptors. Our results indicate that raptors prefer edge habitats with human interventions which could be related to the availability of preferred feeding and perching habitats. While enhanced protection for avifauna of BNL is a current need, more investigations are essential on the biology and ecology of raptors.

**Keywords:** Raptors, Urban wetlands, Human-alterations

## Investigating the Potential of a Native *Glomus* sp. as a Biofertilizer

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Many plant species benefit by forming symbiotic associations with arbuscular mycorrhizal fungi (AM). They are known to enhance plant growth, photosynthetic activity & phosphorus content, act antagonistically towards soil borne plant pathogens, and modify the concentration of plant metabolites. Consequently, the uptake of N, P, and K are also enhanced significantly by AM inoculation. Therefore, mycorrhizae have been developed as biofertilizers in many countries. Hence, it is a timely action to evaluate the potential of local mycorrhizae as plant growth enhancers. A mass propagation method was developed to evaluate the native *Glomus* sp. as a biofertilizer for pepper cultivation. Finger millet, maize and sorghum have been employed as host crops and root colonization was detected by (i) observing the presence of the fungus within root tissue (ii) counting the AM spores in root associated soil, after twelve weeks post inoculation. Both sorghum and finger millet were identified as suitable host crops. Effective spore density for successful colonization of pepper rooted cuttings was determined in a pot experiment. The spore density levels tested were: T1 (400), T2 (800), T3 (1200) and T4 (1600) spores per 800 g of standard potting mixture. The pepper variety Panniyur was used with 5 replicates for the study. After 12, 20 and 28 weeks of post inoculation, root pieces were microscopically examined for the fungal colonization. The cuttings inoculated with 800 spores per 800 g potting mixture was found to be the most effective spore density for pepper inoculation.

**Keywords:** Arbuscular Mycorrhiza, *Glomus*, Pepper

## Do Wetlands Contribute to “Cooling Effects”? A Case Study from Anawilundawa Ramsar Site, Sri Lanka

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Wetlands are characterized by a unique combination of water, soil and vegetation. They are among the most productive and important ecosystems on earth which render significant ecosystem services to the community. Water and vegetation in and around wetlands help in regulating the microclimate, specially lowering the temperature in the local environment.

The present study attempted to investigate the cooling effects provided by Anawilundawa, a Ramsar site in Puttalam District where diverse land uses exist surrounding the wetland. Land Surface Temperature (LST) variation above different land use classes was investigated during the dry months of January, February, June and July of 2016 and 2020 in natural (water bodies, marsh, thick vegetation, grassland) and anthropogenic areas (built-up areas, coconut cultivation and bare lands). The LST values were obtained at 500m points along seven transect lines starting from the center of the water body and extending up to 7km over different land use areas and reaching towards the anthropogenic area.

The mean LST over the wetland (24.10°C) was significantly lower than that of anthropogenic areas (25.01°C) ( $P < 0.05$ ). The temperature range, mean  $\pm$  standard deviation for different land use areas were as follows: water body (23.21°C-24.67°C; 23.89°C $\pm$ 0.58), marsh (23.49°C-25.94°C; 24.57°C $\pm$ 1.02), thick vegetation (22.99°C-25.03°C; 24.04°C $\pm$ 0.56) grassland (23.18°C-25.93°C; 24.36°C $\pm$ 0.77), built up area (24.00°C-28.32°C; 25.40°C $\pm$ 1.40), coconut cultivations (23.19°C-24.23°C; 23.93°C $\pm$ 0.38) and bare land (24.54°C-26.39°C; 25.29°C $\pm$ 0.60). The lowest increase of LST was over the water body (+1.13°C) and the highest was over the built-up area (+4.32°C).

Findings of this study presents important implications for policy makers to conserve wetlands for community well-being especially during the dry season and for climate change adaptations.

**Keywords:** Wetland, Ecosystem Services, Cooling effect

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## A Generalized Reciprocal Service Cost Allocation Model – for Manufacturing Firms

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This study details the development of two reciprocal service cost allocation models. The first model was developed using a system of linear difference equations and the other with a system of simple linear equations. Both models were introduced for a manufacturing firm with at least one production department and more than one service department. It is assumed that

A1: at least one service department will serve one or more production departments and all other service departments can serve any department(s).

This is an extensive generalization of a paper presented earlier by the same author. Any set of allocation ratios chosen for the service departments satisfying this new assumption will lead to a matrix of the form  $\begin{pmatrix} O & B \\ O & A \end{pmatrix}$ , where the matrix  $A = (\mu_{ij})$  represents the matrix of reciprocal allocation between service departments and  $\mu_{ij}$  denotes the proportion of service department  $j$ 's overheads assigned to service department  $i$  at each allocation. This matrix  $A$  is a non-negative square matrix with at least one column sum less than one and all the other column sums less than or equal to one. For a meaningful setup in a manufacturing firm three further assumptions are made.

A2: No service department will serve only itself.

A3: No service department serves only one other service department.

A4: There is no a group of service departments that serves only that group.

To establish unique allocation of service costs to production departments with these models a few important results have been proved under the above assumptions. The first result is when each service department uses less than half of its service for itself, the second if matrix  $A$  is a positive or a non-negative irreducible matrix, and the third if  $A$  is a non-negative matrix with all entries  $a_{ij} < 1$ . The third result is new, and it reads 'if a non-negative matrix  $A_n = (a_{ij})_{n \times n}$  has all entries less than one where one column sum of  $A_n$  is less than one and all other column sums are less than or equal to one, then for all,  $n \geq 2$ ,  $|I - A_n| > 0$ '. Two corollaries to this result has also been proved. In all these results and corollaries unique solution to the models have been established.

**Keywords:** irreducible matrix, non-negative matrix, reciprocal allocation.



## Designing and Construction of a Research Grade Raman Spectrophotometer on a Budget

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Raman scattering based on molecular vibrational states is a reliable optical phenomenon for identifying and distinguishing a wide range of molecules and related processes. Raman spectroscopy finds useful utility in the detection of narcotics, explosives, monitoring of contaminants in food and pharmaceuticals, disease diagnostics and metrology just to name a few. Although many research grade Raman spectrophotometers are now available commercially, due to demanding device performances, price becomes excessively high. Therefore, the scientific community with tight financial constraints, especially in the developing world, is deprived of such a useful research facility. Here we present an alternative design for a research grade Raman spectrophotometer built with off the shelf optomechanical components without compromising the device performance. Commercially Available Instruments (CAI) provide standard features with further add-ons available at an extra cost upon request. An instrument such as Renishaw inVia™ confocal Raman microscope can accommodate several lasers and corresponding optical filters, a feature which is also available in this custom-built design. Currently our designed system consists of; options for illumination at 532 nm and 785 nm with compatible detection filters for stokes shifted optical signals and two microscope objective lenses including a  $\times 50$ , 0.42 NA, long working distance compatible with NIR region. Compared to a standard detector size of 1024 pixel  $\times$  256 pixel, this design has a 1600  $\times$  200 back-illuminated electron multiplication (EM) CCD for low light detection (with 16  $\mu\text{m}$  pixel size), which also contains a 16-bit ADC that can be operated at 3 MHz with low read noise = 39.8e. While the maximum signal count is at 65535, the noise margin lies around 300. The spectrograph consists of a Czerny-Turner geometry containing ruled diffraction gratings of (either 600 l/mm or 1200 l/mm), able to resolve spectra down to 0.1 nm. The system at 532 nm illumination has, therefore, the capability of measuring Raman wavenumbers of up to 4300  $\text{cm}^{-1}$  at a resolution of 3.5  $\text{cm}^{-1}$  against the 0.3  $\text{cm}^{-1}$ , spectral resolution of CAI. The overall cost of construction of the spectrophotometer was approximately USD 86,000 relative to the prohibitively high (>USD 250,000) of a CAI with approximately similar features.

**Keywords:** Optics, Raman spectroscopy, Lasers

## Evaluation of Entrance Surface Dose (ESD) for Chest, lumbar Spine and Abdomen X-ray Procedures in a Selected Hospital in Sri Lanka

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Ionizing radiation is harmful to living beings because it can break apart biologically important molecules such as DNA. Therefore, it is important to enforce radiation protection where radiation is used in medical diagnosis by following justification, optimization and individual dose limitation. Introduction of quality control (QC) programs and regular dose audits assist to ensure that the dose delivered to the patient is in accordance with the principle of As Low as Reasonably Achievable (ALARA). The radiation risk in general diagnostic X-ray imaging can primarily be quantified by the Entrance Surface Dose (ESD), which is known as the radiation dose measured on the surface (skin) where the X-ray beam enters the patient, including the backscatter radiation. The primary aim of this present work is to evaluate the ESD using the normalized X-ray tube output for common diagnostic X-ray examinations of the chest, lumbar spine and abdomen. Moreover, the obtained ESD values were compared with internationally published Diagnostic Reference Levels (DRLs) to identify the procedures which require optimization. The resultant third quartile value of ESD for chest PA, chest lateral, lumbar-sacral spine AP, lumbar-sacral spine lateral and abdomen AP were 0.59, 2.50, 7.56, 14.11 and 5.95 mGy, respectively. These values were significantly higher than the DRLs set by the international bodies. The major contributor to the high doses reported in this study has been identified as low kVp and high mAs combination. The results suggest that efforts are required to reduce patient doses further while securing the image quality. Therefore, a standard operating protocol should be used among all radiography units in Sri Lanka. Furthermore, a proper quality control program should be conducted in X-ray facilities to ensure the accuracy of diagnostic procedures and minimize the radiation dose. A national survey is required to set diagnostic reference levels for all X-ray examinations across hospitals to compare institutional doses and take remedial actions where necessary.

**Keywords:** Entrance surface dose, X-ray, X-ray tube output

**Validation of mathematically modeled serological data to compare malaria transmission intensities between two previous high malaria endemic districts in Sri Lanka under the prevention of re-establishment phase**

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Sri Lanka has been co endemic to both *Plasmodium vivax* and *P. falciparum* for eons. Achieving malaria pre elimination status in 2008, in 2016 the country was certified malaria free by WHO. Sri Lanka's vulnerability and receptivity to malaria remain high with the persistence of vector mosquitos of the genus *Anopheles*, and a sporadic influx of imported malaria cases, rendering surveillance a critical requirement. Serology proved to rectify the lost precision of the existing malariometrics over declining numbers of cases, yet requires further validation. This study aimed to validate serology as a marker of malaria transmission intensity and to compare the levels of anti-malarial antibodies in two previously high malaria districts; Hambantota and Kilinochchi. Non-malarious Nuwaraeliya district served as the control site. Indirect ELISA measured seroprevalences against three recombinant marker antigens each from *P. vivax* and *P. falciparum* (CSP, MSP1, and AMA1). The control site showed zero seroprevalence against all markers. Based on respondents' seroprevalence and age, seroconversion rates for test districts were estimated using two reversible catalytic models and the loglikelihood ratio test determined the best data fitting model. Changes in transmission intensity were identified for the two previous malaria districts, concerning anti MSP1, AMA1, and CSP antibodies, in parallel to both *P. vivax* and *P. falciparum*. As per model-1, seroconversion rates of Hambantota and Kilinochchi were 0.0057 and 0.00121, 0.00023 and 0.00049, 0.00064 and 0.00138 and 0.00116 and 0.00127, 0.00004 and 0.00099, 0.00701 and 0.00625 for CSP, MSP1, AMA1 to *P. vivax* and *P. falciparum*, respectively. As per Model-2, Past and present seroconversion rates of Hambantota, Kilinochchi of *P. vivax* were -0.00049 and 0.00038, 1.11604 and 0.00064 for CSP, -0.00005 and 0.00009, 0.02243 and 0.00098 for MSP and 0.20494 and 0.00180, 0.00707 and 0.00050 for AMA1, while those of *P. falciparum* were 3.41184 and 0.00022, 0.34468 and 0.00127 for CSP, 3.41184 and 0.00022, -0.00123 and 0.00069 for MSP1, -0.00324 and 0.00487, -0.00099 and 0.00109 for AMA1. The likelihood ratio test determined that Model-1 had the best-fit data ( $p=1$ ). In conclusion, more recent infections of Kilinochchi in contrast to Hambantota, traced by seroconversion rates, showed the efficacy of serology in estimating malaria transmission intensities under malaria eliminated settings.

**Keywords:** Malaria, Prevention of re-establishment, serology

## **In-silico investigation to predict the potential of HDAC inhibitors to inhibit the HDLP enzyme: A molecular dynamics study**

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Histone deacetylase (HDACs) enzyme plays an important role in regulating gene expression, thus could be considered as an effective target for cancer treatment. HDAC inhibitors are the new and promising class of drugs that restrict tumor cells from growing. In this study, the inhibitory efficacy of some HDAC inhibitors such as SAHA, LBH589, ITF2357, and PXD101 was studied using molecular dynamics simulation. The inhibitory efficacy was examined in terms of stability of the enzyme, potential energy of the system, the number of hydrogen bonds, and interaction energies between HDLP enzyme and inhibitor. It is hoped that this research will help to get a better understanding of the atomic-level nature of the inhibitor binding site and how HDAC inhibitors modify the active site of the HDLP enzyme. The RMSD and potential energy have revealed that the stability of HDLP enzyme with SAHA, LBH589, and ITF2357 is higher than the wild-type HDLP (apo form). According to the calculated values for interaction energies, the stability of the HDLP enzyme varies as LBH589 > SAHA > ITF2357 > PXD101, and the distance analysis also shows the same trend. The findings revealed that the LBH589 is a potential lead compound similar to the reference inhibitor SAHA. Therefore, it is possible to suggest this molecule to further clinical researches and clinical tests. Also, the outcomes of this study could be utilized to discover new potent inhibitors for clinical research.

**Keywords:** HDAC inhibitors, PRODRG online server, SAHA

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## Identification of Bioaerosols Heading Direction Using a Quadrant Photo Detector

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Insects are so important to the natural eco system as well as to humans that they are involved in pollination, nutrient cycling, disease spreading, medicine, aesthetics, and biological control. Besides, monitoring insects' activities is a crucial part of understanding their behaviour though most of the insect monitoring techniques have their own limitations. For instance, passive LIDAR is one of the emerging techniques that is capable of in situ monitoring of insects. However, the detection of insect heading direction is very challenging with passive LIDAR. A novel methodology in detecting insect flight direction for a passive LIDAR system was developed with the use of a quadrant photodetector (Hamamatsu S4349).

A control experiment was conducted by sending beads in selected directions of the field of view of the LIDAR system where the quadrant detector is at the focus of the telescope. The data is sampled at a 10 kHz rate for all four channels of the quadrant detector and analysis was done in iterations. The flight direction can easily be determined by analyzing the time domain signal through understanding the orientation of the quadrant detector. However, this method did not reveal whether the insects flew in transverse or longitudinal direction. In the first iteration, insect detection was determined by considering all four channels. The next step was selecting the data set of full width at 10% of the peak signal of the event for each channel. The dataset was transferred into the frequency domain and then compressed with the Singular Value Decomposition (SVD). By selecting the most dominant components after data compression, the feature set was classified using Hierarchical Cluster Analysis (HCA). Upon investigation of individual clusters with the use of an expert dataset, it was found that the heading direction can be identified in both longitudinal and transverse components with the sensitivity of 96%, specificity of 95 % and accuracy of 96 %.

**Keywords:** Insect monitoring, Heading direction, Entomological Lidar.

## Molecular dynamics study on the effect of As(III) ion on human uracil DNA glycosylase enzyme

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Mutations in DNA occur due to exposure to chemicals, toxins, and radiation. The presence of uracil in DNA is a modification that occurs due to the misincorporation and spontaneous deamination of cytosine. Glycosylases can repair mutated DNA, and human uracil DNA glycosylase (hUNG) is one such DNA repair enzyme that initiates the base excision repair pathway. However, the activity of these enzymes gets affected when exposed to toxic metals. Therefore, it is essential to study the mechanism of action of the toxic metals with these enzymes. Experimental investigations have revealed that Cd(II) ions can inhibit the activity of hUNG. These studies suggest that the inhibition takes place due to the replacement of the catalytic water molecule found in the active site of the enzyme by the Cd(II) ion. Other than Cd(II) ion, As(III) is also considered a toxic metal ion categorized under human carcinogens. Therefore, the work here has focused on the accumulation of As(III) with the hUNG enzyme, and the intension of this work was to study the effect of As(III) ion on hUNG. The study was done using CavityPlus web server and computational analysis based on molecular dynamic (MD) simulations considering two systems of the enzyme; in the presence and absence of the As(III) ion. The CavityPlus web server results showed that the number of cavities of the enzyme changes for the two situations of the enzyme. Further, the ability of a ligand to bind with a cavity of the hUNG was comparatively studied using the ligandability results obtained from the server. The root means square deviation and total energy analysis done using the simulation trajectories showed that the enzyme and the system with As(III) obtain high stability compared to the free enzyme and the system, respectively. The localization of the residues of the enzyme in the Ramachandran plot showed that a high percent of residues of the enzyme with As(III) lie in the favorable region of the plot. Based on the analysis of these results, it is concluded that As(III) ion can reduce the activity of the enzyme by forming a stable enzyme-metal ion system.

**Keywords:** hUNG, CavityPlus web server, Molecular dynamic simulation

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## **Effective Radiation Doses for head and neck multi-slice computed tomography (MSCT) protocols**

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Computed tomography (CT) is known as a standard imaging modality prescribed for the head and neck diagnostic imaging. The introduction of multi-detector row CT (MDCT) has enabled imaging of the entire neck region within 2–4 seconds. However, over-ranging due to helical scanning, 3D-volume imaging, and small detector size lead to increased radiation dose in MDCT scans. The International Commission on Radiological Protection (ICRP) recommended that the protection of specific tissues, particularly the lens of the eye, should be a priority. The objective of this study was to evaluate the radiation dose in MDCT for different head and neck protocols. The Effective Dose (ED) of ten head and neck CT examinations from 214 adult patients (mean age 49.2 ±15.9 years) were evaluated. The median ED values for sinuses:non contrast (NC)+contrast enhanced (CE), sinuses:NC, Petrous bone (PTB)/Internal auditory meatus (IAM):NC+CE, PTB/IAM:NC, orbit:NC+CE, orbit:NC, brain with orbit:NC, brain CT angiography (CTA) subtraction, neck:NC and brain/neck:NC were 1.616 mSv, 0.821 mSv, 2.434 mSv, 0.932 mSv, 1.696 mSv, 0.825 mSv, 3.546 mSv, 6.249 mSv, 2.193 mSv and 5.285 mSv respectively. These values can be considered as typical values for the given institution. Moreover, overall radiation doses of this present institution is well below the values suggested by similar studies. However, brain CTA needs dose optimization since it is higher than the values suggested by similar literature.



**Genome-wide *in silico* analysis and characterization of simple sequence repeat loci in  
Coconut (*Cocos nucifera* L.)**

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Coconut (*Cocos nucifera* L.) is an important oil crop that can play a major role in the food security of the people in most of the Asian countries including Sri Lanka. The genomic knowledge on coconut is extremely important to increase productivity by incorporating superior traits targeting quality end products. Simple Sequence Repeats (SSR) are DNA-based markers which are informative for basic and applied studies such as molecular breeding. Coconut genetic and genomic resources, especially molecular markers, have been scarce until recently, impeding coconut breeding efforts. Comprehensive analysis of SSR has become possible now because several coconut genomes have been sequenced. In this study the draft genome of *C. nucifera* Hainan Tall (HAT) variety (accession number GCA\_008124465.1) was surveyed to determine the distribution and frequency of SSRs. The polymorphism of the available SSRs of the HAT variety was investigated using an electronic PCR approach and, manual analysis of each PCR product marker in five genomes: *C. nucifera* Chowghat Green Dwarf variety, *C. nucifera* Catigan Green Dwarf variety, *Phoenix dactylifera* and *Elaeis guineensis* and *C. nucifera* L. ESTs. A total of 522,524 SSRs (repeat units 1-6 bp) from the draft genome of variety HAT with an overall density of 258.675 (SSRs/Mbp) was characterized using the GMATA tool. Dinucleotide was the most common repeat motif with a frequency of 58.87%, followed by 28.01% mononucleotides, 7.15% trinucleotide, 4.31% tetranucleotide, 1.50% pentanucleotide and 0.16% hexanucleotide. The motif AG/CT was the most abundant and AT/TA was the second most abundant among all identified SSR motifs by accounting for 42.01% and 32.79% respectively. A total of 245,048 unique SSR markers were developed from the total SSR loci and a high degree of polymorphism (nearly 51 %) was found between different genotypes. Polymorphic SSR sites of *C. nucifera* were mostly comprised of dinucleotide motifs (82.91%), followed by trinucleotide motifs (10.39%), then tetranucleotide motifs (4.15%). The findings of the present study indicate that whole-genome sequencing is an excellent resource for developing SSR markers, and the newly identified large numbers of SSR markers could make an important contribution to the coconut research community

**Keywords:** *C. nucifera* L. , microsatellites, polymorphism



## analysis of raw cattle milk microbiota in Sri Lanka employing Illumina MiSeq platform

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Bacterial contamination of raw milk is a major concern worldwide in public health and economic viewpoint. Raw milk is highly susceptible to changes in temperature and humidity of the environment. The impact of tropical climatic conditions on the bacterial communities in raw milk has not yet been broadly examined. Therefore, this study was conducted to evaluate the bacterial composition of raw cattle milk produced in Sri Lanka, an island country located near the equator with year-round warm weather and considerable moisture. Ninety raw milk samples were collected from 18 dairy farms representing all three climatic zones of the country (wet, dry and intermediate zones) divided based on the rainfall distribution. Bacterial DNA extraction and purification was performed using Milk Bacterial DNA Isolation Kit as per the manufacturer's instructions. PCR amplification was carried out targeting the V3 and V4 regions of the 16S rRNA gene. Metagenomic sequences were obtained using IlluminaMiSeq platform at the Massey Genome Services (New Zealand). The operational taxonomic units (OTUs) clustering and classification at several taxonomic levels were performed using QIIME2 (version 2019.1) and Phyloseq (an R package). The OTUs belonged to 23 bacterial phyla, 110 orders, 381 genera, and 348 known species. Milk microbiota in terms of relative abundance (RA) was reported at the phylum, genus and species levels. The core microbiome was predominated by Firmicutes (48.33%) followed by Proteobacteria (22.66%), Actinobacteria (15.33%), Bacteroidetes (11.22%) and TM7 (0.91%) phyla. At the genus level, *Macrococcus* (10.30%) was the most abundant followed by *Streptococcus* (10.24%), *Elizabethkingia* (6.46%), *Staphylococcus* (3.48%), *Enhydrobacter* (3.14%), *Atopococcus* (3.04%), *Corynebacterium* (2.46%), *Arthrobacter* (2.13%), *Kocuria* (2.08%), *Acinetobacter* (1.66%), *Rothia* (1.32%), *Micrococcus* (1.14%) and *Bifidobacterium* (1.01%). The six most abundant (RA>1%) bacterial species identified were *Streptococcus agalactiae*, *Staphylococcus saprophyticus*, *Enhydrobacter aerosaccus*, *Atopococcus tabaci*, *Kocuria kristinae* and *Rothia nasimurium*. The members of *S. agalactiae* (5.61%), *S. saprophyticus* (3.48%), *E. aerosaccus* (3.14%) and *R. nasimurium* (1.06%) are known etiological agents in both human and animal diseases. The bacterial taxa diversity identified could be utilized to develop hygiene measures targeting the most problematic species.

**Keywords:** Metagenomic, Illumina MiSeq platform, Bacterial communities

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## Occupational Noise Induced Hearing Loss Among the Dental Professionals Working at Dental Institutes in Sri Lanka.

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Noise at the dental setup has an adverse effect on the hearing ability of the dentists. This study aimed to determine the prevalence of hearing loss among dental practitioners and to identify the demographic and service-related factors associated with hearing loss among dental practitioners working at dental institutions in Sri Lanka.

A descriptive cross-sectional study was designed to include 155 dental professionals working at three dental institutions in Sri Lanka; the National Dental Hospital (teaching)- Colombo, Dental Teaching Hospital-Peradeniya, and Institute of Oral Health- Maharagama. Data were collected through an interviewer-administered questionnaire which obtained information on auditory symptoms, demographic and work-related data and a standard hearing assessment; Pure Tone Audiometry where hearing threshold >15dB is considered as having a loss. Descriptive statistics and regression analysis were used to analyse data.

Participants were in 25- 60 age range. Majority consisted of females, working 6 days per week and attached to restorative dentistry. Work experience ranged from 1 – 37 years. Only 39.4% of dentists were reported to get exposed to loud sounds apart from dentistry. According to the hearing test, 70% of the dentists in the present study were found to have a hearing loss at least in one ear, where left ears were affected more. However, irrespective of the ears, having a normal hearing or hearing loss at hearing thresholds of 6kHz was noted to be poorer, while relatively better hearing in lower frequencies which is characteristic of hearing loss due to noise exposure. The proportion of dentists who experienced tinnitus and difficulty in speech recognition was 14%, while 21% reported difficulty in the following speech only when there is background noise. Age, work experience, specialization in general dentistry, and perceived speech recognition difficulty were significantly associated with hearing loss. More than 10 years of work experience and perceived speech recognition difficulty in noise were significant indicators of existence of hearing loss in both ears.

Dentists attached to the three dental institutes are at risk of developing hearing loss. It is recommended to conduct annual hearing check-ups and take necessary measures to reduce exposure to noise in the dental setup.

**Keywords:** *Noise, dentists, hearing loss*

**PCR- based Detection and Characterization of Candidate Disease Resistant Gene Analogous (RGAs) in Commercially Grown Capsicum Varieties in Sri Lanka**

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Identification of R gene homologous from chilli (*Capsicum annuum* L.) will provide important information for improving disease resistance in breeding programs. A Nucleotide-Binding Site (NBS) domain in R gene family accounts for the largest number of disease resistant genes in plants. In this study it was aimed at detecting the presence of putative disease resistant genes in commercially growing chilli varieties; MI Hot, MI 02, MICHHY1, MICH3, KA 02, Arunalu, Hen miris using a specifically designed primer pair in a PCR-based approach. The PCR amplified gene products were sequenced and homologies were explored in BLASTn. A sequence identity matrix was constructed using these nucleotide sequences of the chilli varieties along with 5 similar homologous sequences obtained from in Cluster W programme of Bio-Edit (version 8.0). Phylogenetic analysis was performed in MEGA X. The similarity between the tested nucleotide sequences of 07 chilli varieties showed more than 90% similarity with each other except the accession, MICH3. Sequence analysis indicated that the identified partial Resistance Gene Analogous (RGA) belong to the NBS–LRR type, which they gave more similar matching with the RGAs identified in other plant species reported from previous studies; more than 85% with *C. annuum* (XM 016690560), 70% with *Solanum pennellii*; (XM015201323,) *Solanum lycopersicum* (XM026028184), *Camellia sinensis*; (XM028216350) and *Sesamum indicum*; (XM011072521) available in the GenBank<sup>®</sup>, suggesting the existence of common ancestors. The study reveals that the candidate R gene nucleotide sequences of tested chilli accessions have a close relation to RGAs found in *Solanum peennellii* and *Solanum lycopersium*. However, gradual alteration found in the generated nucleotide sequences may lead to loss of resistance in target gene action for diseases in chilli. Identified partial RGA nucleotide sequences found in this study are supposed to be located on 11<sup>th</sup> chromosome due to the location of similar RGAs. The information generated in this study is useful for making combinations of possible crosses for generating genetic resistance in chilli for biotic stresses and these RGAs could be regarded as candidate sequences of resistant genes for marker development. This is the first investigation report of NBS family RGAs in Sri Lankan *Capsicum* germplasm.

**Key words:** *Capsicum annuum*, Disease resistance, Resistance Gene Analogous

## Salinity levels in costal saline paddy areas of Jaffna and Mannar districts

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Rice is the staple food in Sri Lanka. Paddy cultivation mostly occur in Dry and Intermediate zones of the country including some low laying land areas along the coastal belt. Coastal zone is more vulnerable to salinity intrusion due to sea level rise induced by climate change. Every year farmers lose their arable lands due to soil salinization. This study primarily focused on identifying and mapping salt-affected paddy cultivating areas in Jaffna and Mannar districts, since these two districts in Northern Province are highly vulnerable to contamination with saline water. Salinity- affected paddy areas were identified with the help of the regional officials of the Department of Agriculture. The soil samples were collected during the Yala season, using Zig-zag soil sampling method. Forty-nine salt-affected areas were identified in Jaffna district and thirteen areas were identified in Mannar district. Composite samples were collected in all identified areas. Composite field sampling was done by collecting sub samples at 15 cm depth by traveling in a zig-zag pattern. Each composite sample consisted of 16 subsamples spread evenly across the field.

Collected soil samples were analyzed for Electrical Conductivity (EC) by using unsaturated soil suspension technique (i.e. 1:5 soil-water extract) to study the degree of salinity. Based on the obtained EC values, the sampled areas were classified as non-saline (<0.15 dS/m), slightly saline (0.16-0.30), moderately saline (0.31-0.60), very saline (0.61-1.20), and highly saline (>1.20). The thematic maps were prepared according to the GPS location and classified data by using Arc GIS 10.3.

The measured EC ranged from 1.6 – 4 dS/m in Jaffna district and 1.5 - 1.7 dS/m in Mannar district. The results revealed that all the study areas are affected by high salinity in both districts. There may be more salt-affected areas in these districts which need to be assessed. Highly saline areas were identified along the costal low-lying lands and areas close to lagoons. The findings of the current study will support policy decision making and potential remedial measures (cultivating salt tolerant varieties, seedling transplanting, water management and land preparation techniques) in relation to the salt-affected paddy areas in the country.

**Keywords:** Salinity, Jaffna, Mannar

**Does the quality of life connect with an individual's nature connectedness and per capita greenhouse gas emission? A preliminary study**

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Sri Lanka is a country that struggles to deal with the negative consequences of climate change caused by increased levels of greenhouse gas (GHG) emission. There is a need to reduce the gap between man and nature while improving the quality of life (QoL). The current study aimed at finding possible relationships between nature connectedness, GHG emission, and perceived quality of life at individual level. According to our knowledge, this was the 1<sup>st</sup> attempt taken by a Sri Lankan research group to investigate possible links between GHG emissions, connectedness to nature and quality of life. A preliminary cross-sectional study was carried out with rigorously screened 30 individuals (mean age = 44 ± 2 years). Participants in the present study included a group of meditation practitioners from a largescale study on “meditation, mindfulness and health”. Data were collected to assess perceived quality of life under 5 domains: a) overall perception of QoL, b) physical QoL, c) psychological QoL, d) social relationships associated with QoL and e) environmental QoL; the latter was assessed through a person's attitude towards the environment or connectedness to nature and GHG emissions under electricity consumption and travelling. Bivariate correlational analyses revealed a significant negative relationship between GHG emission due to travelling and psychological QoL ( $r = 0.51$ ,  $p < 0.05$ ). Except GHG emission due to electricity consumption, other environmental variables were linearly correlated with overall QoL. Even though the findings of the current study have limitations in terms of generalizability due to a non-probability sampling, the methodology of the current research opens doors to investigate QoL in environmental research. Our study findings indicate that ensuring the perceived QoL at the individual level may lead to a reduction in GHG emissions while promoting nature connectedness. Hence, this research highlights the importance of considering the perceived quality of life as a determinant of connectedness to nature and GHG emission at the individual level.

**Keywords:** quality of life, QoL, CNS, GHG

## Electrochemical study of graphene oxide films supported on glassy carbon electrode

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In recent times, Graphene Oxide (GO) based materials have attracted considerable attention in the development of electrodes for a wide range of electrochemical applications. However, insulating nature of GO has limited the use of this material 'as it is' for above mentioned applications. Further, the randomness of oxygen functionalities and their inhomogeneous spatial distribution have a significant impact on the electronic properties of GO. Thus, the investigation of electrochemistry behind this intriguing material is required to realize its application potential. In this study, thin films of GO which were synthesized under different oxidation conditions using Improved Hummers method were casted on glassy carbon (GC) disk electrodes via drop casting. These GO coated electrodes were then electrochemically characterized in the presence of two redox probes potassium ferricyanide and ruthenium(III) hexammine chloride using cyclic voltammetry (CV) to study the effect of oxygen functionalities on electron transfer properties of GOs. The CV results of these GO electrodes for potassium ferricyanide at different scan rates indicate that the electron transfer process is reversible. Further the electrochemically active surface area of GO electrodes measured was much less compared to that of bare GC. This indicates that insulating area of the GO electrodes is higher than the electrochemically active surface area owing to the surface bound oxygen functionalities of GO. Thus, these GO electrodes shows high resistance to electron transfer compared to the bare GC electrode. However, same GO electrodes in ruthenium(III) hexammine chloride showed distinct electrochemical response characteristics to electrocatalytic process due to the presence of oxygen functionalities. In this case, electron transfer process is followed by a catalytic chemical process where electrogenerated reduced ruthenium(III) hexammine chemically react with oxygen functionalities of GO and regenerates the starting material ruthenium(III) hexammine. Further, significant variation can be observed in the rate constants of the chemical reaction for these GO electrodes. Therefore, these GOs can be used as electrode materials for electrochemical applications where oxygenated electrocatalytic reactions are employed.

**Keywords:** graphene oxide, electrochemistry, cyclic voltammetry



**Study of temporal variation of radiofrequency electromagnetic radiation levels in two bedrooms in urban and rural locations in Sri Lanka - a case study****S. A. T. U. W. K. Suraweera\* and K. P. S. C. Jayaratne**

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Nowadays, most people panic with sleeping disorders, and different causes are emerging day-to-day. Some scientists believe that living inside environments with high Radiofrequency (RF) intensities and keeping mobile phones in the bed may lead to sleeping disorders and may change the behavior of the nerve system. In this study, Radiofrequency radiation is measured within the frequency range 300 MHz – 3000 MHz in two bedrooms inside the houses located in Colombo (Urban Location) and Kegalle (Rural Location) districts, respectively. The reason for selecting the above frequency range is most of the television broadcasting, cellular communication, Wi-Fi, and other data communication networks use this frequency range. At the selected locations, RF plane wave power densities and the electric field intensities were recorded using the Spectran HF6065 spectrum analyzer on an hourly basis for a duration of 12 hours. Measured values were compared with the international reference levels published by ICNIRP (International Commission on Non-Ionizing Radiation Protection) and FCC (Federal Communications Commission). Maximum plane wave power density and electric field strength measured in the urban location are  $38.08 \pm 0.01 \mu\text{W m}^{-2}$  (0.0005% of the maximum permissible level) and  $119.80 \pm 0.01 \text{ mV m}^{-1}$  (0.23% of the maximum permissible level), respectively. The maximum RF radiation levels were observed at 4 a.m. at the urban location and at 6 a.m. at the rural location. According to the results, recorded RF radiation values are shifted towards 2 GHz frequency region in the urban location, and at the rural location, those are gathered around 1.1 GHz region. It is found that the urban location is nearly 10 times polluted by RF radiation than the rural location, and still, these values are well below the maximum permissible levels. Further studies are underway to observe high RF polluted locations and their effects.

**Keywords:** Radiofrequency, Electromagnetic pollution, sleeping disorders, nerve system.

## Investigation of the Accuracy of Monthly Water Surface Extraction from Landsat 8 using Synthetic Aperture Radar (SAR) Sentinel-1 Data

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Accurate assessment and dynamic monitoring of surface water bodies using long-term satellite data are critical for water resource planning, drought monitoring, flood control, and disaster mitigation applications. Despite the Synthetic Aperture Radar (SAR) Sentinel-1 systems with high accuracy, wide-coverage, and the ability to obtain all-weather conditions, Landsat optical satellite data have been used to obtain long-term water surface area since SAR data is available only from 2014 onwards. However, high-efficiency and high-precision water surface extraction and the use of Landsat data for dynamic water surface monitoring are more challenging than SAR data due to the presence of clouds and their shadows. Therefore, the main focus of this study is to analyze the accuracy of monthly water surface area extracted from Landsat-8 using SAR Sentinel-1 base data for water surface area as it provides the most accurate water surface area. The data extracted for five reservoirs in Sri Lanka namely Iranamadu, Mahavilachchiya, Kantale, Senanayaka Samudraya, and Udawalawe were used to investigate the accuracy of Landsat 8 derived water surface area using SAR Sentinel-1 Data. Furthermore, the study referred to data only from 2015 to 2020, taking into account that the presence of both Landsat 8 and Sentinel-1 data. The study utilized the cloud computing platform and algorithms available in Google Earth Engine (GEE) to make the analysis more efficient and robust as it used a large volume of satellite data to analyze. The Pearson correlation coefficient ( $r^2$ ) was calculated using the water surface areas extracted from both Landsat 8 and Sentinel-1 in the reservoirs used for the analysis. The  $r^2$  values for five reservoirs were 0.83 (Iranamadu), 0.91 (Mahavilachchiya), 0.91 (Mahavilachchiya), 0.92 (Senanayake Samudra) and 0.91 (Udawalawe). These results show that the water surface areas extracted from Landsat 8 show high accuracy. Henceforth, it can be confirmed that the Landsat series data (1, 2, 5, 7, 8) which used the same sensing mechanism can be used more efficiently to calculate long-term water surface areas as it is available from 1972. The other important point reflected in this study is that GEE can be used more efficiently for long-term water surface extraction.

**Keywords:** Landsat, Sentinel-1, Google Earth Engine (GEE)



## Estimation of effective radiation dose in 16 slice Computed Tomography neck examination

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Computed Tomography (CT) is the most essential imaging technique and widely used in various diagnostic radiological and interventional procedures in Sri Lanka. Because of the increased demand for CT imaging procedures, evaluating patient dose is very important to achieve the maximum benefits over the unnecessary radiation exposure. The main purpose of this work was to estimate the effective dose (ED) for neck CT examination protocols (C-Spine and Neck) performed with a 16 slices CT machine at Base Hospital–Karawanella. 172 patients' data including Volumetric CT Dose Index (CTDIvol), Dose Length Product (DLP), scan parameters and patient demographic data of each examination were collected for a period of one year. These results were compared descriptively and compared with available data. Correlation between adult neck scanning volume (ANSV) and neck scanning length (ANSL) with DLP for each protocols was calculated by using Pearson's correlation analysis. The achievable doses (AD) and Diagnostic Reference Level (DRL) values of calculated ED were 6.2 mSv and 6.8 mSv respectively for single-phase C-Spine protocol and 12.6 mSv and 13.8 mSv respectively for the dual-phase scan. For the neck protocol, AD and DRL values of calculated ED values were 5.7 mSv & 7.8 mSv and 11.6 mSv & 15.8 mSv for dual-phase and single-phase respectively. The p-values of all comparisons were less than 0.05. A strong positive correlations between ANSV and ANSL with DLP were obtained. The results obtained in this study were considerably higher than the data obtained from literature. This study will lead to meaningful standardizing optimization of neck CT examination protocols and will provide a starting point for further institutional analysis of CT radiation doses.

**Keywords:** Computed Tomography, Effective Dose, DRL

## ARIMA and ARIMAX Modelling of Dengue Cases in Jakarta

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Dengue disease has grown drastically around the world. Prediction of dengue cases particularly important to address the epidemic nature of the disease and to implement control strategies. The aim of this study is to model and predict the dengue cases. The present study investigates the appropriateness of ARIMA and ARIMAX methods in modelling and predicting the dengue cases. The monthly reported dengue cases in Jakarta, Indonesia from January 2010 to December 2015 were considered to illustrate the applications of the methods. Average monthly rainfall and average monthly humidity data were selected as independent variables that influence the dengue distribution in Jakarta. Results revealed that the most appropriate ARIMAX model as seasonal ARIMAX (1,1,1) (1,0,0)<sub>12</sub> and the most appropriate ARIMA model as seasonal ARIMA (1,0,0) (1,0,0)<sub>12</sub>. But seasonal ARIMAX model shown lower mean absolute percentage error than seasonal ARIMA model. Therefore, the seasonal ARIMAX model was able to capture some of the influences of climatic variables on dengue cases than seasonal ARIMA model. All of the significant external factors that can be associated with dengue distribution should be identified through a comprehensive study and those factors should be included in the ARIMAX model development in order to make more precise predictions.

**Keywords:** ARIMA, ARIMAX, Dengue

## Fast and Practical Algorithms for Solving Non-square Linear Systems

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In this paper we present a deterministic algorithm for solving a non-square linear system over rationals and number fields. When the solution is not unique, we compute a basis for the kernel to normalize the solution. In this computation we use a modified version of Dixon's algorithm. We rigorously assess its complexity as  $O\sim(m^3d^2 + m^2nd + m^2d^5)$  operations over  $\mathbb{Z}$ , where as the Gaussian method takes  $O\sim(m^3n^2d^2)$  operations to solve a linear  $m \times n$  system  $Ax = b$  over number field  $K$  of degree  $d$ .

**Keywords:** non-square linear system, kernel, Dixon's algorithm

**Faculty of Technology**  
**University of Colombo**



***The Role of Technology in Interdisciplinary Research***

17<sup>th</sup> November 2021

## MESSAGE FROM THE DEAN

### **Professor JKDS Jayanetti**

Senior Professor

Dean,

Faculty of Technology

University of Colombo

Sri Lanka



It is with great pleasure that I write this message on the occasion of the inauguration of the Annual Research Symposium - 2021 of the University of Colombo. From the inception, the Faculty of Technology has actively participated in this highly significant academic event that helped promote the research culture of the university to greater heights. This year also the Faculty held its symposium under the theme The Role of Technology in Interdisciplinary Research on November 17th 2021, via an online platform. The program consisted of technical sessions, an address by a nationally known keynote speaker and plenary lectures delivered by some eminent researchers. Despite the constraints that were caused by the pandemic, researchers of the Faculty were able to present a number of new research findings at the symposium. The online mode also provided an opportunity for undergraduate students across all disciplines the accessibility to this event. I wish to express my sincere appreciation to organizers, reviewers, presenters and participants of the Faculty symposium and congratulate all the contributors to the Annual Research Symposium - 2021 of the University of Colombo.

Thank you.

17<sup>th</sup> November 2021

## MESSAGE FROM THE SYMPOSIUM CHAIR

### **Ms. Sherina Sally**

Lecturer (Probationary)

Department of Information and Communication Technology,  
University of Colombo, Sri Lanka



It is with great pleasure that I send this message at the Annual Research Symposium - 2021 of the Faculty of Technology, University of Colombo. Despite the novelty of the faculty, it has successfully held the research symposium annually consecutively for the past four years which has contributed to cultivate a research environment within the academia. The faculty consists of departments with a culture of multiple disciplines and the theme of this year 'The role of technology in interdisciplinary research' coincides well with this nature. The theme emphasizes the contribution of technology in interdisciplinary research areas, which therefore enhances productive research findings.

In particular, I would like to thank the Dean of the Faculty of Technology and the Acting Head of the Department of Information and Communication Technology for giving me this valuable opportunity to chair the research symposium this year, which has a significant importance as the University of Colombo celebrates a centenary in higher education. My sincere gratitude goes to the Vice Chancellor of the University of Colombo, Senior Professor Chandrika N. Wijeyaratne for accepting our invitation as the Chief Guest. Furthermore, I would like to extend my gratitude to the Keynote speaker and all the Plenary speakers for their continuous support and insightful knowledge shared with us. I also make this an opportunity to express my special thanks to the organizing committee, session chairs, reviewers, academic, academic support and administrative staff for their untiring contribution to make this event a success. Finally, I congratulate all the presenters of the research symposium of 2021 for their contribution by sharing their research findings.

Thank you.

17<sup>th</sup> November 2021

## **ORGANIZING COMMITTEE**

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Ms. Sherina Sally (Lecturer)

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**Annual Research Symposium 2021**  
**Faculty of Technology**  
**University of Colombo**

**17<sup>th</sup> November 2021 from 8.30 a.m. to 4.00 p.m.**

**Programme**

- 08.30 a.m. Admission of the Guests and Participants to the Virtual Symposium**
- 08.45 a.m. National Anthem and Lighting of the Oil Lamp**
- 08.50 a.m. Welcome Address by the Chair ARS- 2021**  
 Senior Professor J.K.D.S. Jayanetti  
 Dean, Faculty of Technology, University of Colombo
- 9.00 a.m. Address by the Chief Guest**  
 Senior Professor Chandrika N. Wijeyaratne  
 Vice Chancellor, University of Colombo
- 9.10 a.m. Keynote Address**  
 Professor Pradeep Abeygunawardhana  
 Director - Technology Diffusion ICTA,
- 09.55 a.m. Vote of Thanks**  
 Ms. M.S. Sally  
 Coordinator – Faculty of Technology, Annual Research Symposium
- 10.00 a.m. Short Break**
- 10.10 a.m. Plenary Session**  
 Dr. D. A. S. Atukorale  
 Deputy Director, University of Colombo School of Computing (UCSC)
- 10.40 a.m. Dr. M. K. Jayananda**  
 Department of Physics, University of Colombo
- 11.10 a.m. Professor C. M. Nanayakkara**  
 Head/ Department of Plant Sciences, Faculty of Science, University of Colombo
- 11.40 a.m. Senior Professor D. K. Weerakoon**  
 Department of Zoology and Environment Sciences, Faculty of Science,  
 University of Colombo
- 12.10 p.m. Short Break**
- 12.20 p.m. Technical Sessions**
- 03.00 p.m. Concluding Remarks**



## INTRODUCTION TO THE KEYNOTE SPEAKER

### **Professor Pradeep Abeygunawardhana**

Director - Technology Diffusion Digital Economy  
Information Communication Technology Agency (ICTA)  
Professor Computer System Engineering,  
Faculty of Computing, SLIIT.



Prof. Pradeep Abeygunawardhana is currently working as the Director Technology Diffusion ICTA. Prior to join to the ICTA, he served as a Professor in Department of Computer Systems Engineering, Faculty of Computing, Sri Lanka Institute of Information Technology (SLIIT). He obtained his Ph.D. in March 2010 from robotic Engineering from Keio University, Japan and his Master in September 2006 from the same university. He is a graduate of University of Moratuwa from Electrical Engineering.

During his PhD studies, he work as a researcher under Global Center of Excellence (GCOE) at Keio University and the 21st Century Center of Excellence program. During 2012- 2016, he worked as a Post-Doctoral researcher at Kagawa University under the theme of life science product development for Kagawa Prefecture.

## KEYNOTE ADDRESS

### **Prof. Pradeep Abeygunawardhana**

Everything in the world is very much inter-connected yet for the ease of understanding and studies, people have separated things around them into different disciplines. However, working with real world applications and scenarios, it is vital to collaborate between different disciplines. Inter-disciplinary or cross disciplinary research plays a key role in the research world. Interdisciplinary research is a mode of research by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more disciplines or bodies of specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline or area of research practice. In other words, Interdisciplinary research is a type of study that draws from two or more disciplines in order to gain a well-developed perspective or discover something new. Benefits of interdisciplinary researches are ability to discover the value of integrating the study of various academic disciplines suited to their life-long interests, be able to create solutions to some of today's most challenging problems, developing interdisciplinary thinkers who analytically and creatively embraces new ideas, developing collaboration skills while working with others who have different perspectives, and developing more innovations and innovative products to the world. Three key factors can be found in interdisciplinary research and those are Knowledge, Connectivity and Complexity. Those can be positively influenced on the success of an interdisciplinary research. Interdisciplinary research allows synthesis of ideas and synthesis of characteristics from many disciplines, having a good knowledge about other related or interested disciplines is very important. Knowledge of a person on a particular domain can align with Bloom's taxonomy stages of remembering, understanding, applying, analyzing, evaluating and creating. Everyone in an interdisciplinary research team should process the first two stages of remembering and understanding on another domain. Ability of move to the other levels in another discipline is always an advantage but not mandatory. Connectivity in interdisciplinary research is the linking with the correct area of other disciplines with the help of other domain experts. This is related to applying and analyzing stages of Bloom's Taxonomy. As an example, if a material engineer wants to develop a new material by combining three types of materials that have many varieties, a material engineer should have basic knowledge and understanding on possible use of Artificial Intelligence.

**Assessment of energy consumption and reduction techniques in black-tea manufacturing process of low-country Sri Lanka**

M. D. N. D. Perera<sup>1,2</sup>, G. Y. Jayasinghe<sup>3</sup>, S. B. Navaratne<sup>2</sup>, C. M. Navaratne<sup>3</sup>, G. D. C. P. Galpaya<sup>1</sup>, G. A. U. Jayasekera<sup>1</sup>

<sup>1</sup>Department of Agricultural Technology, Faculty of Technology, University of Colombo.

<sup>2</sup>Department of Food Science and Technology, University of Sri Jayewardenepura.

<sup>3</sup>Department of Agricultural Engineering, Faculty of Agriculture, University of Ruhuna.

Tea (*Camellia sinensis*) is an important export agricultural-cash crop in Sri Lanka and cost of production (COP) for black-tea in Sri Lanka is the highest in the world, US\$ 1.75/kg black-tea. Out of total COP, more than 30% has consumed at the processing stage. This study was conducted to (a) assess Energy Consumption (EC) in tea factories, (b) analyze Specific Energy Consumption (SEC), (c) evaluate Energy Use (EU) at different steps of black-tea production and (d) identify strategies for Energy Saving (ES) in tea factories. Three low-country tea factories were selected which are producing more than 3 million kg of black-tea per annum and functioning throughout the year. The factories were investigated for EC, EU, SEC and total black-tea production. More than 50% of the EU was recorded by all three factories during the day time. Average apparent power demand for the selected Factories I, II and III (FI, FII and FIII) were 230kVA, 680kVA and 255kVA respectively. EC at peak, day and off peak for FI were 17%, 52% and 31%, FII 18%, 52% and 30% FIII 18%, 55% and 27% respectively. According to energy meter readings, the highest EC was observed for withering, 37-38% against all other processing activities. Calculated SEC for FI, FII and FIII were 0.98, 0.93 and 0.74 kWh/kg black tea respectively. FIII successfully achieved the energy benchmark for low-country black-tea production (0.82 kWh/kg black tea) by adopting the precision ES techniques such as Variable Speed Drives and High Efficiency Motor. Further studies on precision energy management for black-tea manufacturing are an obligatory requirement for long-term ES and to implement relevant management strategies in the tea industry of Sri Lanka.

**Keywords:** *Black-tea processing, energy benchmark, precision, specific energy consumption*

## Analyzing polymorphism of Bg 357×H 10 cross through bulked segregant process with selected DNA markers of rice blast resistant genes

W. A. D. Jayawardana<sup>1</sup>, G. A. U. Jayasekera<sup>2</sup>, K. L. N. S. Perera<sup>3</sup>, S. Mohotti<sup>3</sup>

<sup>1</sup>Department of Plant Sciences, Faculty of Science, University of Colombo.

<sup>2</sup>Department of Agricultural Technology, Faculty of Technology, University of Colombo.

<sup>3</sup>Genetech Molecular Diagnostic Laboratory.

Rice blast is the most important rice disease caused by the fungal pathogen *Magnaporthe grisea*. Blast is normally controlled by fungicides which cause high production cost and environmental pollution. Conventionally, blast resistance is identified through phenotypic screening. However, it is cumbersome, expensive and influenced by environmental conditions. Identification of blast resistant genes with DNA markers tightly linked to them can save both time and money. The current research analyzed Bg 357 X H 10 cross through bulked segregant analysis (BSA) to identify polymorphic DNA markers linked to blast resistant genes. Blast resistant variety (Bg 357) and blast susceptible variety (H10) were selected based on phenotypic screening and used to develop F1 and F2 populations. BSA was carried out for Bg 357×H 10 cross using selected SSR markers and one gene-specific marker. At the end of the BSA process for this cross, two polymorphic DNA markers namely RM7102 (SSR marker) and YL155/87 (gene-specific marker) were identified. These two markers clearly differentiated the parental, F1 and F2 populations of this cross by showing DNA polymorphism. Moreover, YL155/87 gene-specific DNA marker reported to be located in Pita blast resistant gene and RM7102 DNA marker linked to Pi20(t) blast resistant gene. Therefore, the two polymorphic DNA markers that identified in this research can be used for direct selection of blast resistant genes; Pita and Pi20(t) when they are transferring from Bg 357 rice variety to another during breeding programs in future.

**Keywords:** *Rice blast, bulked segregant analysis, DNA markers, phenotypic screening, polymorphism*

## **Fatty acid profiles of selected non-pigmented new improved rice varieties (*Oryza sativa* L.) of Sri Lanka**

M. D. W. Samaranayake<sup>1</sup>, W. K. S. M. Abeyssekera<sup>2</sup>, K. R. R. Mahanama<sup>3</sup>, I. G. N. Hewajulige<sup>1</sup>, H. P. P. S. Somasiri<sup>1</sup>, D. M. J. B. Senanayake<sup>4</sup>

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<sup>2</sup>Department of Agricultural Technology, Faculty of Technology, University of Colombo.

<sup>3</sup>Department of Chemistry, Faculty of Science, University of Colombo, Sri Lanka.

<sup>4</sup>Rice Research and Development Institute, Batalagoda, Sri Lanka.

Rice is one of the principal cereal crops in the world including Sri Lanka. It is reported to have more of monounsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA) than saturated fatty acids (SFA) in research studies conducted world over. The MUFA and PUFA play an important role in the management of cardiovascular diseases and related complications. However, fatty acid (FA) profiles of Sri Lankan rice varieties (RVs) are less investigated to date. In Sri Lanka, the widely cultivating and consuming RVs are the non-pigmented new improved rice varieties (NIRVs). This study evaluated FA profiles of selected non-pigmented widely cultivating NIRVs (Bg 450, Bg 366, Bg 379-2 and Bg 94-1) of Sri Lanka. Grain lengths were measured, and grain sizes were calculated according to the internationally accepted standard methods. Fat was extracted from whole grain rice flour by automated Soxhlet fat extraction method and FA profiles were analysed by Gas Chromatography Flame Ionization Detection method. Results showed that selected RVs were long (Bg 94-1), medium (Bg 379-2 and Bg 366) and short (Bg 450) grain RVs. The MUFA, PUFA, and SFA contents of studied RVs were varied from 9.95 - 13.60, 8.32 - 11.26 and 4.63 - 7.04 mg/g of rice respectively. MUFA in tested RVs were palmitoleic, oleic and eicosanoic acids whereas oleic acid was the most predominant. Short grain RV, Bg 450 had the highest (13.12 mg/g) content of oleic acid while long grain RV, Bg 94-1 had the lowest (9.57 mg/g). Among the studied RVs, PUFA present were linoleic, gamma linoleic, homogamma linoleic and docosadienoic acids while essential FA, linoleic was the abundant. Linoleic acid was most abundant (10.95 mg/g) in Bg 450 while least abundant (8.05 mg/g) in Bg 94-1. SFA in tested RVs were myristic, palmitic, stearic and arachidic acids. Most abundant SFA, palmitic was highest in Bg 450 (6.24 mg/g) and lowest in Bg 94-1 (4.13 mg/g). It is concluded that FA profiles varied among the selected NIRVs of Sri Lanka and Bg 450 showed the best FA profile among the studied RVs.

**Keywords:** *Fatty acid profiles, non-pigmented rice, new improved rice, grain size*

**Acknowledgment:** *Financial assistance by Treasury, Sri Lanka (Grant No.TG 18/146)*

## Isolation and identification of native antagonistic yeasts as biocontrol agents of postharvest fungal pathogens

E. A. M. Jayasinghe<sup>1</sup>, U. M. A. Kumara<sup>2</sup>, K. M. D. N. Rodrigo<sup>2</sup>, N. Thiruchchelvan<sup>3</sup>

<sup>1</sup>Department of Postharvest Technology, University College of Anuradhapura, University of Vocational Technology, Sri Lanka.

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<sup>3</sup>Department of Agricultural Biology, Faculty of Agriculture, University of Jaffna, Sri Lanka.

Economic losses due to the postharvest diseases are a major problem in perishable agricultural commodities such as fruits and vegetables. Among them, postharvest fungal diseases on fruits and vegetables caused major crop losses ranging from 25% in industrialized, up to 50% in developing countries. Control efforts routinely include application of synthetic fungicides such as imazalil or thiabendazole. Often, emergence of resistant strains and environmental pollution due to toxic effects restricted their usage. Thus, isolation and identification of native antagonistic yeasts from natural sources against postharvest fungal pathogens in perishable and determination of their in vitro efficacy were the prime objectives of this research study. YEPD yeast selective medium supplemented with 100 mg/L ampicillin and 50 mg/L chloramphenicol were used to isolate 22 yeast isolates. The dual culture assay supplemented with 2% NaCl solution was performed to identify the antagonistic activity of isolated yeasts. Out of that, 23% isolates shown the antagonistic phenotypes. Molecular identification based on the D1/D2 domain sequences of the 26S rDNA revealed that the antagonistic yeast strains belong to *Pichia kudriavzevii*, *Trichosporon asahii*, and *Trichosporon infestans*. Identified yeasts showed potential antagonistic activity against the postharvest fungal pathogens namely *Aspergillus niger* and *Collecteticum gleosporioids*. Thus, the native yeasts studied in this experimentation showed the effective biocontrol ability against postharvest fungal pathogens in fruits and vegetables. Further investigations are merited to assess antagonistic efficacy under in vivo conditions and formulating technology to identify most appropriate substrate, concentration and combinations for industrial applications.

**Keywords:** *Antagonism, fungal pathogens, killer yeast, perishables, postharvest*

## **Isolation and characterization of thermo-stable $\alpha$ -amylase enzyme producing bacteria from Maha Oya hot spring, Sri Lanka**

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<sup>3</sup>Department of Environmental Technology, Faculty of Technology, University of Colombo,

Excess use of chemical catalysts in industries causes various negative impacts on the environment. Bacteria that can withstand harsh environmental conditions can provide sustainable solutions to such environmental problems since their enzymes are stable under harsh industrial conditions. Among many enzyme classes amylase plays a major role in nutritional, cosmetic and pharmaceutical industries and contributes to 25% - 30% of the world enzyme market. Therefore, this study aimed on isolation and identification of thermo-stable amylase producing bacteria from Maha Oya hot spring and evaluation of the optimum temperatures and pH for enzyme activity. Temperature, Electrical Conductivity (EC), pH, and Dissolved Oxygen (DO) were measured at the site. The standard pour plate method was performed to isolate bacteria. Isolates were screened for  $\alpha$ -amylase production by spot test on starch agar plates. Optimum temperatures and pH for crude enzyme extracts were measured using the Di-nitro salicylic acid (DNS) method. Molecular-level identification of bacterial isolates was performed using the 16S rRNA gene sequencing method. Temperature, EC, pH, DO levels of the hot spring ranged between 51.7 – 52.40C, 1487 - 1507  $\mu$ S/cm, 8.05 – 8.07, and 2.01 – 2.05 mg/L respectively. Four morphologically different, Gram-negative,  $\alpha$ -amylase producing bacterial isolates were identified (Mh11, Mh12, Mh22, and Mh27). Bacterial isolate: Mh11 showed the highest optimum temperature of 45 0C and optimum pH 4 for  $\alpha$ -amylase activity and was identified as *Bacillus cereus* strain VBE0. Bacterial isolate Mh27 which was identified as *Bacillus thuringiensis* strain ISJ33 showed the highest enzyme activity among all isolates, but at room temperature and pH 4. Hence, the Maha Oya hot spring bacterial isolate: Mh11 could be successfully used under industrial settings operate at temperatures around 45 0C. Thus, further optimization studies are underway to enhance the production of enzymes, so that the bacteria can be effectively used for industrial perspectives.

**Keywords:** *Hot springs, Enzymes,  $\alpha$ -amylase, Biotechnology, Thermophiles*



## Studying the effect of spatiotemporal land use/ land cover (LULC) dynamics on inundation occurrence in Bolgoda River Basin, Sri Lanka

B. L. N. Nadeeshani<sup>1</sup>, V. P. N. A. Premasiri<sup>2</sup>, T. A. N. T. Perera<sup>2</sup>, R. P. W. N. Karunasiri<sup>2</sup>,  
D. P. Lakmini<sup>2</sup>, H. M. M. S. D. Herath<sup>2</sup>, R. U. K. Piyadasa<sup>2</sup>, C. M. Navarathne<sup>1</sup>

<sup>1</sup>Department of Agricultural Engineering, University of Ruhuna, Sri Lanka.

<sup>2</sup>Department of Environmental Technology, University of Colombo, Sri Lanka.

Floods are known to be one of the most frequent natural disasters in Sri Lanka since years. The loss of natural land cover for human-modified land uses influences the occurrence, frequency and severity of floods. The Bolgoda River Basin which is located in Western Province of Sri Lanka has been identified as a highly vulnerable area for flash floods. Therefore, the present study attempts (a) to quantify the land use/ land cover changes in 30 years in Bolgoda River Basin and (b) to identify the relationship between LULC changes and flood occurrence and hazardous level. The Classified Normalized-Difference-Vegetation-Index (NDVI) images were generated using ArcGIS (version 10.4) to examine and quantify the LULC changes in Bolgoda River Basin during study period; from 1989 to 2019. Several field surveys were conducted in predetermined flood prone District Secretariats in Bolgoda River Basin (n=9 in total) to investigate inundation fluctuations including four parameters (frequency, duration, area, and depth). The data was collected by using comprehensive questionnaires and conducting pocket meetings and workshops. The built-up areas were increased from 1759 ha (4% from total area) to 7429 ha (18% from total area) whereas the total vegetation cover (forests, agricultural lands, and grasslands), barren lands and water bodies were decreased in 12%, 63% and 17% respectively during the period of 1989-2019. Consequently, inundation frequency, duration and area have increased gradually indicating strong positive correlation ( $r=0.981$ ) with built-up areas. In contrast inundation depth (<2 feet) has no gradual increase during the study period. Water stagnation level was high (2-3 feet) around Bolgoda South Lake area and inundation was highly forced by accumulation of storm water than stream overflows. The findings highlight the critical necessity of sustainable land use planning and management to mitigate the flood risk in an uncertain future.

**Keywords:** *Inundation, Land use, Land cover, Normalized-Difference-Vegetation-Index, Flood risk*



**Assessing the human perception on urban home gardening as a sustainable approach**

D. P. Lakmini, T. A. N. T. Perera, R. P. W. N. Karunasiri, V. P. N. A. Premasiri, H. M. M. S.  
D. Herath, R. U. K. Piyadasa

Department of Environmental Technology, Faculty of Technology, University of Colombo,

Urban home gardening combined with novel agricultural techniques is an emerging new trend that can help for urban sustainability. Sustainable home gardening may advance food security while strengthening the urban agro- ecosystem. Meanwhile it improves land utilization, household socio-economic factors and human wellbeing. Moreover, to ensure food security, home gardening should be promoted to develop a sustainable urban green space which leads towards zero-pollution. Present study was carried out to identify the existing urban agricultural practices, benefits and challenges for the urban sector in Sri Lanka. As an initial study, 402 individuals who engage in home gardening were selected through random sampling from the nine Agrarian Development Centres affiliated to the Colombo district, Sri Lanka. The survey was conducted using mobile ODK Collect App (v2021.2.4) to determine what extend they engage in sustainable agriculture and their perception on urban farming. The results indicated that 90.30% engaged in conventional farming with usage of heavy irrigation and chemical fertilizers. The pipe water was the main irrigation method used by 77.36% home gardeners in urban home gardening. Organic fertilizer usage in Colombo district were 20.15% while integrated fertilizer (chemical + organic) were used by 74.38% for home gardens. According to the perspective of urban home gardeners, main challenges for home gardening were high cost of inputs and less knowledge of home gardening. Majority of respondents (89.55%) demand on organic food production in future with considering economic and environmental benefits. Hence, it is a positive remark to introduce sustainable agricultural technologies to urban households. Therefore, it can be concluded that, as a strategy to overcome this urban food insecurity, urban domestic food production should be strengthened through enhancing sustainable home gardening using novel technology.

**Keywords:** *Home gardening, Food-security, Sustainable farming, Urban farming*

## **A Remote Sensing approach for assessing agricultural land-use land change (LULC) using Normalized Difference Vegetation Index (NDVI) in Western coastal region, Sri Lanka**

J.A.C.J. Thilakarathna<sup>1</sup>, R.P.W.N. Karunasiri<sup>2</sup>, D.P. Lakmini<sup>2</sup>, T.A.N.T. Perera<sup>2</sup>, V.P.N.A Premasiri<sup>2</sup>, H.M.M.S.D.Herath<sup>2</sup>, R.U.K. Piyadasa<sup>2</sup>, G.Y. Jayasinghe<sup>1</sup>

<sup>1</sup>Department of Agricultural Engineering, University of Ruhuna, Sri Lanka.

<sup>2</sup>Department of Environmental Technology, University of Colombo, Sri Lanka.

Evaluation of land suitability for agricultural development is a necessity of agro-ecosystem sustainability. Therefore, this study was conducted (a) to assess the agricultural LULC based on NDVI image analysis, and (b) to evaluate spatial variations of soil physico-chemical parameters in Western coastal region (Waikkala), Sri Lanka. The study identified spatio-temporal changes of the study area using ArcGIS 10.3. By performing NDVI image analysis, vegetation cover of type 1 (shrubs) and type 2 (forest cover) in Waikkala were estimated in the years 2010, 2015 and 2020. Soil samples were analyzed from different depths (top, 20 cm, 40 cm, 60 cm, 80 cm and 100 cm) in 7 locations for physico-chemical parameters (Electrical Conductivity [EC], pH, moisture content, Organic Matter [OM], and soil texture). The NDVI values reveal the change of buildings, water, open area, shrubs and forest cover resulting in increase and decrease of categories. Forest cover in the study region decreased by 35% over 10 years while the shrubs area increased from 49% to 78% result in agricultural land escalation. Physico-chemical parameters of surface soil indicated that soil pH were (6.56 to 7.48) within the acceptable range. EC, moisture and OM had values slightly below the acceptable range as (77.51 to 459.1)  $\mu\text{S}/\text{cm}$ , (2.69 to 9.83) % and (0.177 to 5.744) % respectively. Major soil textural group in the study area was sandy loam which has a low water holding capacity and therefore incorporating organic matter into the soil could improve the soil structure. LULC changes indicates the necessity to create new policies in the area for the protection of forest cover and regulate cultivations during agricultural and economic development. Overall, the western coastal region was suitable for agriculture and NDVI can be used as an accurate method for assessing LULC changes.

**Keywords:** GIS, NDVI image, soil physico-chemical parameters, spatio-temporal variations

## **An assessment of irrigation and water management services in the dry zone of Sri Lanka**

Zihan Zarouk<sup>1</sup>, Ranjana U. K. Piyadasa<sup>2</sup>, H. M. M. S. D. Herath<sup>2</sup>, Vajira Hettige<sup>1</sup>

<sup>1</sup>United Nations Development Programme, Sri Lanka

<sup>2</sup>Department of Environmental Technologies, University of Colombo, Sri Lanka,

The primary focus of this assessment is to determine the current state of knowledge related to main irrigation and water management services felt by the related government stakeholders in the dry zone of Sri Lanka. Data were collected through focus group discussions using a pre-tested, well-structured interview questions in 2019. The respondents were asked to self-rank their perception of each interview question, and choice options were coded using a 5-point Likert scale. A modified five-category consequence scale ranging from “very low” to “very significant” was used to categorize the responses. Data were collected on current knowledge on; 1) Cascade water resource development and management planning, 2) On-farm and off-farm water management, 3) Construction supervision, 4) Operations and Maintenance, 5) Financing for maintenance and 6) Disaster preparedness and response planning related to irrigation and water management. In addition, twenty-seven key informant interviews were conducted with selected members of farm organisations. The qualitative and quantitative data were coded and analyzed using Microsoft Excel and the Statistical Package for Social Scientists (SPSS). Descriptive statistics were used to analyze data obtained from a survey of purposefully selected 134 officers from fifteen government institutions and departments through the official invitation from Anuradhapura, Kurunagala, Puttalam, Vavuniya and Trincomalee districts. The study concluded that government officers’ level of knowledge of irrigation and water management services was moderate (58.9%). Awareness on cascade systems, including the importance of cascade system, agricultural ecosystem of cascade, the ecosystem services of the cascade, off-farm water management, concrete technology and conservation of reservation were identified as significant areas for improvement, in contrast ‘knowledge on repair work of farm road’ was identified as an area with a lower knowledge gap. The study recommends organizing periodic refresher trainings to transferring knowledge on new technologies with hands-on practical sessions.

**Keywords:** *dry zone, irrigation, water management*

## **Impact of COVID-19 pandemic on surface water contamination due to disposal of Plastic Protective Equipment (PPE) and discharge of wastewater**

T.A.N.T Perera, A.I Madhumali, S.H.L Sandamali, P.P.A Sanjeevani, S.M.F Ramshana,  
Ranjana.U.K Piyadasa

Department of Environmental Technology, Faculty of Technology, University of Colombo,  
Sri Lanka.

The COVID 19 virus, has prompted people to utilize plastic protective equipment (PPE) more regularly. As the results, water bodies were highly polluted due to utilized PPE and waste water discharge during the pandemic. This study was carried out to evaluate the immediate impact of PPE and municipal wastewater discharge on surface water bodies. The online questionnaire, which included questions on socio-demographics and surface water quality variations were distributed purposively during 1st of April to 1st of May, 2021. Data were analyzed descriptively using Minitab software. The total number of respondents who participated in this survey was 466, with the majority of them living in urban areas (66 %). Even under these circumstances, 57% of individuals discharged their household wastewater as usual. During study period, the number of hand washes were increased (0 - 5 per day) (45 %) and the major cleaning agent was liquid soaps (40 %), followed by 22% hand sanitizer (> 60% alcohols). Accordingly, the study's findings, 44 % of respondents observed fluctuations in water quality due to discharge of wastewater, 50 % stated that water contamination increased due to PPE during the pandemic. Facemasks were utilized by 79 % of responders on a daily basis for protection. According to 49% of responders, the amount of PPE in water bodies has increased more than usual. Rivers, reservoirs, drains, and streams were the most contaminated water sources according to the 27%, 26% and 14% respondents, respectively. Consequently, this survey revealed that this has become another environmental concern because 37% of respondents have been improperly disposed facemasks. Overall, considerable water contamination was found as a result of increased PPE usage and wastewater discharge according to the study. This problem can be minimized by the sustainable plastic waste management technologies and policies should be adopted while raising public awareness.

**Keywords:** COVID-19, Plastic Protective Equipment (PPE), water pollution, wastewater

**SmartCovidAssist: Continuous monitoring system for the Covid-19 quarantine patients using Mobile App in IoT environment**

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With this COVID-19 pandemic situation, continuous monitoring of the patients and contacts is necessary when they are in quarantine centres or at their homes. The “SmarrtCovidAssist” is a remote monitoring system for the COVID-19 home quarantined patients for continuously monitoring the COVID symptoms during the quarantine period. The system consists of two components; Mobile App with predefined symptoms and other required information for the patients and back-end system for the doctors, administrative staff, and PHIs to monitor the patients remotely. The patients can install the Mobile App and register in the remote monitoring system. Then their names will be appeared in their Grama Nalaradi (GN) divisions in the back-end system. The patients must send the symptoms twice a day using predefined symptoms list, given in the mobile app to the back-end system. The patients’ data will be analysed using the standard threshold values defined in the system and visualized to the relevant patients and the back-end users. If the patient’s symptoms go below the threshold values, it will inform it to the relevant PHI to get the necessary medical treatment for the patient immediately before patient’s condition become worst. Moreover, this system provides the facility to generate reports of the COVID-19 patients in different administrative levels and it will help to get the right decisions in right time to control the COVID-19 spreading in Sri Lanka. The system was tested the User Acceptance Testing (UAT) using 50 patients and contacts in three GN divisions belongs to two MOH divisions to ensure all the functions are working well and whether it can generate the required reports from the system. By that way we ensure the system is smoothly functioning with the expected outcomes.

**Keywords:** COVID-19, Internet of Things, mHelath, Mobile Apps, data visualization

## Evaluation of cyber attacks targeting Internet facing IoT: An experimental evaluation

N. N. Thilakrathne<sup>1</sup>, N. R. Samarasinghe<sup>1</sup>, Madhuka Priyashan<sup>2</sup>

<sup>1</sup>Department of Information and Communication Technology, Faculty of Technology,  
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University of Ruhuna, Galle, Sri Lanka

The rapid growth of Information and Communication Technology (ICT) in the 21st century has resulted in the emergence of a novel technological paradigm; known as the Internet of Things, or IoT. The IoT, which is at the heart of today's smart infrastructure, aids in the creation of a ubiquitous network of things by simplifying interconnection between smart digital devices and enabling Machine to Machine (M2M) communication. As of now, there are numerous examples of IoT use cases available, assisting every person in this world towards making their lives easier and more convenient. With the latest advancement of IoT in variety of domains such as healthcare, smart city, smart agriculture it has led to an exponential growth of cyber-attacks that targets these pervasive IoT environments, which can even lead to jeopardizing the lives of peoples; that are involving with it. In general, this IoT can be considered as every digital object that is connected to the Internet for intercommunication. Hence in this regard in order to analyse cyber threats that come through the Internet, here we are doing an experimental evaluation to analyse the requests, received to exploit the opened Secure Shell (SSH) connection service of an IoT device, which in our case a Raspberry Pi devices, which connected to the Internet for more than six consecutive days. By opening the SSH service on Raspberry Pi, it acts as a Honeypot device where we can log and retrieve all login attempt requests received to the SSH service opened. Inspired by evaluating the IoT security attacks that target objects in the pervasive IoT environment, after retrieving all the login requests that made through the open SSH connection we then provide a comprehensive analysis along with our observations about the origin of the requests and the focus areas of intruders, in this study.

**Keywords:** *IoT, Cyber-attack, Honeypot, Cyber security, Internet security*

## **Internet of Things technologies for managing COVID-19 pandemic: Recommendations and proposed framework**

N. N. Tillakaratne, N. R. Samarasinghe

Department of Information and Communication Technology, Faculty of Technology,  
University of Colombo, Sri Lanka.

With The Internet of Things, often known as IoT, is an innovative technology that connects digital devices all around us, allowing Machine to Machine (M2M) communication between digital devices all over the world. Due to the convenience, connectivity, and affordability, this IoT is being served in various domains including healthcare where it brings exceptional benefits to improve patient care, uplifting medical resources to the next level. Some of these examples include surveillance networks, healthcare delivery technologies, and smart thermal detection. As of now, the IoT is served in various aspects of healthcare making many of the medical processes much easier as opposed to the earlier times. One of the most important aspects that this IoT can be used is, managing various aspects of healthcare during global pandemics, as pandemics can bring an immense strain on healthcare resources, during the pandemic. As there is no proper study is done with regards to the proper use of IoT for managing pandemics, in this regard, through our study we aim to review various use cases of IoT towards managing pandemics especially in terms of COVID-19; owing to what we are currently going through. In this regard, we are proposing a conceptual framework synthesizing the current literature and resources, which can be adopted when managing global pandemics to accelerate the battle pace with these deadly pandemics and focusing on what the entire world is currently going through where almost more than four (04) million people are diminished of this COVID-19 pandemic.

**Keywords:** *IoT, COVID-19, Pandemic, Healthcare, Internet of Things, Technology*



**Sri Palee Campus  
University of Colombo**



***Contemporary Media and Performing Arts:  
Approaches and Practices***

**22<sup>nd</sup> November 2021**



## MESSAGE FROM THE RECTOR

### **Dr. Prathibha Mahanamahewa**

Rector

Sri Palee Campus-University of Colombo



I am delighted that the Sri Palee campus is organizing this Annual Research Symposium on the 'Contemporary Media and Performing Arts: Approaches and Practices' scheduled to be held on 22nd November, 2021. We at Sri Palee aspire very strongly to expand our research and innovation horizon, especially in the niche areas of Mass media and Performing Arts disciplines. This conference is addressing some of the challenges and solutions in these vast fields. The forum is filled with expert keynote speeches, research paper presentations, and invited talks. This will go a long way in enriching the participants' knowledge in general and Departments of Mass Media and Performing Arts in particular, especially those in the field of linguistics and IT. I am delighted that international experts are attending the conference to present their papers and deliver keynotes and invited talks.

I want to congratulate the conference organizing committee for their commitment and outstanding drive in organizing this symposium. I am very confident that this occasion will provide a platform for strengthening our relationships in knowledge sharing. At the same time, it will provide the necessary thrust in joint research collaborations and product commercialization within the research society. I aspire that this symposium will be a foundation for the growth of new ideas towards a better tomorrow.

Last but not least, I would also like to thank The Vice-Chancellor, Senior Professor Chandrika Wijeyaratne, for the continued support and encouragement in every minute to Sri Palee campus. I am sure that the quest of making Sri Palee a top-class campus is not going to be impossible to achieve.

Thank you.

## MESSAGE FROM THE CONFERENCE CHAIR

**Dr. Jayantha Wannisinghe**  
Chair, Annual Research Symposium  
Sri Palee Campus



I take great pride in welcoming you to the Annual Research Symposium (ARS) of the Sri Palee Campus of the University of Colombo 2021, 'Contemporary Media and Performing Arts: Approaches and Practices.

This event is a scientific platform to share experience, foster collaborations through the research talks and presentation to put many thought-provoking strategies for discovering new ideas and new skills, in addition to exposing your capabilities and discoveries to many interested colleagues.

I fervently hope that all participants, students, experts, and policymakers will immensely benefit from this conference. I am looking forward to an exciting and informative meeting, to critical and above all stimulating deliberations, and last but not least, to getting to know many new insights in diverse fields.

This conference wouldn't have been possible without many individuals' remarkable and unstinted support, the Vice-Chancellor Senior Professor Chandrika N. Wijeyaratne and the Rector of Sri Palee Campus, Dr. Prathibha Mahanamahewa, are the pillars of our success. Their guidance and encouragement boosted the morale of both the presenters as well as the organizing team.

A very special token of appreciation goes to our Keynote Speaker, Prof. Daryl L. Harris, Theatre and Dance, School of the Arts, Northern Kentucky University, and the Plenary Speaker, Professor Maya Gunawardena, Assistant Professor in teacher education at the Faculty of Education, the University of Canberra for their contribution to this symposium. I wish to thank the co-chair, the secretary, the members of the organizing and academic committees, and most importantly, the Sri Palee Campus administrative staff for helping me realize this dream.

Finally, I would like to thank each of you for attending this prestigious conference and bringing your expertise to our gathering.

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## Programme

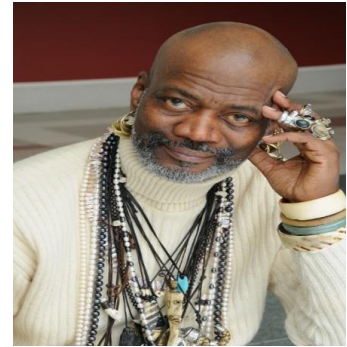
<b>Panel 01</b>			
<b>Time</b>	10.00am- 12.00pm		
<b>Venue</b>	Research Conference Hall		
<b>Chairperson</b>	Prof. Ranjan Hettiarachchi		
<b>Panel Member</b>	Dr. K. V. Dhanapala		
<b>Panel Member</b>	Dr. Kumudini Maddumage		
<b>Panel Convener</b>	Ms. Thisarani Kaluarachchi		
<b>Technical Officer</b>	Mr. Saman Kariyawasam/ Mr. M. G. R. P. Yasasiri		
#	Name of the Presenter	Title of the Abstract	Time
01	Dr. Jayantha Wannisinghe	Woman's calibre: A counter hegemony to hegemonic power structures	10.00am-10.20am
02	M.D.N.D.M.Bandara	An Investigative Study of the Cultural Politics of Gender in Sri Lankan Cinema	10.20am-10.40am
03	Anusha Sivalingam	Study on features of the Sri Lankan Tamil cinema to reflect the lives of the Sri Lankan upcountry people in the context of post black July 1983	10.40am-11.00am
04	H.P.Sajitha Lakmali	The Female Local Government Councillors and Space for Media Representation	11.00am-11.20am
05	K. D. W. Ruchini	Movement Experience of Disabled People in Contemporary Dance	11.20am-11.40am
	Q and A session		11.40am-12.00pm

<b>Panel 02</b>			
<b>Time</b>	01.00pm- 03.00pm		
<b>Venue</b>	Research Conference Hall		
<b>Chairperson</b>	Dr. Tudor Weerasinghe		
<b>Panel Member</b>	Dr. Jayantha Wannisinghe		
<b>Panel Member</b>	Mr. Bhageshri Fonseka		
<b>Panel Convener</b>	Ms. K.D.W.Ruchini		
<b>Technical Officer</b>	Mr. Saman Kariyawasam/ Mr. M. G. R. P. Yasasiri		
#	Name of the Presenter	Title of the Abstract	Time
01	P.T.K.I Dharmasiri	Association of Social Media on Work Life Balance in Pandemic Situation (Special Relevance to WhatsApp and the Employee in Radio Media Channel in Sri Lanka	01.00pm-01.20pm
02	K. P. Gamage	Online Newspaper readership during Covid-19 Pandemic period in Sri Lanka: Cases of Government Online Newspapers	01.20pm-01.40pm
03	S. A. N. P. Suraweera	The Impact of New Media Technology on Sri Lankan Rural Community in the dissemination of Development Information: Special Reference to Mawanalla Electorate, Sri Lanka	01.40pm-02.00pm
04	Prof. Ranjan C.K. Hettiarchchi	Social Media and Dialectal Variation among Youths in Contemporary Sri Lanka	02.00pm-02.20pm
05	Amila Lokumannage	A Study on the Effects of Television Exam Hosting Programs: Special reference to <i>Jathika Pasala</i> Program of Sri Lanka Rupavahini Cooperation	02.20pm-02.40pm
	Q and A session		02.40pm-03.00pm

## INTRODUCTION TO KEYNOTE SPEAKER

Prof. Daryl L. Harris

Theatre and Dance, School of the Arts,  
Northern Kentucky University



Dr. Daryl Harris is a full professor in the School of the Arts (SOTA) Theatre and Dance Program at Northern Kentucky University (NKU). Harris has a BA in psychology and an MFA in theatre, both from the University of Southern Mississippi. He completed doctoral course work in theatre at the University of Victoria. He completed his dissertation, “New Orleans Mardi Gras Indian Chiefs and Their Costumes: Trans-cultural, Communal Icons,” in completion of requirements for the PhD in interdisciplinary studies at the University of Alabama. At NKU since 2003, he is an over 50-year veteran of traditional, alternative, academic, and applied theatre. He has studied and worked throughout North America, Europe, Africa, Southeast Asia, and Australia. In addition to teaching diverse interdisciplinary theatre courses, and being the area coordinator for his program’s Theatre in World Cultures undergraduate area of study, Harris also acts in, directs and costume-designs theatrical productions locally, nationally, and internationally. He is a member of Phi Beta Delta Honor Society for International Scholars, and a 2010 recipient of President Obama’s President’s Call to Service Award, the highest level of awards recognizing and honoring volunteerism. Recently, as a Fulbright Specialist, he co-wrote, costumed, directed, and played a cameo role on Sri Lanka International Buddhist Academy’s world premiere English language production of the traditional Buddhist tale, *Sanda Kinduru*. This was the third in a series of initiatives using theatre techniques to help English as a Second Language students learn and confidently use the language. In 2019 he served as a faculty member for Semester at Sea’s around the world voyage. The research for his MFA in Theatre and his PhD in Interdisciplinary Studies continues to fuel his primary passion: engaging scholars and communities transculturally and transnationally across disciplines.

## KEYNOTE ADDRESS

**Prof. Daryl L. Harris**

### **Contemporary Approaches and Performance Practices: The Survival of the Fit**

Adaptability is the hidden secret to the longevity of tradition. While the heart and soul of many traditional art forms across the globe have remained stable, their flesh and bones have grown and adapted with each passing century. Recently, the rate of that growth and development has accelerated. Each decade presents new challenges to survival and vitality in all areas of the arts. This atypically interactive speech looks at our “new normal.” It touches briefly on the necessity and effectiveness of new trends in digital-artistic marketing. Participants are encouraged to share what is working, and what is lacking in their home institutions. The primary focus, however, is on Innovative practices in language education and qualitative values in contemporary visual and performing arts. Dr. Harris’s “SIBA Initiative” --an ongoing program using theatre techniques to help English as a Second Language students to learn the language, and to speak it more confidently-- serves as a point of departure for the exploration of these topics, as well as the topic of creative arts and education in the new normal. What must we do to fit in this new normal? What must we do to remain fit? What must we do to survive?



## Woman's calibre: A counter hegemony to hegemonic power structures

Jayantha Wannisinghe

Department of Languages, Sri Palee Campus, University of Colombo, Sri Lanka

### Abstract

Sri Lankan society's shift from a feudal status to a capitalistic status has seen slight progress in the woman's position. Sri Lankan women's position is further transformed to a somewhat favorable state by new waves of the economy introduced by neoliberalism. A woman's progress can be seen in her capacity to fight against repressive structures to win her rights within the country's territory. The purpose of this study was to investigate the extent to which women emerge as potentially counter-hegemonic subjects capable of critiquing patriarchal structures implicit in global neoliberalism. It aimed to explore how the 'newly empowered' women challenge patriarchal ideologies that restrict women's upward mobility by crossing the patriarchal boundaries to gain empowerment and post-subaltern status. The argument that women can achieve their complete liberation was also disputed, given that society is still based on a commodity system. This study relied on qualitative research in which content analysis was administered through a thematic approach to examine themes and patterns of data. Data were collected from the respective fiction taking into consideration the utterances of the fictional characters. Results show that heroines in Chandani Lokuge's fiction *If the Moon Smiled* have challenged power structures to obtain women's freedom to re-situate Sri Lankan women's autonomy and desire and use it to critique national, global, and neoliberal bases that oppress women. They attempted to regain women's 'autonomy' situated apart from patriarchal violence by leveraging the counter-hegemonic potential of diaspora and travelling experience to defy the impediments for their upward mobility and reach their rightful place in society. In conclusion, I argue that women need to challenge the commodity system to achieve their freedom.

Keywords: nationalism, neoliberalism, empowerment, women, upward mobility.

## **An Investigative Study of the Cultural Politics of Gender in Sri Lankan Cinema**

M.D.N.D.M.Bandara

Department of Performing Arts, Sri Palee Campus, University of Colombo

### **Abstract**

Interdisciplinary research work on art and culture begins with the emergence of a social consciousness aimed at freedom and human dignity. In this context, the study of cinema and culture as an interdisciplinary field of study is currently playing a significant role. It is critical to experimentally analyze the complex dynamics of the interrelationship between cinema and gender in the discourse on culture and well-being. That cultural politics emerging from gender affect the existence, well-being, identity, and freedom of women and men needs to be examined to understand gender issues better. This research aims to explore the impact of cultural politics on gender through Sri Lankan cinema. This study aims to examine how Sri Lankan Cinema addresses the issues of gender. The research is qualitative, and for data collection, a purposive sample method will be employed to choose the sample. A structured interview will be used to interview a hundred participants in the sample and collect data from the respective films in the study. The data will be analyzed qualitatively using thematic analysis. Among the films screened in Sri Lanka from 1960 to 2020, six award-winning films, both local and foreign, representing one film in each decade, have been selected. This research makes use of Max Neef's theory of fundamental human needs when analyzing the data. It is expected to conceptually analyze structural divisions that divide people socially and culturally as gender, class, and caste. It will allow the researcher to chart the changes and the corresponding attitudes towards women regarding socially changing perceptions.

**Keywords:** gender, Sri Lankan cinema, cultural politics, structural divisions, fundamental human needs

## **A Study on features of the Sri Lankan Tamil cinema to reflect the lives of the Sri Lankan upcountry people in the context of post-black July in 1983**

Anusha Sivalingam

Department of Mass Media, Sri Palee Campus, University of Colombo

### **Abstract**

The unfair labor exploitation, which started with the migration of people from India to work as laborers, is still not addressed. History bears evidence that upcountry people used to record their life struggles through literature, including cinema. ‘Thottakkari’ (1963), ‘Meenavappen’ (1973), ‘Puthiyakatru’ (1975), ‘Naan Unkal tholan’ (1978), and ‘Aval oru Jeeva Nathi’ (1980) are some examples for the above. Cinematic efforts in the upcountry have become minimal after 1983, along with few short movies as ‘Thodu’, ‘Pokirom’, ‘Puratchi’ and ‘Vaakkuruthi’ which reflected the upcountry lifestyle. After 1983 there was only one docudrama as ‘Ingirunthu’. The objective of this study was to investigate the reason for the reduction of upcountry-based Tamil films productions after 1983. The research was conducted through the qualitative methodology. The migration, along with the physical and mental disaster created during the 1983 riots, stands as the fundamental reason for reducing this cinema production. And, there was a dominating impact on the upcountry cinema production from the political system. The study reveals the influence of South Indian cinema on upcountry productions. Estate authorities have restricted the rights of upcountry Tamil people by prohibiting the utility of cameras within the estate. Even though producers have attempted to minimize this hurdle, the economic barrier stood still. Hence, they did not receive financial support. Thus, provoking an urge to discuss this circumstance while creating awareness among the society is essential.

**Keywords;** Sri Lankan cinema, Sri Lankan Tamil cinema, Sri Lankan upcountry films, upcountry literature in Sri Lanka

## **The Female Local Government Councillors and Space for Media Representation**

H.P.Sajitha Lakmali

Department of Mass Media, Sri Palee Campus.

### **Abstract**

Media is playing a vital role in the contemporary society. It is capable to reshape ideologies among people especially during political campaigns. However, in practice, ostensibly, Sri Lankan media do not spare enough time and space for the female local government councillors in contrast to the national and local level male and female politicians. This study was focused on the problem of mainstream media's lack of concentration on female local government councillors. The study identified fifteen newspapers which are in Sinhala and Tamil languages, including both weekends and daily publications. Furthermore, the study has taken seven television channels which broadcast content in Sinhala and Tamil, owned by the government and private sector for the period of March'21 to May'21. It was designed with qualitative content analysis and was used to map the identified media space for the female local government councillors. It is found that government, private, and even women's newspapers and programs have not been provided with sufficient allocation to represent women representative's voice. Based on the findings, the study recommend future works of developing a balanced media representation space for female under local government as part of a policy development in the media industry. This paper is among one of first such analyses compiled for supporting dedicated media space for female councillors attached to the local government institutions.

**Keywords:** women, media, local government councillors, representation

## **Movement Experience of Disabled People in Contemporary Dance**

K. D. W. Ruchini

Department of Performing Arts, Sri Palee Campus, University of Colombo, Sri Lanka.

### **Abstract**

In the contemporary dance approach, we can identify that the purpose of using the performer's body has surpassed the ideology of beauty. Instead, it tries to use the body to symbolize different social-cultural ideologies. Also, it tries to use diverse bodies and body experiences in the dance-making process. This research attempts to identify how to use the body of disabled people in contemporary dance performances. Further, it examines the way to use improvisation dance techniques to create dance movements through disabled bodies. Also, try to understand socio-cultural knowledge embodied in those dance movements. Questionnaire surveys, interviews, and observations were used to collect data about the experience of the disabled persons who participated in the dance movement improvisation workshop and performances during February 2020. The experience of the audience relevant to the performance was also recorded. Further, the process of dance making and the final performance was used as a case study to analyze the dance movements and the cognitive involvement. According to findings, the embodied experience and emotions of disabled people were brought out and transformed into movements through improvisation dance activities. The movement qualities were unique and exhibited the characteristics of each disabled body. The movements improvised by disabled participants reflected the embodied knowledge of their socio-cultural experiences. Further, it highlighted that they were empowered by gaining confidence, understanding, and acceptance in themselves in improvising dance movements and performances.

**Keywords:** contemporary dance, disabled body, embodiment, improvisation techniques, empowerment

## **Association of Social Media on Work-Life Balance in Pandemic Situation (Special Relevance to WhatsApp and the Employee in Radio Media Channel in Sri Lanka)**

P.T.K.I Dharmasiri

Department of Mass Media, Sri Palee Campus, University of Colombo

### **Abstract**

This study focused on the employees' work-life balance in both state and commercial radio media channels in Sri Lanka. Work-life balancing is beneficial for both the employer and the employee in various ways. Due to job dissatisfaction, customer satisfaction goals cannot be accomplished. In a global pandemic situation, employees have many responsibilities when working from home. Technology has helped make an international workplace where people can do business with companies all over the world. Social Media has made it possible for employees to become an integral part of communication in every kind of organization. This research used WhatsApp usage as the independent variable and work-life balance as the dependent variable in elucidating the impact of WhatsApp Communication on work-life balance. A questionnaire was used to collect data from a sample of 100 employees randomly selected. The research method was quantitative, which consisted of surveys and interviews. Collected data were analyzed through AMOS (SEM) software. The results showed that all the radio media services used WhatsApp groups as an effective communication method during the pandemic situation. The role of WhatsApp as a new media approach in the concept of working from home in an epidemic situation is at a very high level. It was revealed that even a radio station was conducting the relevant programming and news production work, answering a WhatsApp message much faster than answering an email. The research also revealed that the speed at which an individual or organization responds to WhatsApp is between 6-10 minutes from the time it is published. Its use based on credibility and privacy protection is instantaneous in the current state of social media compared to other social media extremes. WhatsApp can be identified as one of the best ways to update and socialize information quickly during an epidemic situation.

Keywords: communication, social media, work-life balance, radio media, pandemic

# Online Newspaper readership during Covid-19 Pandemic period in Sri Lanka: Cases of Government Online Newspapers

K. P. Gamage

Department of Mass Media, Sri Palee Campus, University of Colombo

## Abstract

The purpose of this study was to explore why Sri Lankan readers were compelled to read government online newspapers during the Covid -19 pandemic periods in Sri Lanka. The main objective of the research was to investigate how contemporary social circumstances affected newspaper readers' transition to online newspapers during the Covid-19 pandemic. The online newspapers *Daily News*, *Dinamina*, and *Thinakaran* published between September 2020 and August 2021 were selected for this survey. The data from the department of digital media department in Lake House were obtained. An online questionnaire was administered to a sample of fifty e-newspaper users in the western province as this was the most affected province during the pandemic period. According to survey data, the busiest month for online newspapers was November 2020, with the *Daily News* being the most read online newspaper. The mobile phone was the most popular device for accessing online newspapers, followed by desktop PCs. The findings revealed that most printed newspaper distribution temporarily ceased due to travel limitations, and only government newspapers continued to be published online for free on their official websites. The survey has revealed that many readers have turned to online newspapers for news because of the ease of access. It can be concluded that due to the lockdown of the country, travel restrictions, quarantine, and isolation, online newspapers became the most convenient and effective means for the Sri Lankan newspaper audience to stay informed. It was discovered that the government's establishment of a work-from-home policy had a more substantial impact on increasing demand for online newspaper usage and adaption.

**Keywords:** newspaper reader, adaption, online newspapers, Covid -19 pandemic, government newspaper

**The Impact of New Media Technology on Sri Lankan Rural Community in the dissemination of Development Information: Special Reference to Mawanalla Electorate, Sri Lanka**

S. A. N. P. Suraweera

Department of Mass Media

Abstract

According to the World Bank collection of development indicators, compiled from officially recognized sources 2020, the rural population in Sri Lanka was reported 81.29%. Therefore the rural community of Sri Lanka should be considered a significant part when making decisions by the state or non-state. Considering the need to satisfy the information of this rural community, they made use of mainly traditional methods of communication like two-stage opinion leaders, posters, and village group discussions. However, after the establishment of modern media in Sri Lankan society, this traditional method of obtaining information has undergone changes. In particular, the role of this traditional media is remarkable in providing development information in the past and present rural societies in Sri Lanka. However, in parallel with the advancement of communication and technology, new media approaches have instigated changes in every aspect of human life. Although any person can observe this condition, it must be proved through an in-depth research process. Therefore the main objective of this research is to investigate the impact of new media technology on the rural community in Sri Lanka in disseminating development information. The problem with this research was to explore the impact of new media technology on sharing development information with the rural community in Sri Lanka. In this study, both qualitative and quantitative research approaches will be used, and ten villages in the Mawanella electorate will be selected as the sample in this research. Interviews, questionnaires, and self-observation techniques will be utilized to collect data for this study. This research will reveal what is the most appropriate medium to be followed in disseminating development information to the rural people, and it will be helpful for policymakers, journalists as well as NGOs to share development information with the rural community

Keywords: rural community, traditional method, dissemination of development information, new media



## **Social Media and Dialectal Variation among Youths in Contemporary Sri Lanka**

Ranjan C.K. Hettiarchchi

Department of Mass Media, Sri Palee Campus

### **Abstract**

Youths' increasing use of social media for interactive reasons has resulted in dialectal variances in phonological, morphological, syntactic, semantic, and lexical terms. The focus of this study is on the interpersonal messages shared by social media users. Previous studies have been unable to focus on the new language usage trend in social media in the context of contemporary Sri Lanka. A structured interview was conducted with hundred participants who were conveniently chosen. A content analysis was used to identify new language aspects that emerged in the context of social media, and a syntactic analysis was conducted to identify structural changes in the language that occurred on social media. According to the study's findings, traditional language has undergone several changes, including simplicity and the blending of dialect and standard language within the same text in a social media context. It was also discovered that written exchanges must be brief since interactants must connect swiftly and efficiently. It was discovered that social messages serve similar functions to spoken language, and as a result, elements of spoken language were detected in written social media conversations. The syntactic analysis revealed that morphological and syntactic modifications were common, although phonological changes were rare. New vocabulary was discovered that was unique to social media and specific semantic shifts in which terms had their meaning re-appropriated by social media. Emoticons were used to describe how a user is feeling or the intended tone without writing it down. In conclusion, it was found that a new social media dialect has been formed among Sri Lankan, social media users.

**Keywords:** communication, social media, dialectal variation, language change, syntactic analysis

**A Study on the Effects of Television Exam Hosting Programs: Special reference to *Jathika Pasala* Program of Sri Lanka Rupavahini Cooperation**

Amila Lokumannage

Department of Mass Media, Sri Palee Campus,  
University of Colombo

Abstract

The study is based on the effects of the television exam hosting program in Sri Lanka. Sri Lanka Rupavahini Cooperation has been broadcasting educational programs from the day it was launched. *Jathika Pasala* program commenced in 2007, and it offers programs for Advanced Level (A/L) and Ordinary Level (O/L) students. The objectives of this study were to identify how many students and teachers watch the *Jathika Pasala* Program, understand how the *Jathika Pasala* Program helps students with their studies, and determine how the *Jathika Pasala* Program assists teachers in their teaching. The following questions were asked: how many students and teachers watch *Jathika Pasala* Program, how does the *Jathika Pasala* Program help students with their studies, and how the *Jathika Pasala* Program assists teachers in their teaching. For this study, the survey method of the questionnaire was used to evaluate the effects of television exam hosting programs. This research study consisted of 200 grade 11 students equally divided according to gender and 100 teachers from 10 selected schools in the Colombo district. The questionnaire consisted of closed-ended and open-ended questions. The survey revealed that most students and teachers watch the *Jathika Pasala* Program. It helped students improve their knowledge, and the program was more effective than classroom teaching. The majority of teachers agreed that *Jathika Pasala* program helped them with their teaching. To conclude, during the Covid-19 pandemic, Education Television played an essential role in the education system.

**Key Words:** Education, Exam Hosting Programs, *Jathika Pasala*, Sri Lanka, Television

# University of Colombo School of Computing



## *ICT for Emerging Regions*

04<sup>th</sup> November 2021

## MESSAGE FROM DIRECTOR

### **Professor K.P. Hewagamage**

Director,

University of Colombo School of Computing



It is with great pleasure we welcome you to the 21st International Conference on Advances in ICT for Emerging Regions (ICTer 2021), which will be held on 2nd and 3rd December 2021. The ICTer conference is hosted by the University of Colombo School of Computing (UCSC) with the support of local and international partners. In the history of the last 23 years, this is the very first time that we are going to organize the ICTer Conference as a blended conference due to the prevailing situation in the world due to the Covid-19 pandemic, allowing some participants to attend the conference physically. Based on the last year experience, the organizing committee is planning to host the conference as an open conference, allowing public to watch the conference through YouTube webcasting. All the participants are invited to watch the last year conference proceedings at [www.icter.org/conference](http://www.icter.org/conference).

The International Information Technology Conference (IITC), first held in 1998 was the predecessor of the ICTer conference organized jointly by the University of Colombo and Infotel organization. In 2008, The International Conference of Advances in ICT for Emerging Regions succeeded the IITC conference while integrating it with the IEEE Computer Society to make it a formal annual International event in Sri Lanka.

Last few years, we organized the conference at the Prof. V. K. Samaranayake Auditorium, University of Colombo School of Computing. Although we planned to have the conference in the same venue, these unexpected circumstances forced us to think about organizing the conference in an online mode. We believe that this is an opportunity to move forward irrespective of all challenges that we are facing in organizing an online conference even without going to our workplace during these days.

ICTer Conference has been a platform for dissemination of research work not only at the cutting edge of computing research and development at the UCSC but also research that

addresses real problems in emerging regions carried out by other universities, including those outside Sri Lanka. During the last few years, Publications in ICTer have 1260 citations, and h-index of 16 and an i10-index of 30, according to google scholar. The ICTer conference is renowned for its high standards. The UCSC along with other higher education institutions and the support of the IT industry of Sri Lanka has been improving on these standards over the years. In this year, ICTer has received more than 250 submissions and been maintaining an acceptance rate of about 30-40% percent. A publication at ICTer is highly valued locally as well as internationally. A strict double-blind review process has been followed over the years, with a paper receiving a minimum of two reviews to achieve this high standard. ICTer has had its conference proceedings published in IEEE Xplore continuously since 2010.

ICTer2021 has had a dedicated team organizing and supporting it. We take this opportunity to express our sincere gratitude to the conference co-chairs for their leadership and all committee members who belong to the young academic team at UCSC. Also, we would like to extend our gratitude to all reviewers, keynote speakers, paper presenters, and session chairs. We greatly appreciate the support provided by the University of Colombo administration, governmental institutions, and higher education institutions throughout Sri Lanka. Finally, we would like to thank all our sponsors, without whose support this conference would not be possible.

We hope that you have a productive as well as a memorable conference, ICTer2021.

## MESSAGE FROM SYMPOSIUM CHAIR

### **Dr. Thilina Halloluwa**

Senior Lecturer,

University of Colombo School of Computing



As a Co-Chairperson of the ICTer 2021, I am delighted and honoured to bring this message to the 21<sup>st</sup> International Conference on Advances in ICT for emerging region (ICTer) held on the 2nd and 3rd of December 2021. This annual international conference is organized by the University of Colombo School of Computing (UCSC) in collaboration with IEEE Sri Lanka section and IEEE Computer Society, Sri Lanka chapter. Hence, the accepted papers of the ICTer2021 conference proceedings will be published in IEEE explorer after the conference, to disseminate it among a larger international audience.

The International Information Technology Conference (IITC) first held in 1998 was the premier IT conference in Sri Lanka. The International Conference of Advances in ICT for Emerging Regions succeeded the seminal IITC conference and is arguably the leading IT conference in Sri Lanka. Hence it is with great pride and pleasure that the UCSC is hosting the ICTer2021 at the new Prof. V. K.Samaranayake auditorium.

ICTer Conference has been a platform for dissemination of research work not only at the cutting edge of computing, but also research that address real problems in emerging regions. Publications in ICTer have more than 2000 citations and an h-index of 19 and an i10-index of 57 according to google scholar.

The ICTer conference is renowned for its high standards. The UCSC along with other higher education institutions and the support of the IT industry of Sri Lanka has been improving on these standards over the years. This year, the number of submissions has continued to grow to 250, reflecting the continued growth in computing research in the region. After following a rigorous blind peer review process using more than 70 reviewers and cross checking all the papers for plagiarism, we were able to accept 51 as full papers, with around 20% acceptance rate. The best research work presented will be invited to be published in expanded form in the International Journal on Advances in ICT in Emerging Regions. Our technical program is

rich and varied with six (6) keynote speeches and one (1) invited talk. In addition to the papers, there will be 30 poster presentations that will add value to the conference. We also expect to provide technical demonstrations, and numerous opportunities for informal networking.

As a conference chair, I know that the success of the conference depends ultimately on the many people who have worked with us, in planning and organizing the conference. ICTer2021 has had a dedicated team organizing and supporting it. I take this opportunity to express my sincere gratitude to the

Director, UCSC, Prof. K.P Hewagamage for his leadership and constant advice. Also, would like to extend my gratitude to all reviewers, keynote speakers, paper presenters, session chairs and experts conducting workshops. Finally, I would like to thank all our sponsors, without whose support this conference would not be possible.

We hope that you have a productive as well as an enjoyable conference

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## Programme of Sessions

<b>Agenda – 2<sup>nd</sup> December 2021</b>		
08:00 AM	Inauguration of the ICTER 2021 Conference	
08:00 AM	Welcome Address by the Conference Co – Chairs	
08:10 AM	Address by the Vice Chancellor of University of Colombo	
08.20 AM	Address by the Director of UCSC	
08.30 AM	Keynote 01 : Making Smart Cities More Playable Prof. Anton Nijholt	
09.30 AM	Platinum Sponsor Speech	
10.00 AM	Tea Break	
10.10 AM	Sponsor Advertisement	
10.20 AM	Session 1-A	Session 1-B
	NLP	Information security
12.10 PM	Session 1-C	Session 1-D
	Applications of IT	Physical Computing
01.30 PM	Lunch Break	
02.00 PM	Session 2-A	Session 2-B
	Poster Presentations (Distributed Computing ,Physical Computing)	Poster Presentations (Bioinformatics, NLP)
02.30 PM	Session 3-A	Session 3-B
	Bioinformatics,	Applications of IT
03.00 PM	Tea break	
03.10 PM	Keynote 02 : Today’s students are tomorrow’s workforce, So what? Mr.Chathuranga Manamendra	
04.10 PM	End of the first day of the Conference	

<b>Agenda – 3<sup>rd</sup> of December 2021</b>		
08:00 AM	Start of the Second Day of the Conference	
08:10 AM	Welcome Address by the Conference Co – Chairs	
08:20 AM	Sponsor Advertisement	
08:30 AM	Keynote 03 -Artificial Intelligence for Internet of Things Security and Forensics Dr. Nhien-An Le-Khac	
09:30 AM	Tea Break	
09:40 AM	Gold Sponsor Speech	
10.00 AM	Session 4-A	Session 4-B
	Machine Learning	HCI
11:10 AM	Session 4-C	Session 4-D
	Open categories	Machine Learning
12.15 PM	Keynote 04 : Elephants and algorithms - how computer science can revolutionize acoustic monitoring - Dr. Daniela Hedwig	
01:15 PM	Sponsor Advertisement	
01.30 PM	Lunch Break	
02.00 PM	Sponsor Advertisement	
02.30 PM	Tea Break	
02:50 PM	Session 5-A	Session 5-B
	Machine Learning	Applications of IT
04.10 PM	Awarding of the Best Paper	
04.30 PM	End of the Second day of the Conference	

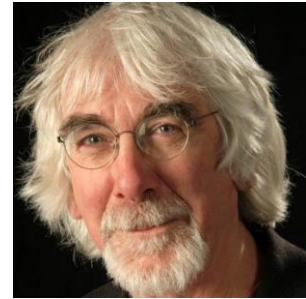
## INTRODUCTION TO KEYNOTE SPEAKERS

Prof. Anton Nijholt

Human Media Interaction

University of Twente, Netherlands

<https://wwwhome.ewi.utwente.nl/~anijholt/index.php?topic=about>



Biography: Anton Nijholt received his Ph.D. in computer science from the Vrije Universiteit in Amsterdam. He held positions at various universities, inside and outside the Netherlands. In 1989 he was appointed full professor at the University of Twente in the Netherlands, where he initiated its Human Media Interaction group. During some years he was a scientific advisor of Philips Research Europe, Eindhoven. A few years (2015-2017) he was a global research fellow at the Imagineering Institute in Iskandar, Johor, Malaysia. In 2018 he became a member of Microsoft's Technical Leadership Advisory Board on Brain-Computer Interfaces (BCI). His main research interests are multimodal interaction with a focus on entertainment computing, affect, humor, and brain-computer interfacing. Nijholt, together with many of the fifty Ph.D. students he supervised, wrote numerous journal and conference papers on these topics and acted as program chair and general chair of many large international conferences on entertainment computing, virtual agents, affective computing, faces & gestures, multimodal interaction, computer animation, and brain-computer interfaces. More recently he explores those topics in augmented reality environments. Nijholt is the chief editor of the specialty section Human-Media Interaction of the journals *Frontiers in Psychology* and *Frontiers in Computer Science*. He is also series editor of the Springer Book Series on *Gaming Media and Social Effects*. Recent edited books include the 2019/2020 books "Making Smart Cities More Playable: Exploring Playable Cities" and "Brain Art: Brain-Computer Interfaces for Artistic Expression."



Dr. Nhien-An Le-Khac,  
Lecturer/Assistant Professor,  
School of Computer Science, University College Dublin, Ireland.  
<https://people.ucd.ie/an.lekhac>

Dr. Nhien-An Le-Khac is a Lecturer (tenured) at the School of Computer Science (CS), UCD. He is currently the Programme Director of MSc programme in Forensic Computing and Cybercrime Investigation (FCCI, [http://www.csi.ucd.ie/PostgraduateProgrammes/MSc\\_FCCI](http://www.csi.ucd.ie/PostgraduateProgrammes/MSc_FCCI)) - an international programme for the law enforcement officers specialising in cybercrime investigations. To date, more than 900 students from 62 countries in 5 continents have graduated from this FCCI programme. He is also the co-founder of UCD-GNECB Postgraduate Certificate in fraud and e-crime investigation (<https://goo.gl/bSddQx>). He was a Research Fellow in Citibank, Ireland (Citi). He obtained his PhD. in Computer Science in 2006 at the Institut National Polytechnique Grenoble (INPG), France. His research interest spans the area of Cybersecurity and Digital Forensics, Machine Learning/Distributed Data Mining for Security, Fraud and Criminal Detection, Cloud Security and Privacy, High Performance computing, and Secure Healthcare IT systems. Since 2013, he has collaborated on many research projects as a principal/co-PI/funded investigator. He has published more than 150 scientific papers in peer-reviewed journals and conferences in related research fields. He is also an active chair as well as a reviewer for many key conferences and journals in related disciplines.

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Cornell University, USA.

<https://www.birds.cornell.edu/ccb/daniela-hedwig>



Dr. Daniela Hedwig is a behavioral and conservation biologist studying various functional aspects of mammalian vocal communication systems and how we can apply such information to improve current passive acoustic monitoring methods. What functions do vocalizations serve and what are the socio-ecological drivers behind their evolution are the central scientific questions she asks in order to chart out vocal communication systems within a broader behavioral-ecological framework. While her research interests comprise diverse species, ranging from gorillas to manatees, she currently focuses on the elusive African forest elephant, a species threatened with extinction due to poaching for ivory and habitat destruction. She explores how vocal communication enables forest elephants to maintain their social relationships within and between family groups and how in turn environmental constraints may inhibit this ability. In addition, she directly applies information on the context-specific acoustic variation in elephant vocalizations to the interpretation of passive acoustic monitoring data. The development of this novel method will allow for the remote non-invasive monitoring of the behavior of various other species on a detailed level, generating valuable information for behavioral biologists and conservationists.



Chathuranga Manamendra,

Director – Software engineering at IFS R & D International,

Sri Lanka

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Chathuranga is a versatile, enthusiastic and competent person who has experience in multiple industries such as technology, banking and education. He holds a B.Sc in IT as well as two masters in computer science and business administration. He has served as lecturer, mentor and academic advisor in multiple universities in Sri Lanka. Currently he is serving as a director - software engineering at IFS R & D International. Before joining IFS, he served as the Vice President - Technology and Operations at Digitalx Pvt Ltd and as a software engineering manager at Pearson Lanka.

He holds a Master of Computer Science from University of Colombo School of Computing and a Master of Business Administration from Cardiff Metropolitan University, UK. He is a proud product of SLIIT where he obtained his bachelor of science in information technology special degree.

He is a caring person who loves making a difference into the lives of the young generation. He is happily married with a son and a daughter.

## **ABSTRACTS OF KEYNOTE ADDRESSES**

### **Professor Anton Nijholt**

#### **Making Smart Cities More Playable**

Digital technology can make cities smart. City management can make use of information that can be extracted from databases in which data is collected about energy consumption, traffic behavior, waste management, human behavior in public environments, and opinions of the general public, for example as they can be collected from social media. But can this digital technology and the data collected from it help to make living in a city more enjoyable? How can digital technology and information provided by digital technology make cities playful, allow citizens to engage in playful and entertaining activities that help to enjoy their daily and sometimes boring activities such as commuting, working, career and social obligations, housekeeping? In this talk, we investigate how sensors and actuators in an urban environment can be introduced and used to design playful applications. We discuss how ideas about playable cities have developed and pay attention to the criticism of the concept of playable cities that has emerged in recent years.

### **Dr Nhien-An Le-Khac**

#### **Artificial Intelligence for Internet of Things Security and Forensics**

Today is the era of Internet of Things (IoT), millions of machines such as cars, smoke detectors, watches, glasses, webcams, smart blood pressure monitor, etc. are being connected to the Internet. The number of machines that possess the ability of remote access to monitor and collect data is continuously increasing. This development makes, on one hand, the human life more comfortable, convenient, but it also raises on other hand issues on security, privacy. Some challenges can be listed as the multiple locations and networks; the management and automation features of an IoT network; the survival period and visibility nature of IoT devices; huge amount of IoT data collected. Due to the un-standardized nature of IoT devices, the cybercrimes can exploit security vulnerability of these devices as well as of their eco-systems such as the insecure web, backend API, cloud, or mobile interfaces, etc. Attacks such as sniffing, surveillance, DDoS, etc. on IoT networks and IoT devices are normally difficult to detect.

Recently, Artificial Intelligence (AI) have made tremendous progress in many areas such as computer vision, pattern recognition, natural language processing, cybersecurity, etc. Many AI-based approaches, using machine learning and deep learning models have been developed as a key solution to secure IoT eco-systems. Hence, in the first part of this talk, I am willing to present achievements of using machine learning and deep learning for IoT security and forensics.

On the other hand, such AI-based approaches themselves could also raise issues in privacy and security. It is more severe if these approaches are black-box to end-users or investigators. For example, deep learning models are trained on very large amounts of data from potentially untrustworthy sources, providing opportunities for adversaries to manipulate them. In recent years, many sophisticated adversarial attack techniques have been exploited to compromise deep learning based systems. Therefore, in the second part, I share my thought on how to provide the robustness and safety to AI-based models against these adversarial attacks.

### **Dr Daniela Hedwig**

#### **Elephants and algorithms - how computer science can revolutionize acoustic monitoring**

Passive acoustic monitoring (PAM) is an emerging non-invasive method that allows for the continuous, long term and large-scale monitoring of populations of elusive, yet, acoustically conspicuous terrestrial species as well as anthropogenic disturbance at reasonable cost. As such, PAM can serve as an excellent evaluation tool that enables information-based decision making and adaptive management in wildlife conservation. However, challenges associated with retrieving, storing, and analysing vast amounts of sound recordings from remote locations still impede data acquisition and interpretation, and slow down the turnaround time from sound to actionable data for conservationists. The Elephant Listening Project at Cornell University is at the forefront of developing and implementing PAM tools to support protected area managers across Central Africa in monitoring forest elephant populations and illegal gun hunting. This talk will illustrate applications of PAM in forest elephant conservation, challenges on the ground and in the analysis lab, and how innovative computer technology and engineering solutions offer opportunities to contribute to effective conservation strategies.



**Chathuranga Manamendra,**

**Today's students are tomorrow's workforce, So what?**

Societies have been immensely impacted by the technological advancements which have caused us to comprehensively transform our way of working, travelling, buying, fulfilling minimum requirements, interacting & socializing and many more. It's need not to say that the speed of the changes will continue to increase by altering many of our current practices. So what? How do we enable students to succeed in the workforce while it evolves to both create and eliminate jobs?

**ABSTRACTS****Generalization of LSTM CNN ensemble profiling method with time-series data normalization and regularization**

Disni S. Rathnayake, Pasindu Perera, Heshan Eranga, Manjusri Wickramasinghe

University of Colombo, Faculty of Science

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Colombo, Sri Lanka

This study concentrated on generalizing an anomaly detection method of time series data using ensemble LSTM CNN network with time series data normalization and regularization. Considering the relevant conditions must meet for time series normalization, an algorithm was proposed for time series normalization. Checking the stationarity and normality of time series data is fundamentally included in the proposed algorithm. Afterward, different types of time series data are visualized with different normalization methods, and the impact of each of these methods is discussed. Normalization techniques like Min - Max, Adjusted Min – Max, Sigmoid and Tanh are used. When sigmoid normalization used with a dataset where the original data is almost in the range of zero to approximately one was able to normalize well. But for the data which is not in the range of [0,1] this method cannot be used since it tends to overlap data that is not available in original data. The study reveals that a smooth, non-linear sigmoid function performs a better transformation for many anomalous time series data as a normalization factor. The prediction errors of the LSTMCNNkeras (LSTM CNN ensemble neural network was implemented using Keras cis called LSTMCNNkeras.) model are discussed and compared with and without proposed normalization approach. Also, the gross effect of both normalization and regularization steps to the prediction errors of the LSTMCNNkeras model is discussed. For the time series data where the range lies somewhere between 0 to 1, produced better predictions in LSTMCNNkeras model along with Sigmoid normalization and Dropout regularization techniques. The gross effect of Layer weight regularization with Tanh normalization was able to produce a foreseeable growth in the performance of LSTMCNNkeras model with more accurate predictions for many time series data.

Keywords: anomaly detection, time series, lstm, cnn, ensemble networks, generalization, normalization, regularization

## **Microbiome Data Analysis for Disease Likelihood Prediction**

Dinithi Wickramaratne, C.R. Wijesinghe, A.R. Weerasinghe

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Colombo, Sri Lanka

The community of microbes including bacteria, viruses, fungi etc. living in and on our body is known as the human microbiome. The human microbiome plays an important role in our life helping in digestion, developing immunity and synthesizing vitamins. Advancements in next-generation DNA sequencing technologies have enabled profiling of microbial communities fast and efficient. Studies have shown that the gut microbiome has been linked to many disease such as type 2 diabetes, colorectal cancer and inflammatory bowel disease. The application of modern machine learning algorithms is proving to be valuable in predicting disease likelihood. However, the high number of dimensions in microbial datasets compared to the number of samples, is causing machine learning approaches to perform poorly. Traditional approaches of feature reduction cause a loss of important information. Therefore, efficient dimensionality reduction methods should be employed in microbiome-related classification tasks. In this paper, we explore a model to perform disease likelihood prediction, using autoencoders to minimize the information loss in traditional approaches of feature reduction.

Keywords: autoencoders, dimensionality reduction, metagenomics, microbiome

**A Path Planning Algorithm for Drones to Optimise Safe Pesticide Usage in Arable  
Lands**

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Though pesticides are chemical mixtures and toxic to all living beings, farmers apply them to their farmlands with the purpose of controlling pests, and increasing the quality and the quantity of the harvest. Farmers and their families are the common groups who face the adverse effects of pesticides due to overexposure. As a solution for that, we propose a path planning algorithm to cover all arable areas of a farmland using an autonomous drone while avoiding unsafe areas. Here, the drone can spray the approved amount of pesticides only to arable areas with minimum human intervention. This approach cherishes the concept of satellite farming with autonomous drones.

Keywords: drone systems, reinforcement learning, q learning, autonomous drones

**A Network Analysis based Credibility Ranking  
Model to Combat Misinformation on Twitter**

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Colombo, Sri Lanka

Social information has emerged as a key component that drives growth in modern day society. The emergence of Web 2.0 and the global connectivity it brought with it has caused massive changes in news-reporting and journalism landscapes. Micro-blogging platforms play a key role in global news propagation today. There is a growing need to filter the noise and extract only credible or useful information from the unprecedented volume of data disseminated through these platforms every day. While there is a number of studies carried out on determining credibility of user generated content, there is no one accepted credibility analysis solution. The solutions presented in the past are also difficult to be used in real world applications owing to complexities. In this paper, we argue for a methodology that attempts to solve the issue of identifying credible information through analysis of source credibility. First, we look at the different constructs of credibility as discussed in prior studies and define credibility for our approach. Secondly, we carefully choose an appropriate credibility analysis approach which alleviates the practical problems encountered in previous studies. We then build three credibility ranking models which follow three slightly different approaches. We also conduct two different user surveys to understand how the community perceives credibility within their networks, and use this knowledge to build and evaluate our ranking models. Through a detailed study, we show that the analysis of perceived credibility of content authors— established through either human input or by assessing the available metadata — is helpful to identify highly credible users within these platforms. We show that by preemptively identifying credible users in a network, it is possible to curb misinformation on micro-blogging platforms.

Keywords: Twitter, Credibility, Social Network Analysis, User graph

**Generating a digital signature for singers to identify their songs**

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Counterfeiting is imitation of the voice of a popular artist, done with the intention of selling or passing it on as a genuine. This study proposes a solution for this problem by providing digital signatures for the unique voices of singers that are generated using songs sung by the artists in Sri Lanka. Voice isolation and Artist classification had been addressed as two different problems throughout the past decades. This project presents a combination of these two problems, which results in a unique signature model for a singer. Songs contain vocal signals surrounded with instrumental music. In order to generate signatures for the voice of the singer, the vocals are isolated. This study proposes an isolation technique using REPET filter, Harmonic - percussive source separation, Butterworth band-pass filter and silence removal, which is proved against a prevailing technique. The signature is generated by using the features extracted after voice isolation. The signature of the singer is originated as a GMM Model. The project had been implemented using open source software. The evaluation had been performed through quantitative and qualitative approaches. The outcome of this research had been successful in generating digital signatures for singers. The singers had been identified accurately even for those who possess similar voices.

Keywords: Audio Signal Processing, Voice isolation, Gaussian Mixture Model, Repeating Pattern Extraction Technique, Harmonic Percussive source separation, Band-pass Filter, Silence Removal

## **Investigating the Chest X-ray Features of Covid-19 Pneumonia Patients using Deep Learning Techniques**

Ayesh Buddhima Meepaganithage, Noel Fernando

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The COVID-19 pandemic has caused devastating effects on global health, the economy, and the daily lives of people. Timely diagnosis is crucial to control the spread of COVID-19. The need for additional testing methods has increased due to the limitations in current testing methods. Some of the studies showed that medical imaging techniques can be used to detect COVID-19 pneumonia. In this study, we focused on applying deep learning methods to classify chest X-rays as COVID-19 pneumonia, normal, and non-COVID pneumonia. We developed two deep learning models to detect COVID-19 using Posteroanterior (PA) and Anteroposterior (AP) view Chest X-rays. Two datasets of 300 chest X-rays (100 healthy, 100 non-COVID pneumonia, 100 COVID-19) for PA and AP view were used. As the first deep learning model, a new Convolutional Neural Network from the scratch was built. Then, VGG16, VGG19, and ResNet50 transfer learning models were used. Finally, the transfer learning models were extended by adding more layers to the top of the existing model. As the first part of this study, we used PA view X-rays and obtained 98% overall accuracy, and 98% precision, 99% recall, and 99% f1-score for the COVID-19 class using the proposed extended VGG19 model. In the second part, we used AP view X-rays and obtained 79% overall accuracy, and 96% precision, 83% recall, and 89% f1-score for the COVID-19 class using the proposed extended ResNet50 model. Finally, gradient-based class activation maps were generated using the proposed extended VGG19 model to visualize the areas that helped the model in detecting COVID-19. This research showed that high performance can be obtained in detecting COVID-19 using extended transfer learning models. In PA view X-rays the proposed extended VGG-19 model performed the best and in AP view X-rays the proposed extended ResNet50 model performed the best.

**Keywords:** Covid-19, Chest X-ray, Machine Learning, Deep Learning, Convolutional Neural Network, Transfer Learning

## **Coconut Price Prediction in Sri Lanka Using Long Short-Term Memory (LSTM)**

### **Approach**

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Coconut is one of main commercial crop in Sri Lanka. Sri Lanka produce around 2500 – 3000 million nuts per annum and hugely consume in domestic household and rest is

use for to manufacture export value added Coconut products. The main issue coconut industry face is the coconut price variations. The goal of this project is to create a machine-learning approach that uses supervised learning to estimate the price of coconut in Sri Lanka. This model can be used by the Coconut Manufacturing sector and Sri Lankan farmers to forecast prices and take required production decisions. Coconut Development Authority publicly available data was selected for this research. The review of the literature assisted in identifying past research in relation to previously built crop price prediction models. The weekly coconut price data set was used to create and test the supervised learning model. The coconut price will be predicted using supervised learning methods such as the long-short term memory neural network (LSTM).

Keywords: Long Short Memory (LSTM), Coconut price, Supervised Machine Learning



## **Live Virtual Machine Migration Techniques**

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Virtualization is an important add-on used in cloud and cluster environments to improve server consolidation, isolation and to reduce operational costs. Virtual machine (VM) is a virtual form of a physical machine that encapsulates cloud customers' critical workload and provides isolation and a secure environment from peer VMs and malicious users. Live migration of a VM allows to transfer VM state dynamically from one host to another while VM is in its execution mode. Live VM migration allows the VM to decouple applications running inside a VM from the hardware on which that VM is hosted. This decoupling feature is crucial for cluster environment activities such as load balancing, fault tolerance, power/energy savings, and server maintenance. This study compares state-of-the-art live migration techniques and their optimizations of VMs in both local and wide area network settings.

**Keywords:** Live migration, Virtual machines, Cloud Computing

## **Application of Edutainment Concepts and Tracking Emotions Based on Transient Emotion Peak in Online Education Systems**

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Edutainment concepts such as Game-based learning (GBL) and ‘gamification’, pave the way for students to learn by experience by going beyond the traditional teacher-centered learning environment concepts. This paper is an attempt of investigating the feasibility of implementing a virtual learning environment by using “Edutainment” concepts to teach Science-based subjects to undergraduate students, to find the most effective way out of GBL and gamification approaches in teaching and to facilitate an online test environment to have frequent formative assessments to self-evaluate themselves. The first goal was to identify this student cohort’s preferred way out of GBL and gamification in learning. A game and a similar gamification approach were designed to teach a subject. Next, a qualitative analysis was conducted by collecting students’ feedback on each approach and a quantitative analysis was done to compare the effectiveness of the two approaches based on answers given to a quiz based on that subject. Under the second goal, it was found that an effective feedback should have to address emotional level of the student too. Hence, this study proposed a systematic way to track the emotional changes based on the transient emotion peak. We conclude, that adult students mostly tend to grab the core concepts rather than playing fancy games and though the proposed algorithm that tracks emotional changes works at a good accuracy level it would be better to use this proposed time interval to track the concentration level with some other features.

**Keywords:** Constructive Feedback, Formative Feedback, Game-based Learning, Gamification, Stimulus Activity, Student Evaluation, Transient Emotion Peak Time

**Minimize Traffic Congestion with Emergency  
Facilitation using Deep Reinforcement Learning**

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In intelligent traffic light control, matrices derived from real-time traffic data are paramount for efficiency and performance. The rewards and state representations in previous studies could mislead a Reinforcement Learning agent in some cases. This paper examines the effectiveness of considering the Standard Deviation of vehicle's Waiting Time (SDWT) on Deep Reinforcement Learning based traffic congestion control with emergency facilitation. The proposed method was self-evaluated by only considering average waiting time under both synthetic and Toronto real-world dataset. It has demonstrated that the proposed method was able to gain a significant impact on performance by considering the SDWT. Moreover, the proposed method was able to reach zero waiting time for emergency vehicles.

Keywords: Machine learning, Reinforcement learning, Traffic light control, Emergency vehicle prioritization, Deep learning

## **A Decision Making Aid for Organizations during Epidemic Situations**

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An epidemic is a widespread infection within a population at a particular period. COVID-19 is one such epidemic which is converted to a pandemic level more recently. COVID-19 has an enormous impact on people's livelihood, health, economy, and social life. In Sri Lanka, we have faced the dreadful side of the COVID-19 during its second, third, and fourth waves. This was influenced by the behavior of the organizations. During this period several intervention strategies have been introduced to stop the disease spread globally and as well as in countries. There were many epidemic models built so far using SIR models, micro-level models, macro-level models, cellular automata, agent-based modeling, etc. For this research we used Agent-Based modeling to simulate a contagious disease spreads in different organizations. Several parameters have been introduced in the development process of these models considering some important aspects of contagious disease spreads. Implemented currently practicing two interventions to enforce the effectiveness of the social distance and face mask-wearing behaviors in the environment. Generated some results from these computational models by changing the above mentioned parameters. The effectiveness of the two interventions in mitigation of the spread of the disease has been able to prove. Flattening the curves of the graphs can be get at lower points when the interventions are enabled in the simulation. The simulation clearly shows the impact of parameters and their importance in the epidemic spreads.

Keywords: Agent based modeling, Epidemic modeling

**A predictive model to minimize false-positive declines in Electronic Card Not Present financial transactions using feature engineering techniques**

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In this research paper, we are been proposing a predictive model to minimize false positive declines (“Legitimate transactions are been declined falsely identifying as fraudulent”) in electronic CNP transactions. Related to the increased popularity of digital payments FP declines are becoming a severe problem among merchants who provide digital payment solutions. It’s estimated that nearly 10% of the transactions are been declined as fraudulent transactions but only very few of them have fallen into the fraud category. To address this problem we have proposed a feature engineering technique based on behavior analysis. Our research is conducted based on a real-life CNP transactional data set from one of the largest fintech service solution providers in Sri Lanka and we have generated 130 features for each transaction and have employed an XgBoost Classifier to learn the classifier. We found out that this solution can mainly benefit the merchants who provide electronic payment solutions which involve CNP transactions to minimize false-positive declines targeting legitimate frequent customers and by the same, it minimizes the fraud losses and protects the customer’s interests.

Keywords: False-positive problem, Machine learning, Feature engineering, Behavior analysis, Rule-based approaches, Fraud detection

**Towards a Framework for Online Exam Proctoring in Resource-Constrained Settings  
Focusing on Preserving Academic Integrity**

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In recent years, there has been a remarkable surge in the global usage of online learning. However, it is facing difficulty maintaining academic integrity during online assessments. To that purpose, many institutions have implemented remote exam proctoring through video-conferencing software, which necessitates a large number of human proctors when thousands of students take an online test at the same time. Unfortunately, government-funded institutes in Sri Lanka cannot use automated online exam proctoring solutions on the market since they are expensive and frequently do not suit low-resource contexts. This research aims to find techniques to reduce computing costs and network data consumption in automated online exam proctoring scenarios. First, we will create a dataset by manually proctoring an online exam via video conferencing because we do not have a publicly accessible dataset to capture potential acts of misbehaviour. Second, we will use the data collected to find an online proctoring system that works well under resource constraints. Finally, the study will assess the suggested method's usefulness in detecting academic dishonesty in low-resource situations.

Keywords: Academic Integrity, Online Exams, Proctoring

## **Simulating Microscopic Traffic With Intelligent Vehicle Agents**

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Traffic Simulation is the process of recreating the flow of vehicles observed in the real world into a simulation environment. Even though many traffic simulations models have been introduced over the past, one of the major topics to be investigated in this field is simulating vehicle traffic with vehicles having intelligent behaviours. Simulating vehicle traffic with intelligent vehicle behaviours is necessary for developing more robust applications using traffic simulation models. Humans have diverse behaviours when driving in traffic. Hence it is essential to reflect this when simulating traffic. This research discusses the research and development of a microscopic traffic simulation model using Machine Learning techniques to simulate vehicles with intelligent behaviours. The main objective of developing such a traffic simulation is to introduce human-like driving agents in traffic simulations. Previous works focus on either law of physics and mimic them to simulate vehicle traffic or use mathematical and rule-based models to simulate traffic. One of the main limitations with this is that they follow a set of rules. Hence it cannot model the unpredictable nature of humans in driving vehicles. Machine learning focuses on using data and algorithms to imitate how humans learn and improve from their experience. Driving is a skill where humans gradually learn and improve in their lifetime. Therefore, it is safe to say that we could develop vehicles with intelligent behaviours using machine learning techniques and use them when simulating traffic. Therefore, Machine Learning techniques will be explored to generate intelligent vehicle behaviour when simulating traffic.

Keywords: traffic simulation, backward movement, Intelligent agent, Reinforcement learning, Machine learning

**Addressing the Last-Mile Delivery Problem via  
Unmanned Aerial Vehicles for urban high-rise  
apartment buildings**

Chethani Wijesekara, Nipuni Yapa Rupasinghe, Nisal De Silva, Kasun Karunanayake,  
Manjusri Wickramasinghe, Thilina Halloluwa  
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The “Last Mile Problem” in Supply Chain is referred to the inefficient final step of the delivery process where the goods and services are delivered to the end-user. This last portion is highly expensive and time-consuming when deliveries are happening using the traditional methods such as delivery trucks or vans, especially in urban environments where there are poor road infrastructure and high traffic congestion. Researchers are now working on finding a solution to this problem using different approaches and one such approach is using Unmanned Aerial Vehicles (UAVs) for parcel deliveries. Well-reputed companies such as Amazon, Google and UPS have ongoing pilot drone delivery projects but only with a scope of delivering parcels to few selected homes in rural areas with gardens that have ample space to lower the UAV safely. Few reasons behind limiting these projects only to rural areas can be identified as safety and privacy reasons in the highly dense urban environment. Due to the high population density in urban areas, there are a huge number of apartment buildings and complexes and some with a large number of floors. Usually, the apartments in these buildings do not have a private garden but mostly there is a balcony. In our research, we plan to discuss how we can use UAVs for delivering parcels to balconies in apartment buildings. GPS signals are mostly inaccurate in urban areas due to many high rise obstacles. Therefore, excessive dependence on GPS navigation has been identified as one of the major challenges of operating UAV related projects in urban areas. As our main research focus, we plan to discuss a UAV navigation method that does not solely rely on GPS signals. In the proposed method, initially, we plan to create a model of the building to locate each apartment balcony separately. With such a model, we hope that we can generalise our system to an apartment building without limiting it to a given building. Then, when the balcony number is given, the UAV should be able to identify the destination point by using the previously created model and navigate between the given starting point and the identified destination point, with proper trajectory planning. Once the UAV reaches the balcony, it should be able to maintain a



proper distance and the angle with the balcony to drop the parcel safely without harming the occupants or damaging the property. In our research, we plan to analyse the available solutions for the above-mentioned scenarios to identify the most suitable approaches in our context and implement an autonomous UAV system that will be able to fulfil all of these requirements. Our solution will be a facility that comes with the apartment building itself and it requires some infrastructure changes of the building. Therefore we see the apartment building of our interest in a futuristic perspective where there will be balconies with a built-in area for drone deliveries.

Keywords: Unmanned Aerial Vehicle (UAV), autonomous navigation, monocular Visual Odometry (VO), Inertial Measurement Unit (IMU), ArUco marker

**Online Proctoring For Mass Examinations****With Optimized Resource Usage**

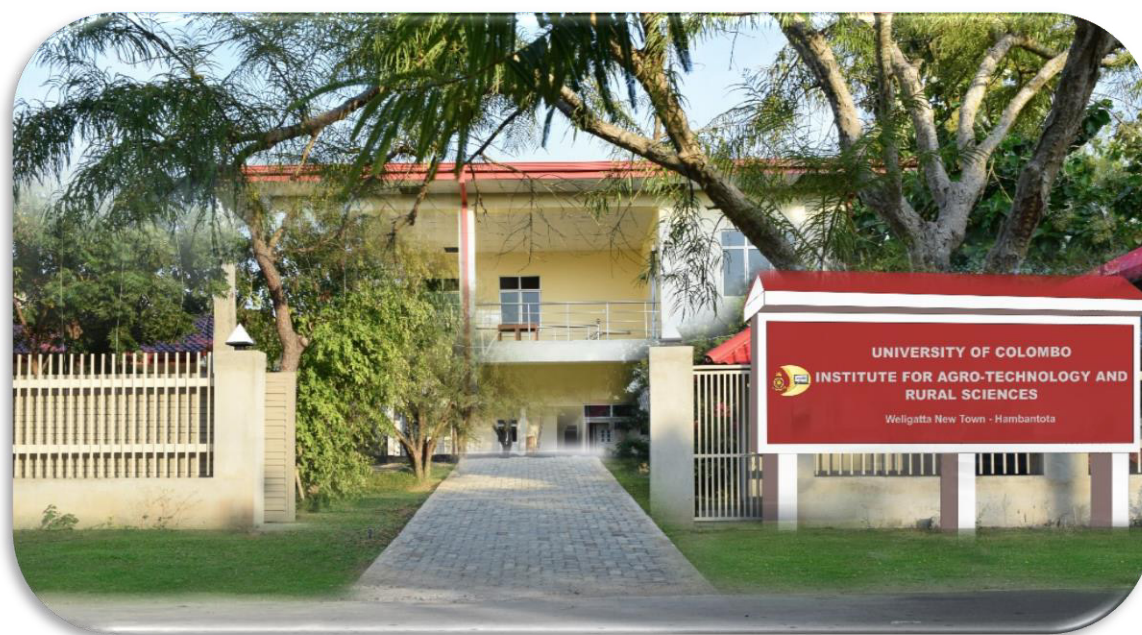
Kodituwakku S.N.E., Gamhatha K.M.D.M.K., Perera B.N.B., Fernando C.G.R., Perera R. D.,  
Pasindu Marasinghe, Thilina Halloluwa  
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Sri Lanka's current education system is moving onto digital modes. Hence the demand for online examinations is surging. Conducting online examinations with video conferencing tools and/or web browsers have several critical issues. The main issue being the bandwidth issue. Most students and proctors do not have the proper bandwidth to send/receive two to three streams when using video conferencing tools. Most of these tailor-made tools used for exam proctoring and monitoring are expensive and come with many limitations. By running two or three applications concurrently, students having devices with low specifications face many issues. Hosting mass examinations online is another critical issue in today's online examination context. There is a need for a considerable amount of proctors for monitoring students in this mode. For institutions where the number of proctors is limited, this will be a major challenge when it comes to monitoring multiple students simultaneously. Besides all these issues, preventing exam offences is another critical issue faced by proctors and exam coordinators when hosting examinations online. There are so many ways that a student can cheat during the exam such as referring to e-learning material, getting external help, using a virtual machine, and using a secondary screen. The proposed solution is a single application that improves the quality of the distance examinations by reducing the aforementioned bandwidth issues and introducing many features that will help to conduct mass exams reliably and efficiently. The examinee's front-view, side-view, screen, current process-list of the device, device specification, device clipboard, and background sound, will be used to analyze the examinee's behavior. For the front view, the examinee's front camera will be used. The side-view will be taken from another mobile device which will be placed on a required proper angle. The real-time process-list, clipboard, and device specification will be taken using a desktop application. Even though the system takes all that data, only side-camera footage will be streamed to a proctor. The front-camera feed will be processed through a machine learning model and will be analyzed whether there is any other person near the examinee. An audio feed will be fetched into another ML model that can also detect

suspicious activity sounds. If the models detect any unnatural behavior or exam offence, the system will send an alert to the proctor with snapshots regarding that behavior. However, all audio and video streams will be encrypted, hashed, and stored in the student computer as evidence. Only the side camera footage will be streamed. Therefore, the proposed solution will reduce the bandwidth issue drastically. Students and proctors can communicate via an inbuilt chat interface if needed. Since the proctor only needs to monitor one video stream per student, mass examinations along with online proctoring can be conducted using minimum resources by using the proposed solution.

**Keywords:** Online Proctoring, Education, Examination

# **University of Colombo Institute for Agro-Technology and Rural Sciences**



*A Way Forward for Smart Agriculture towards  
Rural Development*

28<sup>th</sup> June 2021

## MESSAGE FROM THE DIRECTOR

**Prof. S. Sutharsan**

Director

University of Colombo Institute for Agro-Technology and Rural Sciences, Sri Lanka



I am delighted and proud to deliver this message as the Director of the University of Colombo Institute for Agro Technology and Rural Sciences (UCIARS) to the Virtual Second National Symposium on Agro Technology and Rural Sciences 2021 (NSATRS 2021) on the theme of “**A way forward for smart agriculture towards rural development**”. The symposium will provide a comprehensive overview of the research conducted in the field of Agro Technology and Rural Sciences over the past years.

This institute endeavors to generate well rounded students with knowledge, talents, skills and attitudes with more exposure to outside expertise and practical trainings. The NSATRS 2021 provides the second opportunity to young academics, researchers and students, a platform for exchanging new findings, creative ideas, views and showcasing their talents and it will continue annually to ensure that UCIARS is a promising model in the academic sphere. Hence, UCIARS plays a significant role in knowledge sharing, technology generation & dissemination, product development & patenting and creation of agro-entrepreneurs which make direct contributions to the betterment of the agriculture sector in Sri Lanka.

I congratulate the organizing committee of the NSATRS 2021 for compiling all valuable scientific information as a proceeding which is a commendable team effort of staff and students of UCIARS.

My profound blessings to you all and very best wishes for all your future endeavors!

Thank you

## MESSAGE FROM THE SYMPOSIUM COORDINATOR

**Dr (Mrs.) S. S. Weerasinghe**

Senior Lecturer

University of Colombo Institute for Agro-Technology and Rural Sciences, Sri Lanka



It is a great pleasure of publishing the second proceedings of NSATRS – 2021 with dedicated and lavish contribution of everyone at the University of Colombo Institute for Agro Technology and Rural Sciences. The key goal of the symposium was to provide a platform to share and exchange the expertise, experiences and research findings and to create a forum specially for young researchers and to discuss the challenges and future directions in different research in Argo Technology. The proceeding provides a glimpse of the diverse interests on Agro Technology based research and its new directions. Hence, this symposium provided a great opportunity for sharing brilliant ideas and stimulating awareness and concerts for inspiring the national agriculture beyond the production.

The responses to the call for papers were overwhelming and I would like to express my sincere gratitude and appreciation for all reviewers who helped us to maintain the quality of manuscripts included in this proceeding. I would like to express my thanks to the members of the organizing team for their hard work, commitment, and dedication extended to make this a success. The support received and enthusiasm witnessed by all have truly exceeded our expectations. The symposium that covers timely important subject areas was indeed a step taken by UCIARS to promote the knowledge and enthusiasm of entrepreneurs across it's vision of "Entrepreneurial Agriculture and Sustainable Natural Resource Management".

Enjoy the technical programme please and pleasantly invite your deliberations for applications of technical intelligence for the betterment of Agriculture in Sri Lanka.

Thank you

# NSATRS 2021

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**Second National Symposium on  
Agro-Technology and Rural Sciences 2021  
University of Colombo Institute for Agro-Technology and Rural Sciences  
28<sup>th</sup> June 2021 from 8.00 a.m. to 5.00 p.m.**

**Programme**

- 8.00- 8.05 a.m. Welcome Address Symposium Coordinator**  
Dr. (Ms.) S. S. Weerasinghe  
Senior Lecturer / UCIARS
- 8.05- 8.10 a.m. Inauguration Address by Symposium Chair**  
Prof. S. Sutharsan  
Director / UCIARS
- 8.10- 8.15 a.m. Address by the Chief Guest**  
Senior Prof. Chandrika N. Wijeyaratne  
Vice Chancellor, University of Colombo
- 8.15- 8.45 a.m. Keynote Speech**  
*Inventions and innovations – A key to success*  
  
Dr. Richard S. Cahoon  
WIPO, Sr. Expert  
Bio-property Strategy Group, Inc., President  
Cornell University College of Agriculture & Life Sciences  
Department of Global Development, Professor-adjunct  
USA
- 8.45- 8.55 a.m. Address by the Guest of Honour**  
Mr. Dipin P. R.  
Consul General of India Hambantota, Sri Lanka
- 8.55- 9.05 a.m. Address by the Special Guest**  
Mr. Sanath Ranawana  
Principal Water Resources Specialist, South Asia  
Environment, Natural Resources and Agriculture Division - ADB
- 9.05- 9.15 a.m. Vote of Thanks by the Symposium Secretary**  
Mr. L. M. Rifnas  
Lecturer (Probationary) / UCIARS
- 10.00 - 5.00 p.m. Technical Sessions**



## INTRODUCTION TO THE KEYNOTE SPEAKER

### **Dr. Richard S. Cahoon**

WIPO, Sr. Expert

Bio-property Strategy Group, Inc., President

Cornell University College of Agriculture & Life Sciences

Department of Global Development, Professor-adjunct

USA



Dr. Richard S. Cahoon has the service of 20 years as Director of Cornell University's intellectual property (IP) management and licensing center and Vice President and President of Cornell Research Foundation. Managed staff of 30+. He is President of BioProperty Strategy Group, Inc. an international IP and technology commercialization consulting firm. He is the president of R S Cahoon & Associates, an agricultural IP management and commercialization consulting firm. He is the senior advisor to the Agricultural Innovation Program; USAID-funded project for technology transfer capacity building project at six Indian universities. He is the Lead Expert, Global IP Capacity Building project for International Intellectual Property Institute; technology transfer capacity building for six Philippines universities. He was a former member, Board of Directors for Transonic, Inc. and BioWorks, Inc.

Dr. Richard S. Cahoon is an advisor, World Bank project on assessing biotechnology as an economic development strategy in developing countries. He is adjunct to faculty at Cornell (teaching & project management in agricultural entrepreneurship) and University of New Hampshire School of Law (technology marketing and technology transfer). He is USIMP (Turkish consortium of universities and industry) advisor on technology transfer capacity building. He is the CEO/Founder of two companies based on proprietary technology. He Helped create and launch over thirty new companies based on Cornell IP. He Recruited several dozen entrepreneurs to start new Cornell ventures. He is a mentor for several dozen graduate/undergraduate students, and fellows in the areas of IP management, technology commercialization, and entrepreneurship. He is the Organizer/ key faculty for international courses on entrepreneurship in India, Qatar, Thailand, South Africa, Morocco. He is Currently advising several companies and research institutions on innovation, new technology commercialization, new product development, and "intrepreneurship"

## KEYNOTE ADDRESS

**Dr. Richard S. Cahoon**

### **Inventions and innovations – A key to success**

The key points discussed in keynote speech were; elements of rural development, agriculture as a foundation for new opportunities particularly referring to Sri Lankan context, a particular path to step forward in the field of Agriculture, inventions and innovations in common, the “innovation eco system” and creative economy, what element do people need, particularly in Sri Lanka? And creation of opportunities for the rural development in agriculture.

The factors as sufficient livelihoods for households, health, safety, sound environment, and economic opportunities especially for young people, should be taken into consideration for rural development. Agriculture as a main source of opportunity in Sri Lanka and as the youth all we need to do is to explore and identify what they are. The most interesting thing in agriculture is that it's a democratic and egalitarian industry. Improved agricultural products and different processes in agriculture are also ways for innovations and inventions, as people observe new technologies while paving opportunities for profitability. Hence, as agricultural practitioners, people need to stimulate the younger generation to engage in new inventions and innovations while making them the driving force and considering the government it as a supportive hand. Accordingly, ‘invention and innovation’ is proven to be a powerful way for Agricultural and Rural development.

Thus, by referring to few inspiring stories as the POM's, Inventor Solveiga Pakstaite's and Bob Kime's story, the new inventions and innovations of Agriculture can help individuals to improve their economy. The main requirements for building an innovative ecosystem and creative economy in Sri Lankan Agriculture are identified as; Inventors and innovators, resources to support them, implementors and risk takers, entrepreneurs, intrapreneurs, investors, supportive government and universities.

If these elements are available, the country can be developed in technology, administrative organization, infrastructure and processes, business models, networks, partnerships, channels, new products and services, etc.

## **Eco-friendly bio prills with water Hyacinth (*Eichhornia crassipes*) to raise nursery plants**

H. I. G. K. Anuruddi, K. P. Samarasinghe, L. M. Rifnas, S. S. Weerasinghe\*

*Department of Agro-Technology, University of Colombo Institute for Agro-Technology and Rural Sciences, Weligatta New Town, Hambantota, Sri Lanka*

Easily affordable nursery substrates are a current need due to the higher costs incurred in coir dust-based medium. Meanwhile, plastic based pots and trays used in commercial nurseries and removed during transplanting that leads root damages and environmental pollution. Therefore, it is very important to develop eco-friendly nursery pots using biodegradable materials. With this objective, the present investigation was carried out at University of Colombo Institute for Agro-technology and Rural Sciences - Weligatta, to produce bio prills using Water Hyacinth (WH), locally known as Japan jabara (*Eichhornia crassipes*) which is a common aquatic plant in reservoirs. The fresh WH plants were chopped, dried and pound into a powder. It was mixed with Untreated Coir Dust (UCD) at different ratios and molded into flat structures termed as prills. Treatments were; WH only, WH: UCD 1:1, WH: UCD 1:3, WH: UCD 3:1, UCD only and Commercial Coir Dust (CCD). Electrical Conductivity (EC), pH and Water Holding Capacity (WHC) of the prills were evaluated. The suitability of the product for raising seedlings was tested by raising brinjal seedlings up to transplanting stage in a completely randomized design with 10 replicates. Germination, seedling height, number of leaves, root length, wet biomass and survival of the seedlings at transplanting were recorded. There was a significant difference in EC, pH and WHC between the treatments. When WH proportion is increased in the treatments, EC and pH also increased recording the highest pH (8.2) in prills prepared only with WH. Seedling performance in that treatment was significantly lower when compared to CCD and UCD. It may be due to the high pH and EC which is not suitable for seedling growth. However, WH: UCD 3:1 treatment showed significantly same seedling performance to CCD and UCD treatments in terms of germination, seedling height, root length, wet biomass and survival at transplanting. Therefore, WH: UCD 3:1 prills were selected as appropriate combination to produce bio prills where the WH can be used to maximum extent. Further improvements are in pipeline to increase the WH proportion in the prills while controlling pH and EC.

*Keywords: Bio Prills, Eco Friendly, Seedling Nursery, Water Hyacinth*

## Water Hyacinth based organic grow bags for urban gardening

H. I. G. K. Anuruddi, K. P. Samarasinghe, L. M. Rifnas and S. S. Weerasinghe\*

*Department of Agro-Technology, University of Colombo Institute for Agro-Technology and Rural Sciences, Weligatta New Town, Hambantota, Sri Lanka*

Urban gardening is limited to few structural arrangements to cultivate crops due to limitations of land and water. Therefore, portable, easy to handle and less space required crop growing structures are essential for urban settings. Topsoil, coir dust and compost are the presently used growing media in urban farming activities. But urban soil is heavily contaminated and may not be suitable for growing crops. Since coir-based products are not freely available there is a need to introduce easily available low-cost growing substrates. With that objective, the present study was carried out at University of Colombo Institute for Agro-technology and Rural Sciences - Weligatta, to produce grow bags using Water Hyacinth (WH); *Japan jabara* (*Eichhornia crassipes*) as a growing media. As a parallel study, it has already been identified the growing media of WH: Untreated Coir Dust (UCD) 3:1 as a suitable substrate for growing nursery plants. With the objective of developing grow bag using this identified media combination, the present study was conducted as a further improvement. About 300g of dried and powdered WH and 100g of UCD was mixed and filled into a square shaped (12" x 7") and round shaped (12" height and 8" diameter) black polythene bags and they were inserted into the same sized molds made with wood and steel. These filled bags were compressed using a special device assembled for the purpose to prepare grow bags. Another few grow bags using UCD were also compressed. The suitability of the product for raising seedlings was tested by raising Brinjal seedlings in a completely randomized design with 05 replicates against commercial and UCD grow bags. Germination, seedling height, number of leaves, root length, wet biomass and survival of the seedlings were recorded at 21 days of seed sowing. According to the results, there was no significant difference of the evaluated parameters among the treatments. Therefore, this result implies that, grow bags with WH: UCD 3:1 media have the same capacity to produce seedlings as of commercial coir bags. Adding WH will help to reduce the coir dust utilization which is costly.

*Keywords: Grow bags, Low cost, Urban farming, Water hyacinth*

### **Grow bags from Banana (*Musa spp*) pseudo stem for urban farming**

K. P. Samarasinghe, H. I. G. K. Anuruddi, L. M. Rifnas and S. S. Weerasinghe\*

*Department of Agro-Technology, University of Colombo Institute for Agro-Technology and Rural Sciences, Weligatta New Town, Hambantota, Sri Lanka*

Improper dispersal of agricultural waste not only pollutes the environment but also waste renewable energy. Recycling and reusing of agricultural waste are regarded as critical steps in environmental conservation in agricultural production. generally, popular urban gardens produce cheap, fresh products which are important for assuring food and nutrient safety of urban dwellers. To promote and popularize this concept within a restricted space in urban areas, introduction of low cost, easily accessible materials are of prime importance. Accordingly, there is a need to introduce possible substitutes for replacing high cost growing media to be used in urban gardens. With that objective, the present study was carried out at University of Colombo Institute for Agro Technology and Rural Sciences (UCIARS) - Weligatta, to produce grow bags using Banana Pseudo Stem (BPS) as the growing media for raising plants. In a parallel study, it has already been identified the growing media of Banana pseudo stems added with 1/3 of coir dust (CD) as one of the best substrates for growing nursery plants. Based on these findings the current study was carried out as a step forward to develop a grow bag as a most appropriate structure especially for vertical farming in a restricted space. About 300g of dried and pounded BPS and 100g of CD was mixed and filled into a square shaped (12" x 7") and round shaped (12" height and 8" diameter) black polythene bags and they were inserted into the same sized molds made with wood and steel. These filled bags were compressed using a special device assembled for the purpose to prepare compacted grow bags in which materials remain as a block. It helps easy handling, transportation in commercial scale production and hanging in vertical farming. The suitability of the product for growing plants was tested by raising Brinjal seedlings in a completely randomized design with 05 replicates against commercially using blocks made up of coconut fiber. Germination, seedling height, number of leaves, root length, wet biomass and survival of the seedlings were recorded at 21 days of seed sowing. There was no significant difference in evaluated parameters among the treatments implying that, grow bags with BPS: CD 3:1 media have the same capability to produce seedlings as of commercial coconut fiber bags.

*Keywords: Banana pseudo stems, Grow bags, Low cost, Urban farming*

## TECHNIQUE TO REMOVE THE ASH ADHERED ON BANANA (*Musa spp*) LEAVES BEFORE CURING AS FOOD WRAPPERS

W. G. C. Madushani<sup>1\*</sup>, I. C. Dodampe<sup>2</sup> and S. S. Weerasinghe<sup>2</sup>

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At present, polythene and lunch sheets are widely used as food wrappers despite that lead an enormous environmental problems. As a solution, different types of biodegradable food wrappers have been introduced since recent past and among them Banana leaves are the most practicable and commonly available material. Being Banana is the major fruit crop grown in Sri Lanka availability of raw material is excessive, and the wrapper production technology is available to be practiced as a cottage level industry. One of the limitations of this technique is presence of ash on the wrapper after curing of the food wrappers which affects not only the attractiveness of the product but also customers misled to believe this ash as a chemical has been applied during processing. This ash is an inherent material adhered on to the lower surface of the leaf as a natural element. Hence, this study intended to identify a technique to remove the ash intact on to banana leaves before subjecting for curing as a pretreatment. Pieces of well expanded 40 banana leaves were subjected for four treatments; warm water; cool water, soap water and just tap water as the control treatment. Also, four soaking durations as just 5 minutes, 6 hours, 12 hours and 24 hours were considered. The treated leaves were wiped with a piece of sponge and washed well using tap water. Then the leaves were cured by dipping them in boiling water for two seconds and allowed them to cure for 3-4 hours under room temperature to be used as food wrappers. The quality of the cured leaves was evaluated using questionnaire with a panel comprised of 20 members. According to the results 98% of the respondents reported soaking in soap water for 24 hours as the best treatment for eliminating ash adhered on to the banana leaves. As a conclusion it could be identified the soaking in soap water for 24 hours as the better and easy practice for removing ash on banana leaves before curing them to be used as food wrappers.

*Keywords: Ash layer, Banana, Food wrappers*

**Effect of organic manure on performances of Paddy (*Oryza sativa*) cultivation in Ampara district**

H. M. A. Y. A Sandaruwan<sup>1</sup>, H. I. G. K. Anuruddi<sup>1</sup>, S. S. Weerasinghe<sup>1\*</sup> and M. F. A. Saneer<sup>2</sup>

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Sri Lanka currently produces 2.7 million tons of rice annually and satisfies around 95% of the domestic requirement. Out of that about 16% is produced by Ampara district which is one of the major paddy cultivating districts in Sri Lanka. The extent of paddy cultivation in Ampara district is around 82, 000 ha and cultivate in both Yala and Maha seasons. Currently their cultivations are mainly dependent on inorganic fertilizers and farmers follow the recent recommendation made by the Department of Agriculture (DOA) on the basis of GS divisions. They never apply organic manure to their paddy cultivations and have no experience about application or its impact on growth and yields. Therefore, it is worth to study the feasibility to apply organic manure for paddy cultivation in this area. Having this objective an experiment was conducted in Pannalgama GS division in Damana area in Ampara district using commonly growing rice variety BG 94/1. Five treatments as T1 – only inorganic fertilizer recommended by the DOA as the control treatment (N-225, P 00, K -20 kg/ha) T2 (Composts 10 mt/ha +DOA recommendation), T3 (Cow dung 10 mt/ha + DOA recommendation), T4 (Poultry manure 5 mt/ha + DOA recommendation), T5 (Gliricidia leaves 10mt/ha + DOA recommendation) were tested in Randomized Complete Block Design with three replicates. Pre germinated seeds were broadcasted and plant height (cm), number of tillers, number of panicles, number of seeds/panicle ,100 seed weight (g), total yield (Mt/ha) and straw yield (Mt/ha) were recorded. The cow dung showed significantly higher results in all growth and yield parameters compared to the other organic manure types and the control. Hence, application of inorganic fertilizer along with organic manure preferably with cow dung could be identified as better combinations for obtaining higher yield from paddy cultivation in Ampara district.

*Keywords: Ampara, High yield, Organic manure, Paddy*



## **YIELD AND PEELING PERFORMANCES OF CLONAL-CUTTINGS AND SEEDLINGS OF CINNAMON (*Cinnamomum zeylanicum*)**

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<sup>3</sup>*Department of Export Agriculture, Kandy, Sri Lanka*

Cinnamon plantations in Sri Lanka are predominantly established by the seedlings since British era. The heterogeneous plantations resulted through seedlings raised by cross-pollinated seeds is a major constraint in maintaining the uniformity of harvest. However, cinnamon growers still prefer seedlings due to some issues related to traditional processing methods and crop management practices compared to clonal cuttings. The present study was conducted to evaluate the seedling and clonal cutting populations of cinnamon on performances of bark yield, stem-erectness, branching habit, the ratio of harvestable shoots to total shoots, stem diameter, and stem height. Qualitative traits such as stem-erectness, branching habit and the ratio of harvestable shoots to total shoots were analyzed based on descriptive statistics while quantitative traits were analyzed using a t-test. The results showed that significant differences in all studied characters. Seedlings showed a significantly higher peeling efficiency in traditional processing methods whereas, population of clonal cuttings showed significantly higher ( $p < 0.05$ ) bark yield with a lower peeling efficiency. Seedling plants had over 90 % of erect and slightly curve stems and showed very less branches in the bottom part of the stem. Both these traits were positively affected on to the traditional peeling efficiency of seedling plants. Nevertheless, maintaining of high number of total stems (average number of stems is 7.4) per seedling bush could be the reason for the yield reduction in seedling plants compare to the clonal cutting plants. Further, the observations suggested that the plants raised with clonal cuttings were required more training and pruning practices to obtain erect stems which need to increase the peeling efficiency. Accordingly, it could be concluded that the seedling raised plantations are superior to clonal cuttings derived plantations for traditional peeling techniques despite the lower yields. Therefore, further investigations are planned to improve the yield performances of clonal cuttings.

*Keywords: Bark yield, Cinnamon, Clonal cuttings, Peel-ability, Seedlings*



## MORPHOLOGICAL CHARACTERIZATION OF *Terminalia catappa* L. (TROPICAL ALMOND) IN GALLE DISTRICT, SRI LANKA

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Identification of phenotypic variability mainly depends on characterization of morphological traits. Morphological characterization of plants is important in plant improvements and breeding programs. Morphological traits work for essentially in effective utilization of plant germplasm to get economic and breeding gain. This research was aimed to study morphological characters of *Terminalia catappa* L. (Tropical almond) grown in Galle District in Sri Lanka. The data was collected from 70 selected plants in Galle district and locations were identified through literature and information given by government officials of the relevant authorities and general public. Sites for sampling of *T. catappa* was identified through the snowball sampling technique. According to the study, *T. catappa* plants grown in Galle district shown variations in morphological characters including plant characters, leaf characters, floral characters, fruit characters and seeds characters. *T. catappa* plants grown up to 8-40 m height with erect or spreading canopy. Plant bark is varied in colour with light brown, brown, gray, gray black and black and diameter at the breast height around 10-57 cm. The immature leaves are light green and covered with brown hairs and turn into dark green and hairless when mature. The leaves are obovate with acute or obtuse tip and ariculate of subcordate base. The 10-15 leaves with 18-41 cm length and 10-21 cm width arranged together as close spiral. Trees defoliate twice a year and leaves turn in to the red colour before falling. The inflorescence (length: 6-30 cm) consist 50-80 flowers which are white, greenish white or cream and 0.5-1.1 cm length and 0.2-0.6 cm width. The fruit is a drupe 5- 9 cm in length and 3-6 and ovoid to ovate and rarely rounded, green when immature and turn in to yellow to bright red during ripen. The ripen fruit weight varied from 8-35.5 g. This drupe comprised with exocarp (skin), mesocarp, endocarp and seed. Fruit coat is 0.3-1 cm in thickness. The white colour seed is an ovoid to ovate in shape and covered from 0.7-1.5 cm thick seed coat. The seed is 0.4-1.5 g in weight. Thus, there are some morphological variations of *T. catappa* plants grown in Galle District which can be used by breeders for improvement of the plants.

*Keywords: Characterization, Galle, Morphology, Terminalia catappa, Tropical almond*

## EFFECTS OF SEED TREATMENTS AND GROWING MEDIA ON GERMINATION OF VARA (*Calotropis gigantea*) SEEDS

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*Calotropis gigantean* (Vara) is a least concerned pant in Sri Lanka with a great economic importance. But there is no information on sexual propagation or vegetative propagation of this plant. Seeds of *C. gigantea* float freely in the air, fostering natural regeneration however no information on their success. Therefore, it is important to generate information on seed germination of this plant. With the objective of identifying a suitable seed germination method for *C. gigantea*, current experiment was conducted at University of Colombo Institute for Agro-technology and Rural Sciences. Two conditions; maturity of seeds and growing media were tested to observe their effects on germination of seeds. Well matured seeds before and after splitting of pods were separately collected and subjected for three different seed treatments. As hot water (35°C - 40°C/ 30min), fresh water (30min), Gibberellic acid (4000 ppm for 30 min) and untreated seeds as the control treatment. Four types of media; sand, coir dust, sand: coir dust (1:1 v/v), mixture of sand: compost (1:1 v/v) were used as germination media. The media were sterilized by autoclaving at 121°C for 20 minutes. The experiment was laid out in a Complete Randomized Design (FCRD) in factorial arrangement with 4 replicates in seed trays. Germination was recorded after 7 days of the seed sowing. There was no interaction effect in growing media and seed treatment methods. Seed germination of *C. gigantea* was significantly affected by different germination media and seed treatments separately. The highest germination percentage (67.8%) was observed when the seeds were collected from already split pods and sown in coir dust media. The seed germination percentage of the seeds which were collected after splitting and treated with gibberellic acid gave the highest significant germination percentage (71%). Therefore, gibberellic acid treatment could be identified as the best seed treatment and coir dust as the best media for germination of *C. gigantea* seeds.

*Key words: Calotropis gigantea, Gibberellic acid, Seeds, Split pods*

## **DEVELOPMENT OF AN IN-VITRO PROPAGATION PROTOCOL TO INDUCE SUCKERS FROM SOUR BANANA**

H. K. S. N. Kumari, H. Rohanadheera\* and N. P. Vidanapathirana

*Department of Agro-Technology, University of Colombo, Institute for Agro-Technology and Rural Sciences, Weligatta New Town, Hambantota, Sri Lanka*

Banana is typically propagated vegetatively; thus, tissue culture as a propagation technique provides a robust means to prepare disease-free planting materials that can provide the first line of defense in developing an integrated disease-management program for banana. Generally, it will take 24 weeks to start culture initiation from ex-plant establishment and this could be varying along the mother plant vigor. It majorly effects on increase the cost of production and make barrier to production forecast as well. So, reduction of time gap between ex-plant establishment and proliferation initiation certifies increment of production and productivity with précised forecast. Objective of the study was to determine of the most efficient protocol to induce sucker proliferation at initiation stage for of sour banana. BAP concentrations ranging from 2 – 6 mg/l were tested in split ex-plant in to two segments and non-split methods in standard MS (Murashige and Skoog) basal salt medium. There were altogether ten treatments with ten replicates. The experimental units were arranged in a 5 x 2 factor factorial completely randomized design CRD manner. Number of weeks taken to start the proliferation were observed up to six weeks of time and performances were statistically analyzed using analysis of variance (ANOVA) procedures by SAS 9.1.3 statistical software and mean separation was done using Duncan's Multiple Range Test (DMRT). It was found there were significant interactions between the factors on all the tested parameters. BAP applied at the rate of 5 and 6mg/l with split system showed better performances in all the tested parameters. It could be concluded that, BAP concentrations 5 and 6 mg/l with split system can be used to speed up the proliferation of sour banana suckers.

*Keywords: Ex-plant, In-vitro, Propagation, Sour banana, Split system*

## **EFFECTS OF CINNAMON (*Cinnamomum zeylanicum*) POWDER EXTRACT AGAINST THE PESTS OF RADISH (*Raphanus raphanistrum* Subsp. *Sativus*)**

S. J. Tharanga, N. P. Vidanapathirana\* and A. J. M. C. M. Siriwardana

*Department of Agro-Technology, University of Colombo Institute for Agro-Technology and Rural Sciences, Weligatta New Town, Hambantota, Sri Lanka*

Radish (*Raphanus sativus*) is an important vegetable of family Brassicaceae which can be grown in all agro-ecological regions of Sri Lanka throughout the year. Cinnamon (*Cinnamomum zeylanicum* Blume) is a spice endemic to Sri Lanka contains essential oils with antibacterial, antifungal, antioxidant and insecticidal properties. Hence, this experiment was conducted with two objectives, to identify the best form of cinnamon extract as a spray on radish plants and identify the optimum dosage of cinnamon extract to control pests in radish. The experiment was carried out at the Institute of Agro Technology and Rural Sciences of the University of Colombo in Weligaththa, Hambanthota. For the first objective, four treatments were used with four replicates respectively with cinnamon powder water filtrate 1%, cinnamon powder suspension 1%, Abamectin 0.6% and Control (without pesticide). For the second objective three treatments were used with four replicates respectively 1%, 1.5% and 2% cinnamon powder water filtrate respectively. All treatments were arranged according to randomized complete block design. Growth parameters, and pest incidence were recorded from two weeks after spraying with four days intervals. Though the study showed no significant difference among the treatments, Cinnamon powder water filtrate 1%, Cinnamon powder suspension 1%, and Abamectin 0.6% those were significantly differ from un-treated control treatment in controlling the pest attack. Therefore, two forms of cinnamon powder can be used as a biopesticide for radish. Further two forms of cinnamon powder had no significant effect on plant growth and pest incidence. However, radish plants treated by cinnamon powder water filtrate showed lower number of damaged leaves compared to cinnamon powder suspension. Hence, cinnamon powder water filtrate was used for second experiment as the best form of application. Different concentrations of cinnamon powder water filtrate had no significant difference on plant growth. However, Cinnamon powder water filtrate 1% concentration significantly reduced the number of pest damaged leaves in radish plant with lowest number pest. Therefore, it can be concluded that 1% cinnamon powder water filtrate was the best biopesticide in radish for the control of pests.

*Keywords: Biopesticide, Cinnamon, Pests, Pesticide, Radish*

**EFFECT OF DIFFERENT SOIL AMENDMENTS ON SOIL MOISTURE  
RETENTION AND BEAN (*Phaseolus vulgaris*) CROP GROWTH**

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Common bean (*Phaseolus vulgaris*) is an important and popular vegetable in Sri Lanka. The major issue of bean cultivation is water stress faced due to climate change. So, it is important to find a proper solution which can aid in maintaining the soil moisture level throughout the cultivation. This experiment was designed to identify effectiveness of using Super Absorbent Polymer (SAP) material as water retention mechanism for bean cultivation. The experiment was carried out at the regional agriculture research and development centre, Kahagolla, Bandarawela. Five treatments by combining 1 kg soil mixed with 0.500 g organic matter (T1), 0.500 g coir dust (T2), 0.250 g SAP (T3), 0.500 g SAP (T4) and soil only as control (T5) were replicated five times in a completely randomized design. Plants were watered for the first twenty days for three times a week to the level of field capacity. Then onwards, irrigation was terminated. Daily Water Consumption (DWC), Leaf Relative Water Content (LRWC %), average soil moisture content, Root Weight Loss Ratio (RWLR), chlorophyll content of the leaves was evaluated using SPAD- 502 chlorophyll meter one week after termination of water supply. Significantly highest and lowest water consumption was observed T4 and T1 respectively. But significantly higher moisture content was observed in control treatment and in T3. The highest LRWC % was given by T2 and T4 which were not significantly different from the control treatment. Both SAP treatments and control treatment had significantly similar RWLR. The significantly higher chlorophyll content of the plant leaves was observed in T3 and it was significantly higher than T1. According to the results, SAP based media have positively affected in increasing LRWC %, moisture content of the media and chlorophyll content of the plant while increasing RWLR and water consumption. Thus, it can be concluded that depending on this result, Super Absorbent Polymer based media cannot be recommended as a suitable soil amendment for bean cultivation. Further studies are on pipeline to evaluate the effect of this material on yield parameters too.

*Keywords: Bean, Soil amendments, Soil moisture, Super Absorbent Polymers*

## DESIGN PARAMETERS TO DEVELOP A CART FOR FIELD TRANSPORTATION OF PINEAPPLE (*Ananas comosus*)

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Pineapple is a tropical fruit which believed origins in Brazil or Paraguay (South America). Pineapple was one of the commercial fruit crop grown in tropical countries. Pineapple growing in hilly areas required to transport to roadside for delivering to market. After harvesting, farmer/labors brought harvested pineapple to the roadside using improper packing in to bags or large size cart pulling by bullock or tractor (mechanically). Therefore, pineapples were heavily damaged (mechanical damage) due to this improper handling and filed transportation. Hence, this study was focused to design and develop a cart suitable for field transportation of pineapple growing in hilly terrains to minimize handling and transportation damage. During rainy season pineapple field paths become heavily muddy hence, especially cart wheel designed for easy moving in the muddy field paths. Cast iron was used to fabricate frame of the cart. Maximum height of the pineapple carrier area in the cart was design and adjusted to 1.0m height to minimize mechanical damage due top layers' load to the bottom layer of pineapple. Length and width of the carrier area of the cart was adjusted 2.0m and 1.0m according to the load and capacity to minimize damages. Carrier area of the cart was fabricated by wire mesh with cushioning material for reducing mechanical damage. Ground clearance (distance between ground and carrier) of the cart was adjusted 0.4m height to facilitate easy loading and unloading. This cart can be pulled either by tractor (mechanically) or bullock.

*Keywords: Cart, Design parameters, Field transport, Hilly terrains, Pineapple*

## WOMEN EMPOWERMENT IN RURAL DEVELOPMENT BY USING ICT

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This paper examines empirically the prevailing situation, challenges, and future prospects with respect to the women's usage of ICT in farming. As a comparison with men farmers, women farmers depict a lack of access to productive resources, and there are a lot of opportunities ahead with the usage of ICT in their daily farming activities. The agricultural sector has a great history though its contribution has declined over the recent years, it can be developed through women's empowerment and increasing the usage of ICT. Data was collected using convenient sampling method. Qualitative research methods were employed to collect data from farmers and agricultural extension officers under 5 different themes by focusing on their usage of ICT for their agricultural activities, and its pros and cons. The study aims to promote ICT as an effective tool for empowering women in agriculture, by explaining the opportunities and challenges women undergo in accessing and using ICT. The findings showed that the women farmers in this study were making deficient usage of mobile phones and radios, TVs, computer-related ICT, such as the Internet, due to either associated with high costs, not finding it relevant or useful for their survival needs and into some extent unaware of the possibilities. Moreover, the women in this study have been shown interest, self-empowerment to considerable extent through the use of ICT by expanding on their assets and capabilities. But ICT single-handedly do not empower and are inadequate for significant benefits to emerge, since they do not find them as useful, but rather because they are dedicatedly fighting on a daily basis for their families' survival. The study highlights the importance of capacity development through enhancing digital literacy of the women's community. Because it has a greater potential to develop the rural sector, but also it has come up to a position where it can stand right with a "little help" along with an effective and efficient policy framework.

*Keywords: Agriculture, ICT, Rural development, Women empowerment*



## FORMULATION, EVALUATION AND ANTIBACTERIAL EFFICIENCY OF *ALOE VERA*-BASED HERBAL HAND SANITIZER

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Hand sanitizer is an easy and effective alternative for hand washing with soap and water. With the pandemic of Corona Virus Disease in 2019, regular use of hand sanitizers has been drawn the public attention. However, hand sanitizers are not affordable to everyone due to high prices. Therefore, this study aimed to produce a low-cost herbal sanitizer with *Aloe vera* (Komarika). This sanitizer was prepared according to the standards given by World Health Organization. Glycerol and distilled/cold water in common formulations of sanitizers was replaced by *Aloe vera* gel, which is the only humectants agent available in this sanitizer. The inner gel of *Aloe vera* leaf was extracted and prepared a pulp and mixed with 375.5 ml of 99.8% isopropyl alcohol, 20.85ml of 3% H<sub>2</sub>O<sub>2</sub> with 103.65 ml of *Aloe vera* extract to make 500ml of the solution. Two other samples were prepared by replacing 2ml of *Aloe vera* extract with 2 ml of turmeric extract and clove oil separately. The alcohol content and pH of the sanitizer was 73% and 6.1 respectively when tested at  $27 \pm 2$  °C at the accredited laboratory of Industrial Technology Institute. Microbiological efficacy of the sanitizer was performed using few bacterial strains as given by the specifications for hand sanitizer (Alcohol Base) SLS 1657:2020. A selected volume of the prepared sanitizer was mixed with a specific volume of inoculum suspensions of each bacterial cultures and after 30 seconds of contact time, it was plated on Soybean casein digests agar plates and incubated at  $30 \pm 1$ °C for  $72 \pm 3$  hrs to determine the surviving microorganisms at 30s. By comparing initial microbial concentration with surviving microbial concentration, microorganism reduction was estimated. According to the results, the sanitizer was 99.99% effective against the tested bacterial strains. These results suggest that using of *Aloe vera* gel as a humectant agent and as a major ingredient in hand sanitizer formulations helps to get a quality product that is effective for sanitizing of hands which provide smooth and comfortable sense to the user. The estimated production cost of 100 ml of sanitizer was 71 rupees. Almost 100% of the users were highly satisfied with the smell and the feeling after applying the sanitizer on the hand. The mass production of this sanitizer could be very effective for regular use of sanitizers by the public.

*Keywords: Aloe vera gel, Antimicrobial activity, Herbal hand sanitizer, Low cost*



**REVIEW: ASSOCIATION IN-BETWEEN FOOD ADDITIVES AND  
NON-COMMUNICABLE DISEASES IN MODERN WORLD**

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Non-communicable diseases is one of the challenging health problems of great public health significance. These deadly diseases are associated with higher mortality and morbidity influencing the human resources and the global economy. Prevalence of obesity, coronary heart diseases, diabetes mellitus, cancers and kidney diseases are in increasing in trend in developing countries. The prominent factor for this trend is due to unhealthy food habits and modern types of foods. Modified dietary patterns and diverse food choices or preferences have been resulted because of the various processing, preparation and cooking methods, influence of social media and advertising, economic changes, technological innovations, and modern marketing techniques. Overall effect is, changes in major food constituents and food additives in the diet. Presently around 2500 food additives have been invented and used worldwide. Food additives is one of the key components used in almost all the processed and instant foods and they play a significant role in modern diets with promising sensory attributes they provide to the foods. Although the regulatory bodies recommend the food additives after conducting the safety tests, various health issues associated with additives have been reported at many instances. Hence, this review elaborates the association in-between food additives and non-communicable diseases in modern society.

*Keywords: Food additives, Modern food habits, Non-communicable diseases*

**FARMER AWARENESS ON AGRO-CHEMICAL'S APPLICATION IN  
SOORIYAWEWA OF HAMBANTOTA DISTRICT IN**

**SRI LANKA – A CASE STUDY**

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The southern region of Sri Lanka also plays a key role in the national agricultural production of the country. To maintain the economic levels of agricultural production, farmers are using agrochemicals. When considering the current situation still the farmers are not completely aware of the agrochemicals used for their cultivations. Hence the objective of this study is to investigate the general awareness of agrochemical usage by the farmers. Sooriyawewa DS division in the Hambantota district of Southern Province was selected as the study location. All farmers were listed and only 100 farmers were selected for the study by following random sampling. All respondents in the sample were subjected to data collection through the primary survey by a pre-tested structured survey questionnaire. Collected data were analyzed by using SPSS statistical software (26) and different methods were used to interpret the data. Majority of the farmers, 38% were aware of the agrochemicals through the chemical shop owners (p value<0.05). Farmers (100%) are applying agrochemicals according to the requirements of their cultivations and were always considering the climatic conditions well (96%) and 86% of farmers are believe the cost and benefits from agrochemicals (p value<0.05). They, 90% of farmers never use the same agrochemicals for different crops hence they used specific agrochemicals with recommended ingredients to specific crops (p value<0.05). Further, they are not following the correct dosage instructed by specialists (80%) and, 60% of farmers are not read the label carefully before the application of agrochemicals (p value<0.05). Farmers are well aware of the agrochemicals and their applications in terms of profit but they are not following the correct dosage regarding the information in the containers. Therefore, the extension services should highlight these areas to increase the efficiency in agricultural production.

*Keywords: Agrochemicals, Awareness, Cultivation, Farmers, Knowledge*

## A STUDY ON PERCEPTION OF SRI LANKAN SOCIETY ON CULTURED MEAT

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Production of cultured meat involves synthesizing meat from animal tissue samples in a controlled environment using biotechnology. This technology is supposed to offer enormous benefits in terms of food security, animal welfare, human health and environmental impact. Although the cultured meat concept is popular in developed countries, it remains unknown to Sri Lankans. Due to its high degree of novelty, it remains unclear how consumers view this type of food product, mainly in terms of beliefs regarding its intrinsic attributes such as safety, nutrients and sensory properties. The current study aims at unveiling the perception of Sri Lankans on cultured meat and their willingness to try and buy if it becomes available in Sri Lankan context. A questionnaire-based survey commenced using a sample of 80 people selected with stratified sampling method. The study revealed that 75% of the tested population is interested on acceptance of cultured meat although the statistical evaluation of the probability of respondents purchasing lab-grown meat suggested that there is no satisfactory evidence to predict that consumers would purchase lab-grown meat (Wilcoxon Signed Rank Test,  $p > 0.05$ ). Statistical evaluation of factors considered by the respondents when purchasing cultured meat revealed that the impact on health is the highest considered factor followed by nutritional properties, sensory properties and price (Kruskal Wallis Test). The level of agreement of the tested sample regarding the facts that cultured meat production contributes to preserve natural resources, handle better animal welfare and alleviate starvation was statistically satisfied ( $p < 0.05$ ) whereas the expectancy of having same or better sensory and nutritional properties and safety of consumption of cultured meat were not statistically satisfied ( $p > 0.05$ ) when Wilcoxon Signed Rank Test was conducted for the each statement individually. Hence, information on intrinsic qualities and positive externalities of the cultured meat would have to be combined with different approaches for further improvement of consumers' perception and acceptance. Furthermore, the regression analysis conducted to test the co-relationship between education level and the desire on purchasing laboratory grown meat statistically confirmed that the acceptance level of the laboratory grown meat increases with the education level.

*Keywords: Animal welfare, Cultured meat, Food security, Lab-grown meat*

## CONSUMER AND PRODUCER CONCERNS ON QUALITY OF DRIED FISH IN HAMBANTOTA DISTRICT

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The study was conducted in the Hambantota district focusing on the consumer and producer concerns of dried fish quality. Thirty-six dry fish producers and 92 consumers from all the 12 divisional secretariat divisions in Hambantota district were evaluated using a structured questionnaire. According to the survey, around 60% of the respondents consume dried fish. Yellow fin tuna (*Kelawalla*) is the most preferred among consumers (27%) followed by sprats (*Hal messa*) and skipjack tuna (*balaya*). But according to the dried fish producers, mackerel fish (*linna*) (47%) to be the most preferred by consumers, followed by *balaya* (32%) and *kelawalla* (10%). Almost all the consumers expect the quality products for the price paid. On this basis, quality parameters assessed by consumers include appearance (31%), hardness (24%), smell (18%), color (22%) and freshness (5%). Mold growth is the main reason for quality deterioration as observed by the consumers. Approximately 52.2% of consumers have noticed mold in dried fish products. Almost all the respondents were satisfied with the dried fish in the markets. In the case of producers, 81.8% process dried fish at their homes, while 11.11% produce through coast dried fish. 82% of them add salt when process dried fish. 30.3% of producers were concerned about the product's hardness as the major quality parameter, while 28.7% concerned on the finishing and moisture while moisture content and the expiry date are the factors expected by most of the consumers. In the present study, producers identify fluctuating weather conditions (81%), higher raw fish prices and importation, social issues (16%), resource-based problems (2.3%) as major constraints for production and quality maintenance. Also 59% claimed that COVID 19 pandemic created marketing problems, while 20.5% had no effect due to the pandemic. There is a huge gap between the expected and concerned parameters in the production and quality of dried fish in the Hambantota district. Producers should make aware of the need and concerns of the consumers regarding dried fish which is essential in developing the sector.

*Keywords: Consumer, Dried fish, Hambantota, Producer, Quality products*

# Institute of Human Resource Advancement University of Colombo



## *Impact of Covid-19 Health Crisis on Human Resource Development and Management*

5<sup>th</sup> and 6<sup>th</sup> August 2021

## MESSAGE FROM THE DIRECTOR AND CONFERENCE CHAIR

**Senior Professor (Chair) H.D Karunaratne**

Director and Conference Chair  
Institute of Human Resource Advancement  
University of Colombo, Sri Lanka



Covid-19 pandemic has made significant tremor on day to-day activities and life styles of people all over the world. It has made adverse effects on labor supply, working life, demand for labor, earning patterns, management styles and many more economic, social, cultural, health, and environmental aspects of human resource development and management. Therefore, it is a timely need to conduct International Conference on this topic during the pandemic phase. The Institute of Human Resource Advancement (IHRA) of the University of Colombo has attempted to generate and disseminate scientific knowledge on this theme through this 2<sup>nd</sup> International Conference of IHRA. It was a privilege and honor to me to serve as the Director of the Institute and the Conference Chair for IC2-IHRAUOC held on 05<sup>th</sup> and 06<sup>th</sup> August 2021. IC2-IHRAUOC was designed to address Impact of Covid-19 Pandemic on Human Resource Development and Management in five relevant fields of studies to IHRA-UOC activities as Business and Public Management, Service Management, Social Sciences, Sustainability and Disaster Management including Law and Order, Language and Literature. Most importantly two renowned Professors contributed as Keynote Speakers for this International Conference. There were 55 research paper submissions and after screening 35 high quality research papers were selected to present in IC2 IHRAUOC. I wish to congratulate all authors and presenters of the conference and highly appreciate interactive contribution made by the participants. I hope findings of these researchers and policy alternatives proposed by them will be important to influence the betterment of Human Resource Development and Management in Sri Lanka. I wish to thank organizing committee, abstract reviewers, academic staff members and supportive staff members of the IHRA-UOC for their generous contribution to successfully conduct this international conference. My special thank goes to Senior Professor Chandrika N Wijeratne, Vice Chancellor of the University of Colombo for her kind assistance us and two keynote Speakers, Professor Ananda Kumara, Former Dean of the Faculty of Foreign Studies, Meijo University, Nagoya, Japan and Professor Sisira Kumara, Professor in Public Economics, at the Department of Public Administration, University of Sri Jayawardenepura, Sri Lanka. Finally, I wish to express my thanks to the coordinator and organizing team of the Conference. Thank you very much.



## MESSAGE FROM THE CONFERENCE COORDINATOR

**Ms. Chamari Edirisinghe**

Lecturer

Institute of Human Resource Advancement

University of Colombo, Sri Lanka



As the conference coordinator, I write this message to the 2<sup>nd</sup> International Conference of IHRA-UOC 2021 on Impact of Covid - 19 Health Crisis on Human Resource Development and Management. It is indeed a great privilege for me to serve as the conference coordinator of this research conference. What is significant of this research conference is that it bringing researchers who work in different field of studies yet are rooted in common ground together in one place to discuss and debate while appreciating their roots in fields of business and public management, service management, social sciences, sustainability, disaster management, and law, and language and literature. I believe this research conference is significant in Sri Lankan Research landscape since it brings researchers of different fields together into one place.

I am indeed delighted when Prof. Ananda Kumara and Prof. M. H. A. Sisira Kumara accepted our invitation to deliver the keynote addresses in this research conference. The contribution that they agreed to pay on behalf this research conference was an immense courageous reward to make the event success.

This conference is made possible by the hardworking of many people, though I may not be able to thank through this message. I wish to extend my sincere appreciation to Senior Professor Chandrika N. Wijeyaratne, Vice Chancellor, University of Colombo. Further, I extend my sincere gratitude to Senior Professor (Chair) H.D. Karunaratne, Director, Institute of Human Resource Advancement, University of Colombo. As well, I thank track chairs and the organizing committee for their contribution for making this research conference a successful. I, on behalf of the organizing committee, wish to extend my appreciation to the staff members of the Institute of Human Resource Advancement, University of Colombo. While I gratefully recall the contribution of all reviewers and session chairs, I thank all of them for their intellectual contribution. In the concluding note, I would like to remember and thank all the authors for sending and sharing their knowledge with a larger community.

Thank you.

**THE 2<sup>nd</sup> INTERNATIONAL CONFERENCE - 2021**

**IC2-IHRAUOC**

**ORGANIZING COMMITTEE**

**Conference Chair**

Senior Professor (Chair) H.D Karunaratne (Director)

**Conference Coordinator**

Ms. C.L. Edirisinghe (Lecturer)

**Track Chairs/ Co-Track Chairs**

**Business and Public Management**

Dr. M.G.G Hemakumara (Senior Lecturer)

**Service Management**

Ms. K. P. Mathotaaraachchi (Senior Lecturer)

**Social Sciences**

Dr. W.S. Chandrasekara (Senior Lecturer)

Mr. K.D.N. Hewage (Senior Lecturer)

**Sustainability, Disaster Management, and Law**

Mr. K.A.A.N. Thilakarathne (Lecturer (Probationary))

**Language and Literature**

Ms. K.P.S. Sandamali (Lecturer (Probationary))

**Supporting Staff**

Ms. W.D.N. Asangika (Scientific Assistant)

Ms. N.A.C.N. Nishshanka (Programme Assistant)



## **THE 2<sup>nd</sup> INTERNATIONAL CONFERENCE – 2021**

**Institute of Human Resource Advancement**

**University of Colombo**

**5<sup>th</sup> and 6<sup>th</sup> August 2021**

### **Programme**

- 5.45- 6.00 p.m.      Inauguration**
- 6.00- 6.15 p.m.      Introduction to the Conference and Welcome Address by the**  
Senior Professor (Chair) H.D. Karunaratne  
Director and Conference Chair  
Institute of Human Resource Advancement  
University of Colombo, Sri Lanka.
- 6.15- 6.30 p.m.      Address by the Chief Guest**  
Senior Professor Chandrika N. Wijeyaratne  
Vice Chancellor  
University of Colombo, Sri Lanka.
- 6.30- 6.35 p.m.      Introduction to the Keynote Speaker by**  
Ms. K.P. Mathotaaraachchi  
Senior Lecturer  
Institute of Human Resource Advancement  
University of Colombo, Sri Lanka
- 6.35- 7.05 p.m.      Keynote Address by**  
Prof. Ananda Kumara  
The Founding Dean, Faculty of Foreign Studies  
Meijo University, Japan

- 7.05- 7.10 p.m. Introduction to the Keynote Speaker by**  
Ms. K.P. Mathotaaraachchi  
Senior Lecturer  
Institute of Human Resource Advancement  
University of Colombo, Sri Lanka
- 7.10- 7.40 p.m. Keynote Address by**  
Prof. M. H. A. Sisira Kumara  
Department of Public Administration  
Faculty of Management Studies and Commerce  
University of Sri Jayewardenepura, Sri Lanka.
- 7.40- 7.50 p.m. Vote of Thanks by**  
Dr. W.S. Chandrasekara  
Senior Lecturer  
Institute of Human Resource Advancement  
University of Colombo, Sri Lanka
- 9.00 a.m.- 4.00 p.m. Oral Presentations**

## INTRODUCTION TO KEYNOTE SPEAKER 01

### **Prof. Ananda Kumara**

The Founding Dean, Faculty of Foreign Studies,  
Meijo University, Japan



Prof. Ananda Kumara, being one of the keynote speakers for the 2<sup>nd</sup> International Research Conference of the Institute of Human Resource Advancement of the University of Colombo. Currently serves as a Professor, Faculty of the Foreign Studies, Meijo University Japan where he has served as the founding Dean of the faculty and a Sri Lankan academic residing in Japan. He is also the Director of Sri Lankan Academic Association of Japan, Vice-President Japan Association for Global Competence, Education and International Strategies Advisor, Archi Prefecture. As an academic, he has achieved unparalleled successes both in the fields of teaching and research. He graduated from University of Kelaniya with a B.Sc. Degree in Science. He obtained his Master of Engineering and Doctor of Engineering from Tokyo Institute of Engineering Japan. He was the first foreigner and the Sri Lankan to be awarded with the prestigious Japan International Corporation Agency (JICA) President's awarded for the valuable contribution in Japan.

Prof. Ananda Kumara has done extensive research in areas such as development economics, Quantitative/Qualitative Social Research and Urban Sociology where he has published books, books chapters and, articles in reputed journal. And he was a United Nations researcher at United Nations Centre for Regional Development. He has served as a Director of Meijo University, Japan. He was a former professor, Dean and Deputy President of Suzuka International University Japan. Prof. Ananda Kumara has also served as an initial member, programme coordinator and professor at Tokyo Institute of Technology, Japan.

**INTRODUCTION TO KEYNOTE SPEAKER 02****Prof. Ajantha Sisira Kumara**

Department of Public Administration,  
Faculty of Management Studies and Commerce,  
University of Sri Jayewardenepura, Sri Lanka



Prof. Ajantha Sisira Kumara, being one of the keynote speakers for the 2<sup>nd</sup> International Research Conference of the institute of Human Resource Advancement of the University of Colombo currently serves as a professor at the Department of Public Administration, Faculty of Management Studies and Commerce at the University of Sri Jayewardenepura. As an academic, he has achieved tremendous successes both in the fields of teaching and research. He graduated from University of Sri Jayewardenepura with a B.Sc. Management (Public) Special Degree with a First-Class Honours. Among the many academic achievements, Prof. Ajantha has obtained two Master's Degrees, one in Public Economics and another in Public Policy from National Graduate Institute for Policy Studies (GRIPS), Tokyo Japan and has also obtained a Master's Degree in Public Administration from Postgraduate Institute of Management, University of Sri Jayewardenepura. He earned his Ph.D. from National Graduate Institute for Policy Studies (GRIPS), Tokyo Japan with a thesis in 'Essays on Social Security Systems: Cases of Sri Lanka and Other Emerging Market Countries.

Prof. Ajantha has done extensive research in areas such as public policy, healthcare, micro-economics, and other related fields where he has published books, books chapters and, articles in reputed journals such as Emerald, Taylor and Francis, Oxford, and Willey. He has also contributed as a review of articles in many reputed A+ journals, and his research capacity was recognized in 2019, where Prof. Ajantha was awarded with the Presidential Award for Scientific Research for his co-authored paper title 'Impact of ill-health on household consumption in Sri Lanka: Evidence from household survey data'.

## **Developing an Informed Workplace: Information Technology Adoption and Human Resource Management**

M.W.N.T. Weerakkodi,<sup>1</sup> Chamari Edirisinghe<sup>2</sup>

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<sup>2</sup> Institute of Human Resource Advancement, University of Colombo, Sri Lanka

Information technology adoption has been revolutionalised the ways in which many organisations do business, forcing a paradigm shift for management that has resulted in new and innovative approaches to carrying out business. However, developing an informed work place requires more than just the use of certain hardware and software. What is equally important is the adjustment in other aspects of organisational practice (i.e. human resource management practices). Accordingly, this study examines the effect of information technology on human resource management (i.e. employee information management, employee leave management, employee performance management, and employee welfare management). Survey data were collected from 86 employees from a semi government organization in Sri Lanka. The results of analysis using the SPSS method found a significant positive relationship between information technology and human resource management practices such as employee information management, employee leave management, employee performance management, and employee welfare management. The findings confirm our predictions. Our findings also suggest that information technology most significantly associated with employee performance management. These positive associations also revealed the transformational potential of information technology–supported human resource management since information technology may play a role in enhancing the importance of human resource management practices in an organisation. Study recommends managers to integrate the human resource management practices with information technology since it contributes significantly to reduce administrative financial expenses, and the speed of completion of work.

**Keywords:** *Employee information management, Employee leave management, Employee performance management, Employee welfare management, Information technology*

## **The Need for Data Protection in A Sri Lankan Context: A Critical Review with Special Reference to The Pandemic Period**

K.P. Mathotaarachchi,<sup>1</sup> K.A.A.N. Thilakarathna,<sup>2</sup> W.M.C.P Godage<sup>3</sup>

<sup>1,2,3</sup> Institute of Human Resource Advancement, University of Colombo, Sri Lanka

The Covid-19 has had a profound impact on the daily lives of the individuals where everyone has been put under surveillance with the ultimate objective of keeping them protected from the Covid-19 pandemic. Many systems were put in place to track the movements of people when they travel from one place to another, where biometric data belonging to such were collected using both primitive means as taking their information in a record book to advanced systems of data gathering such as using QR scanners. While these data are extracted from individuals which is a part of their identity, the extent to which these data are going to be processed and used is not properly mentioned at the time of collecting such data and the legal system in the country is inept to provide any protection to those individuals since neither the statutory law or the common law has recognized a right to privacy which could come in aid to help these people protect their data. In this background, by using a qualitative method with a comparative analysis of the existing law in the United Kingdom, this paper attempts to critically evaluate the rights of the data subjects from whom such data is gathered and to propose changes in the existing legal system to better protect the personal integrity of those who have to give their personal data to both governmental and private institutions, especially in situations where the national security and public health becomes a major concern, as in the instance of the Covid-19 pandemic. The results reveal that the existing legal framework in the country is totally inadequate to provide any kind of protection to these data subjects and developing a legal framework based on the eight principles of data protection as advanced in the United Kingdom inclusive of Fairness, specificity, adequacy, accuracy, time limitation, consideration of other rights, security and non-sharing with unprotected countries is a sine qua non to protect the data subjects in Sri Lanka.

**Keywords:** *Data Protection, Privacy, Covid-19.*

**Institute of Indigenous Medicine**  
**University of Colombo**



***Interdisciplinary Approach on Research in  
Indigenous Medicine***

24<sup>th</sup> November 2021

## MESSAGE FROM THE SYMPOSIUM CHIEF ORGANIZER

**Senior Professor Priyani A. Paranagam**

Director

Institute of Indigenous Medicine

University of Colombo, Sri Lanka



It gives me great pleasure to share a few words on the Annual Research Symposium 2021 conducted at the Institute of Indigenous Medicine, (IIM) University of Colombo, Rajagiriya on 24th November 2021. IIM is not only a pioneer institute in indigenous medical education that teaches Ayurveda and Unani but also has a lot of potential to conduct research in indigenous medicine, so that it immensely contribute to the health and wellbeing of the citizens of Sri Lanka and others, offering Ayurveda and Unani undergraduate and postgraduate degrees.

This Annual Research Symposium is a platform to showcase the creative and innovative research activities done by the academic members of the IIM and provide the opportunity to express the recommendations from the outcomes of their research, to the policy makers. Since research output is the caliber of an academic department, individual or institutional Research is one of the main factors which brings recognition to an academic institution. I sincerely wish that our staff will carry out high quality research which would significantly contribute towards the national development of the country.

I would like to take this opportunity to thank the Vice-Chancellor of the University of Colombo Senior Professor Chandrika N Wijeyaratne for the continuous support rendered to uplift the quality of teaching, research and dissemination of IIM. Moreover, I also wish to appreciate the hard work done by the IIM coordinators for ARS, Prof. RDH Kulatunga and Prof. N Fahamiya. Further, I wish to thank all the academic and nonacademic staff of the IIM including two sectional heads who helped in various ways to make this event a success. It is my firm belief that this collection of research studies is a milestone in the history of the Institute of Indigenous Medicine as this carries a very promising message regarding Ayurveda and Unani Medical Systems.

Thank you

24<sup>th</sup> November 2021



## MESSAGE FROM THE SYMPOSIUM CO-ORGANIZER

### **Dr. S.P. Molligoda**

Head/Department of Study in Ayurveda

Institute of Indigenous Medicine

University of Colombo, Sri Lanka



I am very happy to issue this message for the Annual Research Symposium 2021 organized by the University of Colombo and conspired with the Institute of Indigenous Medicine. Apart from teaching, one of the major functions of a university is the production and dissemination of new knowledge through research, therefore I believe that this conference provides a great opportunity to improve the research culture of University of Colombo and for the academics to share their research finding with the rest of the world. Therefore, I see this conference as an excellent gateway to the world of research.

Conference or symposium, promotes application of knowledge and enhances competition leading to enlightenment. Finally, I would like to take this opportunity to extend my extreme sense of gratitude to UGC chairman, vice chancellor of University of Colombo, director of Institute of Indigenous Medicine, keynote speakers, organizing secretary, all members of the editorial committee and relevant contributors.

I congratulate the resource persons; the national and international participants and I hope this would be a valued effort to update the knowledge and skills of the academics.

Thank you

24<sup>th</sup> November 2021

## MESSAGE FROM THE SYMPOSIUM CO-ORGANIZER

### **Prof. M.S.M. Shiffa**

Head/Department of Study in Unani  
Institute of Indigenous Medicine  
University of Colombo, Sri Lanka



As the Co-organizer, I am delighted and honoured to bring this message to the Annual Research Symposium 2021. This year has been a significant year, as we, the Institute of Indigenous Medicine, have already conducted the International conference and now we have organized the Annual Research Symposium with our main campus, University of Colombo and structured to address the theme of “Interdisciplinary Approach on Research in Indigenous medicine”.

The Unani system of medicine has been practiced for a long time; the Arabian traders who have built a friendly relationship with our ancient Kings introduced it in Sri Lanka. Its uniqueness and effectiveness helped to draw royal patronage, so that many Unani practitioners became royal physicians and also, they were rewarded for the services offered to Kings and citizens. Our forefathers, freedom fighters fought hard to preserve this precious knowledge and handed it over to us. This is our duty to explore the treatment potentials of this system and provide them to the present world in an acceptable form. Hence, research is needed to explore the benefits of this age-old system to mankind.

The conference aims to provide a shared platform to the academics to disseminate their research outcomes in the august gathering and share their expertise in different areas. I extend my heartfelt appreciation to the Keynote speakers. As a co-organizer I know that the success of the conference depends ultimately on the many people who have worked with us, in planning and organizing the conference. I specially thank them all for their hard work and dedication. A note of appreciation to the academia for their thorough and timely reviewing of the papers. Most of all, I thank the presenters, for enriching the conferences by your presence.

Thank you

24<sup>th</sup> November 2021

# **ARS 2021 - IIM**

## **ORGANIZING COMMITTEE**

### **Symposium Chief Organizer**

Senior Prof. P.A. Paranagama

(Director, Institute of Indigenous Medicine, University of Colombo)

### **Symposium Co-organizers**

Dr. S.P. Molligoda (Head/ Department of Study in Ayurveda)

Prof. M.S.M. Shiffa (Head/ Department of Study in Unani)

### **Symposium Coordinators**

Prof. R.D.H. Kulatunga (Ayurveda)

Prof. N. Fahamiya (Unani)

**Annual Research Symposium 2021- Institute of Indigenous  
Medicine  
University of Colombo**

**24<sup>th</sup> November 2021 from 9.00 a.m. to 6.00 p.m.**

**Programme**

**Venue:** Auditorium, Institute of Indigenous Medicine, University of Colombo

**Mode:** Hybrid

**Inaugural Session:**

**9.00 a.m.** - National Anthem.

**9.05 a.m.** - Lighting of the Traditional Oil Lamp.

**9.10 a.m.** - Paying Homage to Lord Dhanwantari.

**9.15 a.m.** - Progress of Research Culture, IIM.

**9.20 a.m.** - Welcome Address by Chief Organizer, Senior Professor PA Paranagama,  
Director, Institute of Indigenous Medicine.

**9.30 a.m.** - Address by Chief Guest Senior Professor Chandrika N Wijeyaratne. Vice  
Chancellor, University of Colombo.

**9.40 a.m.** - Addressed by Dr. SP Molligoda, Head/ Department of Study in Ayurveda

**9.45 a.m.** - Addressed by Prof MSM Shiffa, Head/ Department of Study in Unani

**9.50 a.m.** - Keynote Address by Prof. P Hemanth Kumar Parlapothula, Dean Post Graduate  
Section & Head of the Shalya Tantra, National Institute of Ayurveda, Jaipur, India

**10.10 a.m.** - Keynote Address by Prof. Mohd. Anwar, Chairman, Department of Ilaj bit  
Tadbeer, Aligarh Muslim University, Aligarh, India

**10.30 a.m.** - Vote of Thanks by Prof. RDH Kulatunga Symposium Coordinator (Ayurveda)

**Scientific Sessions:**

**11.00 a.m. - 1.00 p.m.** – Session I

**1.30 p.m. - 3.30 p.m.** – Session II

**3.45 p.m. - 5.30 p.m.** – Session III

**5.35 p.m.** - Symposium Closing Remarks & Vote of Thanks by Prof. N Fahamiya Symposium  
Coordinator (Unani)

## INTRODUCTION TO THE KEYNOTE SPEAKER

### **Professor Hemantha Kumar**

Dean, Post-graduate Studies

Head, PG Department of Shalya Tantra

National Institute of Ayurveda, Deemed to be University

Jaipur -302002

Rajasthan, India



Professor Hemantha Kumar Parlapothula is the Dean of Post graduate section and Head of the Department of Shalya Tantra of National Institute of Ayurveda (NIA), Jaipur and he is a specialist in general surgery in Ayurveda. He has an experience spanning more than 20 years in teaching, clinical and the research field in Ayurveda medicine.

Prof. Hemantha completed his BAMS from N.T.R University of Health Sciences in 1992 and successfully completed MS (Ay) from Institute of Medical Sciences in Banaras Hindu University (BHU), Varanasi India in 1997. Further, he has obtained a Ph.D. (Ayu) in Health Sciences in 1992.

Prof. Hemantha has published 2 books, 18 papers in indexed journals and 43 papers in peer reviewed journals and provided guidance for 33 M.D (Ayu) and nine Ph.D. scholars. He is a member of Professional bodies of National Sushruta Association and BHU Alumni Association .He has acted as the Chairman of several committees in his professional scope of work.

He has been awarded Acharya Award in 2014 by Central Council of Indian Medicine and Ministry of AYUSH, New Delhi. Moreover, he bagged the award for Best Doctor in 2006, 2007 and 2013 in SDM College of Ayurveda & Hospital and best teacher award in 2008 in SDM College of Ayurveda & Hospital. Moreover, he was awarded with Sushruta Ratna Award in 2009 by National Sushruta Association, India, and Proctologist award in 2012 by DGM Ayurvedic Medical College.

Further, Prof. Hemantha Kumar Parlapothula participated in a number of seminars / workshops both nationally and internationally and also conducted 125 guest lectures / keynote speeches and contributed for number of CME programs as a resource person.

## INTRODUCTION TO THE KEYNOTE SPEAKER

### **Professor Mohd. Anwar**

Chairman, Department of Ilaj Bit Tadbeer

Faculty of Unani Medicine

Aligarh Muslim University

Aligarh-202002 (U.P)

India



Dr. Mohd Anwar is presently working as Professor & chairman in Department of Ilaj Bit Tadbeer Aligarh Muslim University Aligarh India. He did his BUMS (1989) and M.D Moalejat (1993) from Ajmal Khan Tibbiya College AMU Aligarh. He was awarded the University gold Medal for his outstanding academic performance. He was also engaged in teaching of clinical subjects to undergraduate and post graduate students at several universities and institutes like Aligarh Muslim University, Hamdard University, New Delhi and National Institute of Unani Medicine, Bangalore since 1994. He served as a Member, Academic Council RGUHS Bangalore, AMU Aligarh and Integral University Lucknow. Formerly served as Head of the Department of Moalejat and Ilaj Bit Tadbeer and Deputy Hospital Superintendent, National Institute of Unani Medicine Bangalore.

Professor Mohd Anwar has published 75 research papers in various scientific Journals of repute and authored 3 books. He served as member of several scientific and Research Committees such as Member Institutional Ethics Committee NIUM Bangalore, Member Research Committee CCRUM New Delhi. He has supervised 21 post graduate candidates in Unani Subjects, participated in several conferences and workshops and delivered a large number of invited lectures as a resource person. Currently, serving as the Section Editor (Complementary and Alternative Medicine, Journal of Nuro Pharmac)

Owing to his exceptionally bright academic career he was awarded Hakim Ahmad Ashraf Global award in 2019 by Hakim Ahmad Ashraf memorial society Hyderabad, Best Teacher Award for Clinical Research in Unani Medicine in 2018 and Life Time Achievement Award in academic field in 2020 by Ministry of AYUSH Government of India.

## KEYNOTE ADDRESS

**Professor Hemantha Kumar**

### **Interdisciplinary Approach on Research in Indigenous Medicine**

Traditional medicine comprises medical aspects of traditional knowledge that developed over generations within the folk beliefs of various societies before the era of modern medicine. Herbal medicines remain the major source of health care for the world's population. The world health organization (WHO) has recognized herbal medicine as an essential building block of primary health care of vast countries like India and China. India has a very long, safe and continuous usage of many herbal drugs in the officially recognized alternative systems of health viz. Ayurveda, Yoga, Unani, Siddha, Homeopathy and Naturopathy. The World Health Organization (WHO) defines traditional medicine as "the sum total of the knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness".

In some Asian and African countries, up to 80% of the population relies on traditional medicine for their primary health care needs. Scientific disciplines which study traditional medicine include herbalism, ethno medicine, ethno botany and medical anthropology. We have yet to explore fully the vast storehouse of indigenous, tribal or folklore and traditional system of medicine of our country. India has about 45,000 plant species; medicinal properties have been assigned to several thousands.

In spite of advances in modern system of medicine, there are various areas like tropical diseases, herpes; AIDS, cancer, bronchial asthma etc. might be successfully cured by herbal medicines. Modern science has already accepted the potential of the herbs as a source of new bio-active constituents. There are numerous plants derived drugs of unknown chemical structure that have been found clinically useful in different alternative system of medicine including Ayurveda, Homeopathy and Unani system of medicine. The plants are a rich reservoir of potential leads for drug discovery against various disorders. Today the world's looking towards India for more effective and safer new drugs to control various challenging diseases. Today, there is a novel interest in traditional medicine in all over the world as an alternative to pure synthetic medicines because of various problems associated with them.

Currently, with over 400, 0000 registered Ayurvedic practitioners; the Government of India has formal structures to regulate quality, safety, efficacy and practice of herbal medicine. Millions of Indians use herbal drugs regularly, as spices, home-remedies, health foods as well as over-the-counter (OTC) as self-medication or also as drugs prescribed in the non-allopathic systems. According to W.H.O. 4 billion people use herbal medicine worldwide. Assurance of safety, quality and efficacy of medicinal plants and herbal products is a key issue which needs to be addressed.

The current approaches are needed for integration of ancient system to novel standardization methods and quality control data on safety and efficacy are required according to need of regulatory guidelines for interdisciplinary research of herbal medicine. Truly interdisciplinary research should reflect an equal integration of both the western and traditional concepts of medicine. The application of modern information technology and data basing may serve well to reach these goals. Future research should be directed towards advancing mechanisms for improving and implementing equal reciprocity, benefit sharing, and dispersal of research results within indigenous groups who participate in research projects. As enthusiasm for interdisciplinary studies continues to grow, the future for traditional medical research is bright and encouraging. Time tested traditional wisdom of local people combined with scientific testing and evaluation can only produce a more optimal health care system that both recognizes and respects the benefits of cultural, spiritual and physical human diversity

Thank you

24<sup>th</sup> November 2021



## KEYNOTE ADDRESS

**Professor Mohd. Anwar**

### **Interdisciplinary Approach of Research in Unani Medicine**

Unani system of Medicine (USM) is one of the oldest systems of Medicine. Recognition of USM in this scientific era is due to the strong evidence of validity in its fundamental principles, mainly based on logic and philosophy. However, the essence of any science is based on a continuous quest for new knowledge through research, development, and more recent applications. With the same objective, research work is undertaken in various Research and Academic institutions with the aims to provide scientific evidence to revalidate the theoretical concepts and approach of Unani Medicine present in classical literature.

In the last decades, exhaustive research work has been done. The past, as well as the current trends, have failed to obtain desired results due to various reasons. The ongoing research is in line with modern medicine protocol without taking into consideration or very little consideration of principles of the Unani system of Medicine. Thus, there is a need for a paradigm shift in the research methodology for evaluating Unani Medicine along with collaboration with other science streams and incorporating the use of newer technology accordingly to explain the facts behind the holistic approach of USM on modern Parameters. Various areas need an interdisciplinary approach, for example,

- Scientific interpretation of Unani concept of Mizaj and Akhlat.
- Revalidation of Unani formulation on Scientific parameters
- Experimental and clinical study on Unani single and compound formulation.
- Standardization of drugs, development of scientific data on safety and toxicity profile of Unani drugs
- Standardization and validation of Unani diagnostic concepts and treatment procedures scientifically.
- Standardization of Regimenal procedures and Munzij Mushil Therapy
- A search of treatment modalities of new emerging diseases

This paper will discuss such shortcomings and ways of integrating with an interdisciplinary approach to correlate the concept of USM by properly coordinating different disciplines of Unani Medicine: i.e., Kulliyat, Advia, Moalejat, and Ilaj Bit Tadbeer. Theoretical concepts

present in classical literature to be read out and stated clearly by experts of Kulliyat should be established and co-related in the research studies undertaken by Ilmu Advia through in-vitro and in-vivo experiments exploring them to a maximum extent using the latest scientific models. It is essential to utilize the methodology adopted from other disciplines like genetics, biotechnology, or nanotechnology. Further, the facts that later could be incorporated in clinical studies carried by the experts of Unani Medicine.

Thank you

24<sup>th</sup> November 2021

**Physiochemical characteristics of Termite Mound clay and Potter Wasp Nest clay used in Ayurveda and Traditional Medicine in Sri Lanka - A critical evaluation**

S.K.M.K. Herapathdeniya<sup>1</sup>, S.P. Molligoda<sup>2</sup>, B.S.M.M. Sooriyaarachchi<sup>3</sup>, P.A.D. Nilantha<sup>4</sup>

<sup>1</sup>Unit of Dravyaguna Vignana, Institute of Indigenous Medicine, University of Colombo, Sri Lanka.

<sup>2</sup>Unit of Moulika Siddhanta, Institute of Indigenous Medicine, University of Colombo, Sri Lanka.

<sup>3</sup>Unit of Shalakyia Tantra, Institute of Teaching and Research in Ayurveda, Ministry of AYUSH, Government of India

<sup>4</sup>Institute of Indigenous Medicine, University of Colombo, Sri Lanka.

Termite mound clay and potter wasp nest clay are used widely by Ayurveda medical practitioners and traditional medical practitioners in Sri Lanka. Classical manuscripts of Sri Lanka are enriched with traditional knowledge for the management for skin diseases, bites of bees, mosquitos, poisonous conditions, tonsillitis, edema, trauma, etc. Research objectives of this study were to assimilate information on termite mound clay and potter wasp nest clay and to analyze physical and chemical properties of them. A comprehensive search of the literature was conducted by using manuscripts and Ayurveda literature available in the library of institute of Indigenous Medicine and databases of PubMed, Elsevier, Google scholar and Research Gate. Samples of clay types were collected and Termite Mound Clay and Potter Wasp Nest Clay were subjected to Physical and Chemical parameter analysis tests. Results showed different chemical compositions relevant to the zone. According to the analysed data, the clay collected from potter wasp nests from dry zone contained water extractable P (phosphorus) 29.94 (9.40) ppm. As per the literature, termite mound clay and potter wasp nest clay have many therapeutic benefits such as; cooling and soothing effect, purifying the skin as scrubs, powerful absorptive agent to treat for topical maladies. Further experimental and clinical studies are needed to identify the different mineral values of these different clay types.

**Keywords:** Termite mound clay, potter wasp nest clay, Ayurveda, Traditional medicine

## Characterization of *Kushta e Gaodanti* prepared by different methods

Nazeem Fahamiya<sup>1</sup>, S.G. Ansari<sup>2</sup>, Mohd. Aslam<sup>3</sup>, Mohamed Shiffa<sup>1</sup>

<sup>1</sup>Unit of Ilmul Advia, Institute of Indigenous Medicine, University of Colombo, Sri Lanka

<sup>2</sup>Center for Interdisciplinary Research in Basic Sciences, Jamia Millia Islamia, India

<sup>3</sup>Department of Pharmacology, School of Unani Medical Education and Research,  
Jamia Hamdard, India

*Kushta* is a herbo-mineral preparation of Unani medicine prepared by specialized process. It is rapidly absorbed in human body due to its small particle size and produces instant therapeutic effects. The *Kushta* made from the calcination of purified *Gaodanti* (Gypsum) and *Asgand* (*Withania somnifera*) is called as *Kushta e Gaodanti*. It is used in hemiplegia, facial palsy, numbness, arthralgia, gout, fever and cramp. Since the tests mentioned in the Unani classical texts to determine the quality and purity of *Kushtajat* are subjective, it is necessary to confirm the product standardization utilizing modern technology. In present study, *Kushta e Gaodanti* was prepared by classical method with and without *Asgand* and by Furnace method with *Asgand* to evaluate the quality control parameters by classical tests (finger test, fineness test, floating test, grain test, wall test.) along with modern techniques. And, to verify the effect of herbs in the preparation *Kushta*. The following physicochemical parameters like bulk density, tapped density, Hausner's ratio (HR), Carr's index, pH, loss on drying, ash values and extractive values were estimated according to WHO guidelines for quality control for herbal drugs. The characterization using X-ray diffraction (XRD), Scanning Electron Microscopy (SEM), Energy Dispersive X-ray Analysis (EDAX), Fourier transform infrared (FTIR), absorption spectroscopy, Zeta size and potential analysis was carried out to establish the quality standard by utilizing modern analytical techniques. Further, heavy metal analysis was done for all samples. Although, the physicochemical results were comparable within experimental error in all three preparations, some differences were observed in XRD, SEM, EDAX, FTIR and absorption spectroscopic analysis. Therefore, by using advanced analytical techniques, this work grants an applicable correlation between the traditional and modern information on characterization of *Kushta e Gaodanti*. The analytical data obtained in this study could be used as a standard reference for *Kushta e Gaodanti*.

**Keywords:** *Kushta e Gaodanti*, arthralgia, Unani, gypsum, physicochemical

## Compilation of a High-Performance Thin Layer Chromatography profile for the selected Indigenous medicinal plants grown in Western province, Sri Lanka

S.D. Hapuarachchi<sup>1</sup>, P.D.S.A. Silva<sup>2</sup>, N.D. Kodithuwakku<sup>1</sup>, P.K. Perera<sup>1</sup>

<sup>1</sup>Unit of Dravyaguna Vignana, Institute of Indigenous Medicine, University of Colombo, Sri Lanka

<sup>2</sup>Department of Pharmacy, Faculty of Allied Health Sciences, University of Ruhuna, Sri Lanka

Since the majority of the world's population relies on Traditional and Ayurveda medicine, development of standardization parameters is needed in precise identification of herbal drugs. The present study was aimed at the compilation of High-Performance Thin Layer Chromatography (HPTLC) profile with chromatography fingerprints for several indigenous medicinal plants including; *Acronychia pedunculata* (L.) (*Nil Aweriya*), *Paederia foetida* (*Prasarini*), *Plectranthus amboinicus* (Lour.) Spreng (*Kapparawalliya*), *Plectranthus zeylanicus* Benth (*Iriweriya*), and *Monochoria vaginalis* (*Diya Habarala*). Mature aerial parts were collected from Western Province, Sri Lanka, authenticated from National Herbarium, Royal Botanical Garden, Peradeniya, oven-dried and powdered. Cold maceration was conducted with methanol and extracts were subjected to normal phase TLC. HPTLC was run with the optimized solvent systems. Results revealed that *A. pedunculata* showed 10 peaks with n-hexane: ethyl acetate: chloroform (2:6:2) while *P. foetida* showed 9 peaks with ethyl acetate: n-hexane: dichloromethane (1:4:1). *P. amboinicus* showed 16 peaks with methanol: distilled water: acetic acid (2:5:3) whereas, *P. zeylanicus* showed 11 peaks with methanol: distilled water: acetic acid (2:5:3). *M. vaginalis* showed 6 peaks with methanol: n-hexane: ethyl acetate (6:2:2). Further, the phytochemical and physicochemical properties of these plants were also recorded. It can be concluded that these HPTLC fingerprint profiles would be used for the identification of these indigenous medicinal plants grown in Western Province. Furthermore, these developed standard parameters can also be used to screen these plants and isolate the active principles for pharmacological properties responsible for the therapeutic effects throughout the country. Moreover, for further confirmation more advanced tools including; DNA bar coding can be applied as a precise standardization parameter in the identification and authentication of plant raw materials.

**Keywords:** *A. pedunculata*, *M. vaginalis*, *P. foetida*, *P. amboinicus*, *P. zeylanicus*.

## Anti-inflammatory and cytotoxic effects of a polyherbal extract, Darchini, Khulanjan and Asgand on lipopolysaccharide- stimulated RAW 264.7 macrophages

Mohamed Shiffa<sup>1</sup>, S.M. Ali<sup>2</sup>, M.H. Kazmi<sup>3</sup>, Nazeem Fahamiya<sup>1</sup>, M. Mahfuzul Haque<sup>2</sup>

<sup>1</sup>Department of study in Unani, Institute of Indigenous Medicine, University of Colombo, Sri Lanka

<sup>2</sup>Department of Biotechnology, Faculty of Natural Sciences, Jamia Millia Islamia, India

<sup>3</sup>Department of Pharmacology, Central Research Institute of Unani Medicine, Under CCRUM, Ministry of AYUSH, Government of India, Hyderabad, India

Unani scholars advocate many herbal medicines having anti-inflammatory activities, to treat inflammatory conditions such as arthritis. Among them Darchini (*Cinnamomum zeylanicum*), Khulanjan (*Alpinia galanga*), and Asgand (*Withania somnifera*) are widely used in the joint inflammatory conditions as they possess potent anti-inflammatory properties. Hence, these drugs were chosen to evaluate its safety and efficacy in Vitro. This study was done in Murine macrophage cell line called RAW 264.7 cells. Cells, were grown on Dulbecco's Modified Eagle Medium, supplemented with 10% fetal bovine serum, and penicillin (100 U/mL) and incubated in an atmosphere of 5% CO<sub>2</sub> at 37°C. Cytotoxic effect of six different concentration of extract (100 µg/ml, 150 µg/ml, 200 µg/ml, 300 µg/ml, 400 µg/ml and 500 µg/ml) was evaluated by MTT assay and the extracts did not show any cytotoxic effect, whereas cell proliferation was noticed in dose dependent manner. Anti-inflammatory activity was evaluated from the level of Nitric oxide determined by Griess reaction, and the expression of Tumour necrosis factor alpha (TNF-α), interleukin (IL) 1 β and IL-6 from LPS treated RAW264.7 cells by Reverse transcription polymerase chain reaction (RT-PCR) method. The test drug acted by reduction of TNF-α, IL-1 β, IL - 6 and inducible nitric oxide synthase expression in a dose dependent manner. Research findings showed that the test drug is safe and helps to reduce the inflammation in a dose dependent manner in Vitro. Hence, it is concluded that this test drug has potent anti-inflammatory activity. Further, clinical trials are necessary to study its effects on humans especially in rheumatic conditions. If desired results obtained from the clinical trials, this medicine would be made available for the general public for the rheumatological conditions as this medicine would be comparatively cheaper and easily available.

**Keywords:** Cell line, anti-inflammatory, herbal medicine, inflammatory mediators, cytokines

## Unani management of recurrent Bartholin's gland cyst: A case report

M.U.Z.N. Farzana

Department of Study in Unani, Institute of Indigenous Medicine, University of Colombo,  
Sri Lanka

The Barthollin's glands are symmetrically in the posterior region of the vulval vaginal opening and play a major role in female reproductive system. When cyst is infected it's referred to as an abscess. Bartholin's cysts are common complications of Bartholin's gland due to obstruction of the Bartholin's duct may result in the retention of secretions with resultant dilatation of the duct and cyst formation. Symptomatic Bartholin's cyst give major discomforts to sufferers, impaired the sexual function and disturb their quality of life. Approximately 2% of women, mostly in their reproductive age would develop Bartholin's gland cyst or abscess at some point in their life. There is a gradual involution of the gland as from 30 years of age; hence a higher incidence occurs between 20 - 30 years while high parity seems to be associated with lower incidence. Abscesses are almost three times commoner than the cysts but the ideal treatment for this disease remains controversial in contemporary medicine and causes haemorrhage, postoperative dyspareunia, recurrent infections and recurrence as the most common complication after incision and drainage. According to Unani medicine, management of cyst or abscess mentioned under the heading of "*Akyas/Dubayla*" and its management mentioned that using of *Zimad* (Paste) which could have *Muhallil e Warm* (Anti-inflammatory), *Daf e Taffun* (Antiseptic) and *Musaffi e Khoon* (Blood Purifier) and it will provide very good response in acute suppuration in chronic Bartholin's cyst/abscess. The aim of the study was to explain the successful Unani management of Bartholin's cyst. Here we present a case report of a 31 year old female patient with the history of Bartholin's cyst has a past history of Bartholin's abscess that was treated through suction with needle syringe two times. This patient presented the Unani gynecology OPD at Borella Ayurvedic Teaching Hospital for the treatment of Unani for this recurrent Bartholin's cyst and treated with *Zimad* (Paste) which was mentioned in Unani Pharmacopeia (IMPCOPS). The management by use of selected Unani treatment has been proved result on recurrent Bartholin's cyst.

**Keywords:** Barthollin's glands, Unani, *Muhallil e warm*, *Akyas*, *Dubayla*

**A novel herbal ergogenic-aid for enhancing motor performances - A preclinical study**K.N.A. Dharmasena<sup>1</sup>, A.R. Murthy<sup>2</sup>, K. Choudhary<sup>2</sup>, G. Sharma<sup>2</sup><sup>1</sup>Unit of Dravyaguna Vignana, Institute of Indigenous Medicine, University of Colombo,  
Sri Lanka<sup>2</sup>Postgraduate Department of Dravyaguna, National Institute of Ayurveda, Jaipur, India

Athletes involved in any sport are in search of a method that improves their performances. These efforts and strategies are defined as 'Ergogenic aids.' The International Olympic Committee has published a list of banned substances for athletes considering the pros and cons of ergogenic aids. Hence, it is high time to explore safe herbal ergogenic-aids in the field of sport. Ayurveda is regarded as a life science enriched with time-tested herbal formulas. Rational use of these formulas may be worth in sports medicine. This study aimed to find a novel ergogenic aid to improve motor functions of athletes using a classical decoction formula mentioned in Ayurveda authentic books. Aqueous and alcohol extracts of the novel formula were prepared. An acute oral toxicity study has been conducted for the extracts. In addition, the ergogenic effect of the extracts has been assessed by the motor performances using the rat Rotarod model (Dunham & Miya, 1957). Twenty-four healthy albino Wistar rats were randomly divided into four groups. 5ml/Kg of distilled water, Caffeine (20mg/Kg), 200mg/Kg of aqueous extracts, and 200mg/Kg of alcohol extracts of the drug has been given orally for groups 1, 2, 3 and 4 accordingly for 14 days. Time spent by each rat on the Rotarod apparatus was observed on the 15<sup>th</sup> day. Data were analyzed statistically by one-way ANOVA followed by Dunnett multiple comparison test using graph pad prism software. Caffeine-received animals showed statistically highly significant ( $P < 0.001$ ) results, while aqueous extracts received animals showed significant effects ( $P < 0.05$ ) comparing to the negative control. Conversely, the alcohol extracts received group showed statistically insignificant ( $P > 0.05$ ) results. Results suggested a significant improvement in motor performances of the rats after the administration of aqueous extracts of the formula. Hence, the study rekindles the optimism in discovering safe herbal ergogenic aid to enhance the motor performances of professional athletes.

**Keywords:** Herbal ergogenic aid, motor performance, performance-enhancing methods



## Quality assessment of a poly-herbal decoction used for the Polycystic Ovary Syndrome

S.H.K. Deepthika<sup>1</sup>, K.P.K.R. Karunagoda<sup>2</sup>, P.K. Perera<sup>3</sup>, L.D.A.M. Arawwawala<sup>4</sup>

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*Sesamum indicum* L. and *Nigella sativa* L. are medicinal plants which have been commonly used in Ayurveda and traditional medicine for the treatment of gynecological problems. The effectiveness of *Nigella sativa* and *Sesamum indicum* for oligomenorrhea was scientifically proven. Moreover, a decoction made out of both *N. sativa* seeds and *S. indicum* seeds in a ratio of 1:1 w/w is given as a remedy for polycystic ovary syndrome. Up to date no scientific experiments were carried out to assess the quality of this decoction. Therefore, an attempt was made to evaluate the quality of the decoction made out of *N. sativa* seeds and *S. indicum* seeds in terms of (a) phytochemical analysis (b) development of TLC fingerprints (c) antioxidant activity (d) microbial limits and (e) heavy metal limits using standard protocols. Results revealed that except flavonoids, other phytochemical constituents such as phenols, tannins, alkaloids, saponins, steroids, terpenoids, monoterpenes, sesquiterpenes and cardiac glycosides were present in the decoction. Further, TLC fingerprint profile was developed for the decoction and visualized the spots under UV light and calculated the  $R_f$  values of each spot. Total phenolic content of the decoction was  $3.38 \pm 0.07$  mg gallic acid equivalents/g of extract and exhibited dose dependent ( $R^2 = 0.979$ ) scavenging activity towards 1-diphenyl-2-picrylhydrazyl (DPPH) radicals.  $IC_{50}$  value of the decoction was  $850.5 \pm 30.2$   $\mu$ g/mL for the DPPH assay. *Escherichia coli* and *Coliforms* were not detected whereas Yeasts & Moulds and *Staphylococcus aureus* were present less than 10 colony forming units (CFU) per 1 ml of the decoction. Moreover, heavy metals such as Hg, As, Cd and Pb were not detected in the decoction. In conclusion, reported phytochemicals and antioxidant properties may be responsible for the remedy of Polycystic Ovary Syndrome while absence of harmful microbes and heavy metals are the indication of the safety of the decoction.

**Keywords:** Antioxidant, *Nigella sativa*, Polycystic Ovary Syndrome, *Sesamum indicum*

**Alcoholic extraction and physico-chemical evaluation on Pathyadi Choorna**A.G. Samarawickrama<sup>1</sup>, H.L.P.D. Liyanage<sup>2</sup><sup>1</sup>Institute of Indigenous Medicine, University of Colombo, Sri Lanka,<sup>2</sup>Ayurveda hospital, Meegoda, Sri Lanka.

Since time immemorial, Ayurveda practitioners have successfully treated by using herbal based treatments. The herbal medicines are beneficial for therapeutic effect, they presence of active constituents. Pathyadi Choorna is a classical formulation mentioned in Bawaprekasha under Amavata Adikariya and used as a remedy for *Amavata*. Pathyadi Choorna consists of Harithaki (*Terminalia cecular*), Yawani (*Carum copitum*) and Shunti (*Zingiber officinale*). In the present study was designed to assess the quality of the Pathyadi Choorna according to standard protocols. TLC fingerprint developed for Pathyadi Choorna using 0.1- 0.2 ml of methanol. Pathyadi Choorna was prepared according to the method described in Sharangadhara Samhita. According to the results, Pathyadi Choorna appeared powder in texture, brownish yellow with aromatic taste. Moisture content, solid content, total ash, water soluble ash, acid insoluble ash were 10.19, 89.81,  $5.8 \pm 1$  at 29°C,  $88 \pm 0.0\%$  w/w, and  $7.4 \pm 0.0\%$  w/w respectively. The present study disclosed that the methanol extract of Pathyadi Choorna and its constituents exhibited presence of various secondary metabolites viz. alkaloids, flavonoids, phenols, steroid, saponin, tannin, resin. This study would provide preliminary scientific evidence for Pathyadi Choorna as potent drug, because of Pathyadi Choorna has more active principles. Therefore, Organoleptic properties and physico-chemical parameters of Pathyadi Choorna is essential in order to evaluate active constituents responsible for its medicinal actions and the manufacturing of new drugs. Further exploration of Pathyadi Choorna and its constituents is required to isolate and identify active molecules for detailed evaluation of in vivo biological activities of such isolated compounds.

**Keywords:** Pathyadi Choorna, *Amavata*, physico-chemical parameters, *Bawaprekasha*

***Moringa oleifera* leaves a culinary strategy to combat COVID 19 pandemic**

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COVID-19 pandemic has caused negative consequences to the mankind and making massive death toll. Researchers are working to find a remedy and yet the task is not achieved. However, consumption of *Moringa oleifera* leaves, according to traditional medical systems, is very effective in controlling infectious diseases. This review was focused to analyze the scientific evidences of the bioactivities of moringa leaves against COVID-19. Data bases such as PubMed, HINARI and Google scholar were used to filter the journal articles with the search terms '*Moringa oleifera*', 'COVID-19' and 'Corona viruses'. The studies revealed that moringa leaves have the potential to increase the number of antibodies including lymphocytes and thus boost the immunity. In addition, it contains a chemical compound niacinin which acts as anti-inflammatory and anti-pyretic. Ellagic acid and apigenin, compounds found in moringa leaves showed a particular binding affinity with the target protein 3CL protease is the main protease of the SARS-CoV-2 and thus prevents the assembling of the virus particles and thereby stops replication of the viruses. Further, natural inhibitors in moringa significantly blocks the spike protein and ACE2 interaction and thus prevent binding the human cell, and infecting those cells. Moreover, natural flavonoids found in moringa act as an anti-viral activity specially on influenza viruses such as COVID-19. Further, moringa leaves are also possess rich nutritive values such as protein, Vitamin A, B2, B6, and C and minerals like iron, magnesium and zinc. The review concludes that moringa leaves have multipotential properties to work against COVID-19. It provides nutrition and boosts the immunity and that in turn work in different ways to fight against COVID-19 virus. The study suggests to make aware among the public to increase the consumption of moringa leaves as one of the culinary health care measures to save community from COVID-19 pandemic.

**Keywords:** COVID-19, corona virus, Moringa, *Moringa Oleifera*

## Diet and dietary therapy in health and diseases in Unani

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According to Unani Medicine, diet and dietary therapy are important factors in health promotion and disease prevention measures. These two measures, as mentioned in Unani principles of treatment, are as equally important and are the first line of treatment modalities in any disease conditions depending on the nature of a disease, and nutritional and medicinal values of each ingredient of diet. The objective of this review was to reveal the practice of diet and dietary therapy as mentioned in the classical Unani text book and request to include in the national health policy for the benefit of the public. Unani text books were used as a source of information. The selection of diet in health promotion and disease prevention is mainly depend on the temperament of each individual to maintain and sustain the particular temperament of that individual. According to Unani Medicine healthy individuals have been grouped into four namely; Sanguine, serous, bile and melancholy. Similarly, food articles and medicinal herbs have also been having their own temperaments. In disease condition, it is the duty of the Physicians to determine the diet to suit each individual. Diet in Health promotion include; selection of whole grains and pulses, temperament of foods to suit each individual, follow the rules of eating, maintain moderate amount of diet and also obtain a good source of drinking water. Diet in therapeutic management includes; Diet in acute diseases, diet in chronic diseases, diet designed to achieve therapeutic values should also be considered. As conclusion we propose that this practice is time tested and including research and empirically proven of having efficacy the policy makers of the country should take these simple, safe and less cost measures to introduce these traditional practices when making national policy in relation to health.

**Keywords:** Diet, dietary therapy, temperament, health, disease

### Quality assessment of *Palathrayadi kwatha*

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Herbal medicines are obtained from plants for the treatment and wellbeing of mankind. However, the regulation norms for the herbal medicines are not sound when compared to the synthetic medicines. It is very much required to control the quality standards of the herbal drugs and products for the betterment of the mankind. *Palathrayadi kwatha* (PTK), consists of eight medicinal plants (*Harithaki* -*Terminalia chebula* Retz-fruit, *Vibhithaki* -*Terminalia bellirica* (Gaertn.) Roxb - fruit, *Amalaki* -*Phyllanthus embilica* Linn - fruit, *Daruharidra*- *Coscinium fenestratum* (Gaertn.) Colebr - bark, *Mustha*- *Cyperus rotundus* Linn – rhizome, *Bimba-Cocconia grandis* (L.) Voigt- whole plant, *Vishala*- *Mukia maderaspatana* (L.) Cogn- whole plant and *haridra*-*Curcuma longa* Linn- rhizome) and used in the Sri Lankan indigenous medical system for treatment of *Madhumeha*. Therefore, an attempt was made to evaluate the quality of the PTK in terms of (a) phytochemical analysis (b) pH (c) development of TLC fingerprints (d) microbial limits and (e) heavy metal limits using standard protocols. Results revealed that flavonoids, phenols, tannins, alkaloids, saponins, steroids, terpenoids, monoterpenes, sesquiterpenes and cardiac glycosides were present in the decoction. The pH value of the PTK was 6.5 at 25 °C. Further, TLC fingerprint profile was developed for the decoction using methanol, dichloromethane, cyclohexane in a ratio of 0.1:1:1 (v/v). Spots were visualized under UV light (both at 254 nm and 366 nm) and calculated the R<sub>f</sub> values of each spot. TLC fingerprint of PTK exhibited the presence of claimed plant ingredients. Pathogenic microbes such as *Escherichia coli*, *Coliforms* Yeasts & Moulds, *Staphylococcus aureus* and *Salmonella* were not present in the decoction. Moreover, heavy metals such as Hg, As, Cd and Pb were not detected in the PTK. In conclusion, quality assessment was carried out for PTK for the first time and according to the results it is suitable for the human consumption.

**Keywords:** Diabetes, *Palathrayadi kwatha*, phytochemicals, quality control

## Nutritional and medicinal effects of *Rakta sali* in health and diseases

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Rice is one of a staple foods that has been consumed by majority of the people especially in Asia and West Indies that the history goes back to Stone Age. Although there are many varieties *Oriza sativa* (Asian rice) and *Oryza glaberrima* (African rice) are mainly consumed. The objective of this study was to reveal efficacy of *Rakta sali* (Red rice) which is not only having the nutritive value but also having medicinal effects as a single remedy or in combination with other ingredients for various diseases as mentioned in the Classical texts in Ayurveda. Data was collected and compiled specially from Caraka and Suśrta Samhitā and other relevant lexicons. The collected data was analyzed extensively and recorded. *Śāli* type of rice is categorized under the *śūkadhānya* (Corn with bristles). *Raktaśāli* (Red rice) is the best among them and it relieves thirst and alleviates all the three vitiated *doṣa*. *Ācārya Suśruta* says it is sweet, cold in potency, light in digestion, strength promoting, *pitta*-pacifying, slightly increasing *vāta* and *kapha*, unctuous and constipates. It has been recorded that consuming *Rakta śāli* (Red rice) alone or in combination with other ingredients for various diseases. *Red rice* is beneficial for wound. It has antipyretic action. It help to increase the immune action of the body hence it helps to eliminate all diseases. And it is cause to increase lactation. It has proven that rice has been used not only as a food but also as a medicine in Ayurveda. In conclusion it is proposed to encourage the people to consume *Rakta śāli* rice, as our ancestors used to this, in order to promote health, prevent diseases and manage various disease conditions. It is also recommended to take a policy decision by the concerned health policy making authorities to limit the polishing of rice that are being marketed.

**Keywords:** *śāli*, *tridośa*, *sītavīrya*, *saṃhitā*, *pitta*

## **Anthropological analysis of traditional practices of ancient Sri Lankans *w s r* to management of infectious diseases**

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Anthropology is the study of people, their evolutionary history, how they behave, adapt to different environments, communicate and socialize with others. Considering traditional practices among ancient Sri Lankans anthropologically, there is a sustainable concept behind them. This aims to study those practices during the infectious diseases. Information was collected by interviewing 25 Sri Lankan senior citizens in Ratnapura and Kandy districts. Results showed that different strategies followed at different stages in managing infectious diseases. Percentage of resource persons' opinions are: such diseases were categorized as '*Deiyange Leda*' (100%) or 'diseases of Gods' as causative factor is unknown. Concerning God denotes the purity leads to maintain an optimum hygiene and social-discipline. For communicating; '*Wasangatha Veti Demeema*' at village entrance (8%), hanging *Kohomba Kola* at home entrance (100%) were done restricting outsiders. For protection; Chanting *Pirith* (100%), making Vows to local Gods (100%), *This-Bamba Kepeema*, *Mal-Eli Videema* and *Shankha Naada* (8%) were followed. Isolation of patient and belongings, using Banana leaves for eating and sleeping were practiced to control spreading (100%). Management was on home-remedies and consuming *Pathpadagam*, *Kottamalli* boiled water, cleaning with *Kohomba Kola*, *Amu Kaha* boiled water, spraying *Amu Kaha* water, lighting *Kohoma Thel* lamps, Herbal Fumigation, wearing *Vada Kaha*, *Perumkayam*, *Kaha Noola* were the protective and curative measures (100%). Easily digestible *Thembun Hodi*, *Kenda* were consumed (100%) to maintain optimum nourishment and hydration. After 7-14 days patient bathes at water streams (100%). All used herbal ingredients have proven Anti-Viral, Anti-Bacterial, Anti-Fungal, Anti-Inflammatory and Anti-Oxidant properties. Analyzing these procedures anthropologically and scientifically, all are highly standard nature knitted, nature friendly strategies and were capable in managing infectious diseases successfully. In concluding, sophisticated traditional knowledge of the ancient Sri Lankans is more advanced and stronger than the 21<sup>st</sup> century knowledge. Those practices should be re-established and validated to face pandemic like COVID 19 effectively.

**Keywords:** Anthropology, *Deiyange Leda*, Infectious diseases



**Tamalakyadi decoction: Chemical variations in two types of decoction preparation methods used in Ayurveda and Sri Lankan traditional medical system**

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Decoction is a well-known herbal dosage form in many traditional systems in the world. Two main types of decoction preparation methods are described in Ayurveda Pharmacopeia (AP) of Sri Lanka (60 g of ingredients in 1920 ml of water and reduced to 240 ml) and Sharangadhara Samhita (SS) of India (60 g of ingredients in 960 ml of water and reduced to 120 ml). Even though dried coarse powder (CP) is recommended for decoction preparation, mostly consumers get the large particle (LP) sizes from the vendors. In general, the sizes of the CP and LP are 10/44 (1.7 mm/355micrones) and approx. 2 cm respectively. Hence the objective of the present study was to investigate the chemical variations in 2 types of preparation methods of Tamalakyadi decoction in terms of (a) extractable matter% (b) total phenolic content [TPC] (c) total flavonoid content [TFC] and (d) Thin Layer Chromatography (TLC) fingerprints. Four types of decoctions were prepared according to the particle sizes as follows; Decoction 1: As AP and LP, Decoction 2: As AP and CP, Decoction 3: As SS and LP, Decoction 4: As SS and CP. The highest extractable matter was in decoction 2 ( $8.6 \pm 0.3\%$ ) followed by decoction 4 and 3 respectively. The highest amounts of TPC and TFC were found in decoction 2 ( $212.4 \pm 1.8$  mg GAE/g of extract and  $10.8 \pm 0.5$  mg QE/g extract) followed by decoction 4 ( $190.2 \pm 0.5$  mg GAE/g of extract and  $8.2 \pm 0.2$  mg QE/g extract), decoction 1 ( $180.5 \pm 2.1$  mg GAE/g of extract and  $7.4 \pm 0.6$  mg QE/g extract) and decoction 3 ( $160.1 \pm 0.4$  mg GAE/g of extract and  $6.4 \pm 0.2$  mg QE/g extract) respectively. Phytochemical differences were clearly exhibited by the TLC fingerprints of four decoctions. In conclusion, preparation method of decoction 2, which belongs to Sri Lankan traditional system is more beneficial to people.

**Keywords:** Tamalakyadi decoction, flavonoids, phenols, TLC



## Pedagogy of medical education in Susruta Samhita

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Medical Education is the process of training a student to become a medical practitioner. Gurukula System of Education reflect the pedagogy in ancient India. Vedic period (1500 BC to 600 BC) can be considered as the period where world's first formal education is practiced. Medical education in Samhita period is an extension of this Vedic education. Ayurveda, a system of Medicine developed in Ancient India can be considered as the oldest medical system developed through systematic and scientific manner. Ayurveda has main eight specialties developed. Susruta Samhita (~600 BCE) is the main text contains facts related to Ayurveda surgery (Shalya Tantra) composed of 186 chapters. It can be referred as the written evidence of training a scholar especially related to surgery. This review has been carried out to find out the teaching and learning methodologies of Susruta Samhita. Knowledge receiving methods and concept of research, evidences for student centred learning, active learning, simulator based learning, divergent discussion style, qualities of a medical student and ethics, qualities of the teacher, learning environment, teaching and learning models such as concept of deep learning, direct regular teaching concept, importance of both knowledge and skills, importance of learning other sciences, continuous medical education are some examples to claim that well-structured pedagogy of medical education is practiced in that period. Concept of the licensed medical professional with the requirements to be fulfilled are also mentioned in the text. Considering all facts, it can be concluded that Susruta described the Pedagogy of Ayurveda Medical Education going beyond the Vedic teaching methods and structured towards and training of a student in an organized manner and development of knowledge, skills, attitudes and mindset of the learner to become a competent medical practitioner.

**Keywords:** Medical education, Susruta Samhita, pedagogy

## COVID-19 impact on mental health and management with Unani medicine: A narrative review

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Corona Virus Disease -2019 (COVID-19) is an extremely infectious disease often including severe acute respiratory syndrome. This infection was declared as pandemic and Public Health issue of International concern in January 2020. The COVID-19 pandemic has reached a level of a crisis of humanitarian with over 228,807,631 confirmed cases and 4,697,099 deaths reported globally to date (22<sup>nd</sup> September 2021). And also this outbreak has affected not only physical health but also terrible effect on the health system. This causes severe psychological distress, depression and anxiety which lead to permanent psychiatric illness to patients. And also psychological symptoms were effect on reduction on academic performance, economic issues, and social insinuations of daily life. But up to now no any effective management had not been declared in the contemporary medicine for the management of psychological consequences of COVID-19. In such conditions, in Unani system of medicine, psychological and anxiety disorders and its management mentioned under the heading of “*Amraze Nafsaniya*” and also pandemic diseases and its post complications are emphasized by Unani physicians in their Unani classics under the chapter of influenza about pandemic (*Nazla Wabai/ Nazla Haar*) and epidemic diseases. Keeping the consequences of psychological impact of COVID-19 and its management focused to review the management via Unani medicine. The article have been assembled via using electronic data-base such as Medline, PubMed, NCBI and Science Direct and Unani classical books such as Al Qanoon fit tibb, Al Hawi, Tibbe Akbar. This study explained that symptoms of anxiety, repeated stress, depression and changes in sleeping pattern are common psychological issues to the COVID-19 pandemic and its management via Unani medicine. Therefore, highlighting these mental health issues during pandemic needed a psychological support and interventions through Unani medicine to improve their quality of life during COVID-19 pandemic are clearly indicated in Unani classics.

**Keywords:** COVID-19, Mental health; Unani, *Amraze Nafsaniya*

## A review on clinical efficacy of *Habbe Mudir* in the management of Poly Cystic Ovarian Syndrome (PCOS)

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Polycystic ovarian syndrome (PCOS), correlating with *Marz-e-Akyas-e-Khushyat-ur-Rehm* in Unani, is a prevalent, complex endocrinopathy affecting 5% - 10% of women in reproductive age. It is characterized by polycystic ovaries, chronic anovulation and hyperandrogenism leading to symptoms of irregular menstrual cycles, hirsutism, acne and infertility. Evidence based medical management emphasizes a multidisciplinary approach for PCOS which is often associated with side effects and not effective in some cases. In addition, women with PCOS have expressed a strong desire for alternative treatments. The objective of this review is to explore the action of the ingredients of *Habbe Mudir* and its efficacy in the management of PCOS. The methodology was designed to gather information by searching many review articles published up to now, through electronic databases such as Google Scholar, PubMed, Research Gate, etc and other authentic Unani classical texts. The ingredients of *Habbe Mudir* are *Elwa* (*Aloe barbadensis*), *Zafran* (*Crocus sativus*) and *Heera kasees* (Ferrous sulphate). *Habbe Mudir* is effective in improving fertility outcomes in PCOS by regulating ovulation due to its medicinal properties such as *Mudir haiz* (Emmenagogue), *Munzija balgam* (Concoctive of phlegm), *Muqawwi jigar* (Hepatotonic), *Mufattit sudad* (Deobstruent), etc and are known to contain phytohormones which induce the menstruation by maintaining the hormonal balance (hyper-insulinemia, hyper-lipidemia, hyper-androgenism) thereby improving metabolic hormone profile. Also, it acts as an antioxidant, increases blood circulation, and is used as a haematinic. Therefore, *Habbe Mudir* can be recommended for the management of PCOS. However, further phytochemical analysis and pharmacological studies on the ingredients of *Habbe Mudir* are required to prove its efficacy and strengthen the current knowledge for future research.

**Keywords:** PCOS, *Habb-e-Mudir*, *Elwa*, *Zafran*, *Marz-e-Akyas-e-Khushyat-ur-Rehm*

## The efficacy of Devadali Nasya in the management of Kamala (Hepatitis)

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Acute and chronic Viral Hepatitis is highly prevalent globally as about 2.3 billion people of the world are infected and cause of significant mortality and morbidity, approximately About 1.4 million deaths per year. Kamala (hepatitis) is one of the important Pitta Dosha dominant diseases in Ayurveda, where the description appears to be most comprehensive and incorporates the disorders of Hepatitis in Hepato-Biliary System of Allopathic Medicine. There is no cure for hepatitis, but several conservative treatments used to manage symptoms and reducing the risk of chronic health issues by modern medicine. This study aims to evaluate the effectiveness of Ayurveda Nasya (nasal drop) therapy which contain the water extract of *Luffa echinata* fruit for clinical outcomes in hepatitis. Acute, and chronic diagnosed 20 Hepatitis patients in age between 11 – 70 years, who fulfill the research criteria were treated with Devadali Shita Kashaya Nasya 4 drops into each nostril consequently thrice at 5 minutes intervals for three days. Data was analyzed by SPSS Statistics software and there was a significant ( $p < 0.001$ ) and rapid re-normalization of the symptoms such as yellowish discoloration of eyes, abdominal pain and tenderness, burning sensation, anorexia, clay colour stools, nausea, and biochemical parameters of liver functions such as Bilirubin count, ALT, AST and Alkaline Phosphatase levels, at the end of the treatment. No any adverse effects or life-threatening conditions were observed or reported during the study period. This study highlights the significance of Devadali Nasya treatment in hepatitis, which can be used as an effective drug and it has provided the strong platform for the further studies.

**Keywords:** Hepatitis, *Kamala*, *Nasya*

## Review on potential use of herbal medicine in COVID-19 associated coagulopathy

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New Coronavirus Disease (COVID-19) become severe when associated with several comorbidities such cardiovascular diseases, diabetes, immune suppression etc. COVID-19 associated Coagulopathy (CAC) is a unique presentation having combination of low-grade DIC and pulmonary thrombotic microangiopathy which leads to severe disease and death. Intense systemic inflammatory response leading to cytokine storm predispose the condition. Concept of Raktha (blood) and application of various herbs having the potential to change the properties of blood has been mentioned in Ayurveda Authentic Texts and widely used as ingredients in many formulas. The present review was carried out to identify the herbs that can be used in coagulopathies. The review was carried out using Ayurveda Authentic Texts and published Journal articles. There are several categories of herbs that can be used in coagulopathies such as Raktha Vishravaniya (induce bleeding) and Raktha sanghata bhedaka (anti-coagulants), Asruk Vahaka (induce circulation), Raktha Prasadaka (improve the properties of blood) plants and materials. There were 14 Raktha Vishravaniya plants and pippalyadi and Surasadi group of drugs acting as Raktha sanghata bhedaka (44 plants). Some of these plants act on inducing circulation. Raktha prasadaka dravya include Madura rasa dravya and some of ashes of minerals. Most of the materials except raktha prasadaka dravya shared similar pharmacological properties such as astringent taste, light, sharp, alkaline, hot in potency, Kapha-Vata alleviating and acting in respiratory system. Some are spices such as pepper, cardamom, garlic, ginger, turmeric and mustard seeds that can be used daily during and after COVID infection to improve the disease condition and reduce complications. Anti-inflammatory action is evident in most herbs while some contain anti-coagulant activity at various level of coagulation cascade. Interdisciplinary research on utility of these medicines and formulas on COVID patients with comorbidities may provide evidence-based medicine to preserve lives.

**Keywords:** COVID-19 associated coagulopathy, herbal medicine, spices

## COVID-19 related clinical studies in Traditional Systems of Medicine: A systematic review

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Coronavirus disease (COVID-19) is an infectious disease caused by SARS-CoV-2 virus. COVID-19 is a global pandemic affecting almost all the countries in the world. There is currently no cure for the COVID-19 and therefore the treatment is largely supportive and empirical. There has been high interest in the use of traditional medicines for COVID-19 from early in the course of the pandemic. Several traditional medicines were also investigated for their potential utility in treating SARS-CoV-2. A systematic literature review was carried out to obtain clinical studies related to COVID-19 conducted in traditional systems of medicine. Electronic databases such as Google Scholar, PubMed, Sri Lanka Clinical Trials Registry (SLCTR), Clinical Trials Registry-India (CTRI), International Clinical Trials Registry Platform (WHO-ICTRP) and AYUSH Research Portal were used to review articles regarding clinical studies related to COVID-19 conducted in Unani, Ayurveda, Siddha and Indigenous medical systems. This review assessed studies published on potential single and compound drugs in traditional systems of medicines that could be used to prevent or treat COVID-19. From this review, administration of some single drugs such as *Ashwagandha* (*Withania somnifera*), *Guduchi* (*Tinospora cordifolia*) and *Yashtimadhu* (*Glycyrrhiza glabra*), compound drugs such as *Guduchi Gana Vati*, *Samshamani Vati*, *Joshanda-e-Behidana-Unnab-Sapistan*, *Joshanda-e-Khameera-e-Marwareed* and *Kabasura Kudineer*, and patented products such as AYUSH-64 and *Chyawanprash* are identified as interventions used in the clinical studies. Findings of these studies support the beneficial pharmacological properties of traditional medicines such as anti-viral, anti-inflammatory and immunomodulatory properties which are used in the prevention and treatment of COVID-19 infections. Traditional systems of medicine have a unique holistic approach to COVID-19 and can be adopted wisely to overcome the current crisis. However, traditional medicines need to be investigated for their clinical efficacy and safety for the prevention of adverse effects. Further, clinical studies should be designed with large sample size in future.

**Keywords:** COVID-19, Ayurveda, Unani, Siddha, Indigenous Medicine

**A comprehensive review on the concept of *Akhlat* (Humours) and its role in maintaining the health according to Unani medicine**

A.L.M. Ihsan<sup>1</sup>, M.I. Manuha<sup>1</sup>

<sup>1</sup>Unit of Kulliyat, Institute of Indigenous Medicine, University of Colombo.

The well-known *Akhlat* (Humours) is one of the very basic constituents and concepts of the Unani System of Medicine. According to Unani Medicine, the basic physiology of human body highly attributed with seven fundamental factors such as *Arkan* (Elements), *Mizaj* (Temperament), *Akhlat* (Humours), *Aaza* (Organs), *Arwah* (Pneuma), *Quwa* (Faculties) and *Af'al* (Functions). Aims of the study was to collect and interpret the concept of *Akhlat* and its role in health and disease from various databases. This was a comprehensive literary review. The method of collection of literary material was from Unani classical published books, their translations and the online electronic databases such as PubMed, Google scholar, Research gate and Science direct were filtered up to August 2021. The collected materials were then analyzed and systematized in a comprehensive way. Humours are the moist and fluid portions of the body that are created in the liver by the nutrient components of ingested food and liquids; they are responsible for growth, repair, energy production, preservation of individual and the species. According to most Unani philosophers, the body is in a state of health when the four primary *Akhlat*: *Dam* (sanguine), *Balgham* (phlegm), *Safra* (yellow bile), and *Sauda* (black bile) are mixed in the correct proportions, but diseases emerge when there is a condition of disharmony. As per Unani medicine, blood is a blend of four primary humours and sources for the organ to maintain its structure and activities while taking into account its temperament. These primary humours have their own temperaments as dam is hot and moist, phlegm is cold and moist, yellow bile is hot and dry and black bile is cold and dry. This study concluded that the theory of four humours plays an important role in determining health and disease in Unani medicine.

**Keywords:** *Akhlat*, Humour, health, disease, Unani medicine

**A Review on pharmacognostic, phytochemical and pharmacological studies of  
*Leucas zeylanica***

M.S.M. Nasmeeer<sup>1</sup>, M.M.M. Rifae<sup>1</sup>, M.N.F. Rizniya<sup>1</sup>

<sup>1</sup>Department of Unani, Institute of Indigenous Medicine, University of Colombo

*Leucas zeylanica* belongs to Family Lamiaceae, known as Gatathumba in Sinhala and Thumpai in Tamil has been utilized in traditional medicine since ancient time. This herb has been used mainly in gastro intestinal disorders, mild fever and aches as home remedy around the world. This review focused to summarize updated studies on the taxonomical, morphological, phytochemical and pharmacological findings of this plant. Manual literature survey of classical manuscripts, electronic databases of PubMed, Google Scholar, and Science Direct were searched to gain the information with special reference to its pharmacognostic, phytochemical and pharmacological aspects of *Leucas zeylanica*. The research papers published in English language from 2005 to up to date were selected for this study. *Leucas zeylanica* is an abundantly available medicinal plant in Sri Lanka. Phytochemical screenings on the plant have revealed the presence of various pharmacologically active principles including alkaloids, flavonoids, gums, tannins, steroids, reducing sugars, glycosides, amino acid and saponins. This species has been extensively investigated as a source of natural pharmacologically active compounds with potential antimicrobial, anticancer, antipyretic, anti-inflammatory, analgesic, antidiarrheal, antibacterial, antioxidant, mosquito repellent, antifungal, photo-protective, cytotoxic, anthelmintic, diaphoretic, sedative, stimulant and CNS depressant properties. Recent research has done in Sri Lanka showed anti-microbial properties of *Leucus Zeylanica* through photo-mediated activity against *S. aureus* and *B. subtilis*. This study reveals that updated findings on Pharmacognostic, Phytochemical and Pharmacological Studies of *Leucas zeylanica* validate its traditional uses. Further investigation on this plant will paw the way to novel drug invention.

**Keywords:** *Leucas zeylanica*, Lamiaceae, anti-microbial, Gatathumba, Thumba



## **Arq e Ajeeb a potent immune-modulatory formula in Unani Medicine – A literary review**

M.N.F. Rizniya<sup>1</sup>, M.H. Faslul Haq<sup>1</sup>, M.S.M Nasmeer<sup>1</sup>

<sup>1</sup>Department of Unani Medicine, Institute of Indigenous Medicine, University of Colombo, Sri Lanka

*Humma e waba'iyya* or *Nazla e waba'iyya* mentioned in classical text of Unani system of medicine as Epidemic fever like illnesses. Fever, headache, dry cough, sore throat, myalgia, nasal irritation, malaise, dyspnoea, extreme thirst, loss of appetite, insomnia, nausea, vomiting, diarrhea, and abdominal pain are the symptoms of above condition and could correlate with the symptoms of current pandemic of COVID-19. Since ancient times, plants with therapeutic properties have secured an important place in the healing practices and treatment of diseases. *Arq e Ajeeb* is a compound formulation of Unani medicine. It is reputed for its beneficial effects in the treatment of *Nazla* and *Is'hal*. Aim of this study was to compile scientific validation of the ingredients of *Arq e Ajeeb* special reference to anti-viral and immune-modulatory actions. Manual literature survey of classical Unani texts, electronic databases of PubMed, Google Scholar, and Science Direct were searched to collect data on *Humma e waba'iyya* or *Nazla e waba'iyya* and related pharmacological actions of ingredients of *Arq e Ajeeb*. Among the wide-ranging of pharmaco-biological activities of thymol, menthol, and camphor, this review study highlighted the therapeutic significance and pharmacological actions of antiviral, anti-inflammatory and immunomodulation. The components of *Arq e Ajeeb* revealed virucidal and cytotoxic activity against Japanese encephalitis, HSV-1, Hepatitis C and Influenza A and B viruses. Further classical texts indicated *Mussakin e Alam*, *Munzija* and *Thriyaq* actions of *Arq e Ajeeb*. It has been considered useful in preventing and reducing the risk of contamination of infection during epidemics with using a smaller amount as effective dose. Present study in the light of Unani medicine has been provided a new insight for the prevention and possible management of these diseases. More Clinical studies will pave the ways for efficient use of *Arq e Ajeeb* in *waba'i* diseases.

**Keywords:** *Humma e waba'iyya*, *Arq e Ajeeb*, immune-modulator, anti-viral, *Thriyaq*,

**Therapeutic effect of *Ithrifal e Muqil* and *Roghan e Khas* on *Bawaseer* - A case study**

M.H.F Risla<sup>1</sup>, M.S.J Shamlala<sup>1</sup>, K. Kirushanthi<sup>1</sup>, M.N.F Shafana<sup>1</sup>, A.A.F Hasna<sup>1</sup>, M.N.F. Nafla<sup>1</sup>, J. Ruhunage<sup>2</sup>

<sup>1</sup>Department of Study in Unani, Institute of Indigenous Medicine, University of Colombo

<sup>2</sup>Bandaranayake Memorial Ayurvedic Research Institute, Navinna, Maharagama

*Bawaseer* (Haemorrhoids) are defined as the congested vascular cushions with dilated veins in the anal canal. It is characterized by protruded anal mass, pain, discomfort during defecation and rectal bleeding. According to the *Unani*, *Bawaseer* is one of the *saudavi* conditions. In *Unani* view, it is due to the accumulation of melancholic sanguine (*Damm e saudavi*) in the anal vessels resulting in engorgement and subsequent ulceration in anus. Majority of the people are suffering from this condition because the risk of the recurrence is high and the complications after treatments are more violent. Therefore, Combination of *Ithrifal e Muqil* and *Roghan e Khas* are beneficial on *Bawaseer* as it is mentioned in authentic texts. This study was designed to assess the effectiveness of combination of *Ithrifal e Muqil* and *Roghan e Khas* on *Bawaseer* patient. It was conducted at Bandaranayake Memorial Ayurvedic Research Institute, Navinna, Maharagama. This study describes a case of clinically diagnosed 62 years old male patient with protrusion of anal mass, bleeding from anus and pain during defecation for one week. He was administered with ten grams (10g) of *Ithrifal e Muqil* twice a day and externally *Roghan e Khas* application were given for four weeks without discontinuation. Treatment protocol was consisted with local and systemic therapies. After one (01) week of therapy there was a marked improvement of pain. At the end of follow up period a complete remission of symptoms were observed. It is concluded that the treatment protocol which is used to treat the patient was effective in the management of *Bawaseer* of this patient.

**Keywords:** *Bawaseer*, Haemorrhoids, *Ithrifal e Muqil*, *Roghan e Khas*

**Analysis of conventional classroom versus online learning and its challenges among  
BUMS undergraduates**

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<sup>1</sup>Unit of Kulliyat, Institute of Indigenous Medicine, University of Colombo, Sri Lanka

<sup>2</sup>Unit of Moalejat, Institute of Indigenous Medicine, University of Colombo, Sri Lanka

Learning activities of Higher Education Institutions are transferred to online mode with the global impact of COVID 19 pandemic. Institute of Indigenous Medicine, University of Colombo adapted to online learning activities since April 2020. It is vital important to examine the learning experience and students' perceptions on online learning through appropriate feedback. This study was designed to compare the effectiveness of conventional classroom versus online learning and to capture the challenges pertaining to online learning among BUMS undergraduate students of Institute of Indigenous Medicine, University of Colombo. Feedback was collected from 257 undergraduate students of 2014/2015, 2015/2016, 2016/2017, 2017/2018, 2018/2019 and 2019/2020 academic year using a structured questionnaire via Google forms. The findings revealed that 54.1 percentages of students strongly agreed as the conventional method was more effective than the online learning. Effectiveness of both types of learning modes was equal among 45.5 percentages of students. Further, it showed that theory component was more effective than the practical component in online learning among 2014/2015, 2015/2016, 2016/2017 and 2017/2018 academic year students. Student centered learning was more practicable in conventional classroom learning compared to online learning. To access the internet, most of the students (80.9%) used the smart phone and data line (75.9%). This study pointed out financial challenges (50.5%), network problem (54%) and challengeable learning environment (57%) among the students. It indicated that online learning should be considered as an alternative method considering the pandemic and rather conventional classroom learning has an impact. Further, the findings highlighted students' interest and adaption towards online learning. It is recommended to increase students' motivation on online learning through various strategies while planning and implementing teaching and learning activities.

**Keywords:** conventional classroom learning, online learning, student centered learning

## Evaluation of efficacy of Hijamah on Zaghtuddam Qawi Ibtidae (Primary hypertension)

S. M. Raeesuddeen<sup>1</sup>, Mansoor Ahmad Siddiqui<sup>2</sup>, Mohd. Aleemuddin Quamri<sup>2</sup>

<sup>1</sup>Unit of Moalajat, Institute of Indigenous Medicine, University of Colombo, Sri Lanka

<sup>2</sup>Department of Moalajat, National Institute of Unani Medicine, Bangalore, India

*Zaghtuddam Qawi* (Hypertension) is a disorder of circulatory regulation characterized by persistent, non-physiologic elevation of systemic blood pressure. It is the leading cause of death in the world. 90 to 95% of hypertensive patients suffer from *Zaghtuddam Qawi Ibtidae* (primary hypertension) in which a single reversible cause of the elevated blood pressure cannot be identified. The clinical features of target organ damage due to *Zaghtuddam Qawi* correspond with the clinical features of *Imtila*. *Hijamah* is a surgical procedure prescribed by Unani physicians to treat the *Imtila*. This is the peak time to evaluate the efficacy of *Hijamah Bil Shurt* in the management of *Zaghtuddam Qawi Ibtidae* which corresponds with *Imtila*. Hence, a clinical trial was conducted to evaluate the efficacy of *Hijamah* on *Zaghtuddam Qawi Ibtidae* on modern parameters. A randomized open standard controlled trial with the test procedure and control drug was conducted in 50 cases randomly assigned into two groups; test and control groups. Test group of 30 cases was subjected to the test procedure once and Control group of 20 cases was treated with standard control drug 25 mg of Atenolol once daily and both groups were followed up for 60 days. All the cases were assessed for subjective and objective parameters. The results were analyzed statistically. The test group exhibited statistically significant reduction in SBP at  $p < 0.05$ ,  $p < 0.01$  with respect to 0 day of test and  $p < 0.05$ ,  $p < 0.01$  with respect to 0 day of control and DBP at  $p < 0.01$ ,  $p < 0.001$  with respect to 0 day of test and  $p < 0.05$  with respect to 0 day of control. Thus, it can be concluded that the test procedure is safe and effective and validates the use of test procedure in the management of *Zaghtuddam Qawi Ibtidae*.

**Keywords:** *Zaghtuddam Qawi*, *Imtila*; *Hijamah*, hypertension, Unani.

**National Institute of  
Library and Information Sciences (NILIS)  
University of Colombo**



***Cultural Heritage: Bridging the Past, Present and  
Future Through Libraries, Museums, and Archives***

20<sup>th</sup> December 2021

## MESSAGE FROM THE DIRECTOR

**Dr (Mrs.) Pradeepa Wijetunge**

Director - NILIS

University of Colombo

Sri Lanka



It is with great pleasure that I bring this message to the 2021 Annual Research Symposium of the University of Colombo. This year is exceptional as we celebrate establishing the university in 1921 as Ceylon University College. Together with the staff and students of the National Institute of Library and Information Science (NILIS), I offer my warmest greetings to all the staff and students of the University of Colombo.

The Annual Research Symposium of NILIS, is a significant component of the series of annual symposia of the University of Colombo. This year our symposium theme is **Cultural Heritage: bridging the past, present, and future through libraries, museums, and archives**. We selected this theme because the libraries, museums, and archives make incomparable contributions to protect that country's cultural heritage, though seldom recognised, appreciated, or supported. We strongly believe that NILIS will generate a timely discourse on our cultural heritage and preserve our heritage for future generations through the libraries, archives, and museums with this symposium. It is a pleasure to have the National Library of Sri Lanka and the Department of National Archives, and the South Asia Chapter of the Association for Information Science and Technology (ASIS&T) as collaborators.

There are about fifty papers from national and international researchers, including India, Indonesia, Nigeria, Pakistan, South Africa, and Sri Lanka, discussing a wide range of topics varying from *temple paintings as a permanent representation of the vibrant ancient civilisation and indigenous medical knowledge sharing practices in Sri Lanka*, to the *identification of gender equality archives as world documentary heritage and bridging the cultural past, present and future through a slave's notebook protected in the Archives of South Africa*. In keeping with the tradition, the abstracts of the students and staff of NILIS are presented here, while the complete volume of the NILIS symposium will contain all the abstracts.

I am thankful to the Chief Guest, Vice-Chancellor of University of Colombo, Senior Prof. Chandrika N Wijeyaratne and the Guest of Honour, Senior Prof. Premakumara De Silva, the Chairman of the Board of Management of NILIS, for gracing this occasion and for their immensely valuable guidance, motivation and inspirations, and to Prof. Raj Somadeva, the keynote speaker today, and to the lead paper presenters, to the Director and staff of UCSC for their support always extended to NILIS without any hesitation and also for providing the technical assistance to conduct the symposium virtually, to Dr. Ruwan Gamage the Symposium Chair of NILIS and the other co-chairs, to all the collaborating organisations, and the presenters for adding colour and vibrance to the symposium, the senior staff of the university library for the extensive support and last but not least to all the academic staff of NILIS and visiting, other staff lead by the Senior Assistant Registrar Mr. J. Wipularathne and the Senior Assistant Bursar Mrs. Sajeewani Jayasekara for their continuous dedication and commitment to NILIS.



## MESSAGE FROM THE SYMPOSIUM CHAIR

### Dr. Ruwan Gamage

Senior Lecturer

NILIS, University of Colombo, Sri Lanka



NILIS Research Symposium (NRS 2021) will be virtually held on 20th December 2021 starting from 9.00 am onwards. This year's theme is Cultural Heritage: Bridging the Past, Present, and Future Through Libraries, Museums, and Archives.

Cultural heritage institutions were traditionally keeping various forms of artefacts with the objective of preserving them for future generations. However, now the objectives are directed towards conservation as well as use of time-tested knowledge for the benefit of the present generations as well. However, issues persist such as conflicting narratives, identity, censorship, multiculturalism, inclusion, exclusion, intellectual property, privacy, and data security etc. The objective of the NRS 2021 is to discuss, reveal, and find solutions to at least a few of these problems.

We are glad that several national institutions are collaborating with NILIS in this endeavor. These are the South Asia Chapter of the Association of Information Science and Technology (ASIS&T), National Library of Sri Lanka (NLSL), Sri Lanka National Archives (SLNA), and the Royal Asiatic Society of Sri Lanka (RASSL).

We received over 50 abstracts from Sri Lanka and abroad. The reviewing process is yet in progress. Only a list of abstracts submitted by NILIS students and staff has been given in this volume. My gratitude goes to them for considering presenting their valuable research findings at the NRS 2021.

I am grateful to the Senior Professor Chandrika N Wijeyaratne, Vice Chancellor of University of Colombo who accepted the invitation to be the Chief Guest, and Professor Raj Somadeva, Professor of Archaeology of the University of Kelaniya for accepting to deliver the keynote speech.

A special note of thanks goes out to the Co-Chairs; Dr. Bhakti Gala, Mr. W. Sunil, Dr. Nadeera Rupesinghe, and Dr. Malini Dias. Officials of the ASIS&T, NLSL, SLNA, and the RASSL are in the program committee. Support of Dr. Champa Alahakoon and Mr. L.A. Jayatissa in the editorial process is also of immense value.

Finally, I should thank Dr. Pradeepa Wijetunge, Director- NILIS for her continued support and guidance. Senior Assistant Librarian Mr. Uditha Alahakoon's enthusiasm and knowledge on the thematic discipline brought us many relevant researchers on board. Outstanding support from the academic, administrative, and other staff of the institution is also recorded with gratitude.



# **NILIS Research Symposium (NRS) 2021**

## **ORGANISING COMMITTEE**

### **Symposium Chair**

Dr. Ruwan Gamage (Senior Lecturer)

### **Co-Chairs**

Dr. Bhakti Gala (Chair, Association for Information Science and Technology)

Mr. W. Sunil (Director General, National Library of Sri Lanka)

Dr. Nadeera Rupesinghe (Director General, Sri Lanka National Archives)

Dr. Malini Dias (President, Royal Asiatic Society of Sri Lanka)

### **NILIS NRS 2021 Committee**

Mr. P.G. Premadasa, Retired Senior Lecturer

Mr. Uditha Alahakoon, Senior Assistant Librarian

Mr. Janaka Wipularatna, Senior Assistant Registrar

Ms. Sajeewani Jayasekera, Senior Assistant Bursar

**NILIS Research Symposium 2021**  
**University of Colombo**

**20<sup>th</sup> December 2021 from 09.30 to 15.30**

**Programme**

- 09.30 Inauguration
- 09.40 **Welcome Address by Director – NILIS**  
Dr. Pradeepa Wijetunge
- 09.45 **Keynote Address**  
Professor Raj Somadeva, Professor of Archaeology, Postgraduate Institute of Archaeology, University of Kelaniya
- 10.05 **Address of the Guest of Honor**  
Senior Professor Premakumara De Silva,  
Chairperson, NILIS Board of Management
- 10.15 **Address by the Chief Guest**  
Senior Professor Chandrika N. Wijeyaratne,  
Vice Chancellor, University of Colombo
- 10.30 **Launch of the Symposium Proceedings and Presentation of Mementos**
- 10.35 **Vote of thanks by Symposium Chair**  
Dr. Ruwan Gamage, Senior Lecturer, NILIS, University of Colombo
- 10.45 Lead Paper and Technical Session 01
- 12.00 Lead Paper and Technical Session 02
- 13.15 Technical Session 03
- 14.45 Panel Discussion – Role of Libraries, Archives, and Museums
- 15.15 Concluding remarks

## List of abstracts submitted to NRS 2021 by NILIS students and staff

1. **Preservation of information resources in selected school libraries in Badulla district**  
*W.R.N Indrachapa*
2. **Contribution of public libraries for uplifting citizenship in Sri Lanka**  
*K.A.D.A.D. Gunarathna and Uditha Alahakoon*
3. **Identification of Information Needs for the Development of Culture-Based Fisheries in Sri Lanka**  
*A.V.K.M.R. Amaraweera and U. P. Alahakoon*
4. **Collection Management of Pirivena Libraries Northwestern Province**  
*R.M.G.W.C.T.K. Ratnayake*
5. **A study of the impact of online learning methods on the qualitative development of the learning-teaching process**  
*P.R. Devabandu*
6. **Role of the principal's in improving Resourced based learning in schools**  
*Wajira De Silva*
7. **Attitude of Principals towards the functioning of school library learning resources centre as a partner of curriculum**  
*H.A.L.P.Hapuarachchi*
8. **Importance of non-fiction movies as an information source to study cultural heritage**  
*Suminda Kithsiri Gunaratna and Uditha Alahakoon*
9. **Bibliometric study on folklore books published in Sinhala during 2010-2019**  
*Uditha Alahakoon*
10. **Effects of COVID-19 pandemic on finding support materials by postgraduate students attending online classes**  
*P.C.N. Karunarathna*
11. **A study of Times of Ceylon Christmas collection: from the year 1909 to 1979 by Sandaresee**  
*Priyathma Sudusinghe*
12. **A study of the classification methodology in the old collection of the Department of National Museums Library of Sri Lanka**  
*Sandaresee Priyathma Sudusinghe and Maduranga Prasad Wijayawardhana*
13. **The impact of awareness and participation of the general public in conservation and preservation of ola-leaf manuscripts in Sri Lanka (a focus group study)**  
*S.A. Jeewan*
14. **Archiving experientials: a digital archiving approach to preserve intangible cultural heritage**  
*C. Wijesundara, and S. Sugimoto*
15. **Students' behaviour in using reference materials for research purpose: a study based on research reports submitted by undergraduates of Swami Vipulananda Institute of Aesthetic Studies**  
*G.F. Yasanthini*

# Postgraduate Institute of Medicine University of Colombo



## *Postgraduate Medical Education in the Era of COVID-19*

26<sup>th</sup> November 2021

## **DIRECTOR'S MESSAGE**

**Professor Senaka Rajapakse**

Director

Postgraduate Institute of Medicine

University of Colombo



The Postgraduate Institute of Medicine (PGIM) is the sole institute in Sri Lanka that is responsible for the specialist training of medical doctors. Currently, more than 400 doctors obtain Board Certification each year from the PGIM, and each of these graduates complete a research study as part of their training programme. In addition, many other medical doctors complete training programmes at Masters level, which may also include a research project.

PGIM has recognised research as an important component in the development of a competent and an evidence-based practitioner. We strive towards improving the quality of the research studies done by our trainees through several initiatives, including conducting regular research methodology workshops. We have also provided more opportunities for the trainees to publish their research and gain recognition for their efforts in their examinations.

The Annual Research Symposium of the PGIM would be another opportunity for the trainees, trainers and for any researcher focusing on areas related to medical sciences to disseminate their study findings. The symposium will also be a gathering for both trainees and trainers and an opportunity to share their experiences as well as to learn together transforming the future postgraduate medical education in the country.

I take this opportunity to thank the organising committee for their effort and wish all the participants a memorable academic experience.

## CHAIRPERSON'S MESSAGE

### **Dr Pandula Siribaddana**

Senior Lecturer

Postgraduate Institute of Medicine

University of Colombo



Postgraduate Institute of Medicine (PGIM) has been the cornerstone of specialist education in Sri Lanka for all doctors. The training provided by the PGIM has won accolades from around the globe and the services rendered by the graduates and Board Certified medical and dental professionals of the PGIM have transformed the health and wellbeing of all Sri Lankans for more than four decades.

However, a lesser-known aspect related to postgraduate medical education at the PGIM is the considerable amount of research that is being conducted – contributing to the scientific knowledge and medical practice within and outside the country. The potential for these research initiatives to impact the health and care services and strengthen the health system in the country remain high. An opportunity to disseminate these study findings will be another step closer to fulfilling this potential.

Thus, it is a pleasure for me to chair the Annual Research Symposium of the PGIM for the year 2021 and I believe that in the years to come, the ARS of the PGIM will play a central role in disseminating medically related scientific knowledge in Sri Lanka.

## **ORGANISING COMMITTEE**

### **Chairman**

Dr Pandula Siribaddana

### **Secretary**

Mrs Dilhani Munasinghe

### **Members**

Prof Senaka Rajapakse

Prof Chandani Wanigathunge

Dr Kamani Samarasinghe

Prof A Pathmeswaran

Prof Gominda Ponnampereuma

Dr Rizka Ihshan

Mrs Chandima Wadasinghe

Mr Palitha Kodagoda



**PROGRAMME**

08.30 – 09.30	Inauguration and Keynote Address	
	<p>Keynote Address: Disruptive Impact of COVID-19 on Specialist Training</p> <p><b>Dr Mumtaz Patel</b> Vice President RCP Global</p>	
	Trainees Track	Trainers Track
09.30 – 10.15	Find Your Style   Learning Strategies for PGs	Where the Trainer Becomes an Assessor   Workplace Based Assessments
10.15 – 10.30	Tea Break	
10.30 – 11.15	Avoiding blunders in PG exams   Tips for PG trainees	Beyond a Signature   Using the Portfolio as a Teaching Tool
11.15 – 12.30	Ace Your Research   Essential skills for scholarly writing and publications	Mastering the Virtual World   Trainers Guide to Using Technology in Postgraduate Training
12.30 – 13.00	E-Poster Viewing Session	
13.00 - 14.00	Free Paper Session 1 Free Paper Session 2	
14.00 – 15.00	Staying 'sane' during PG training   Achieving work-life balance and maintaining wellbeing	Avoiding the 'Hawk-Dove' Effect   Competencies for PG Examiners
15.00 – 16.00	Free paper session 3 Free paper session 4	
16.00	Close of event	



## INTRODUCTION TO KEYNOTE SPEAKER

### **Dr Mumtaz Patel**

Global Vice President

Royal College of Physician, London



Dr Mumtaz Patel is a consultant nephrologist based in Manchester, who brings a range of experience and skills to the role. She is currently postgraduate associate dean for Health Education England and is a deputy director for conduct and progress at the School of Medicine at the University of Liverpool. Mumtaz has also worked as an RCP regional adviser for training, and clinical lead for quality management for the JRCPTB.

After completing her medicine degree at University of Manchester in 1996, Mumtaz went on to pursue a career in renal medicine. She completed her foundation training at the Manchester Royal Infirmary and obtained her MRCP in 2000. She did her renal specialist training in Yorkshire and gained her PhD from the University of Manchester in the genetics of lupus nephritis in 2006. She was appointed as a consultant nephrologist at Manchester University Foundation Trust in 2007.

After developing an interest in medical education, Mumtaz became involved in various educational roles from department to divisional lead, renal training programme director and was then appointed as postgraduate associate dean in 2016. She obtained an MSc in Medical Education in 2014 and has a strong research background in assessment, professionalism, differential attainment, and quality improvement.

## **KEYNOTE SPEECH**

**Dr Mumtaz Patel**

### **Disruptive Impact of COVID-19 on Specialist Training**

Abstract:

COVID-19 has affected many aspects of life including education and training. Due to exigency of services as well as the new normal, training provided in the clinical settings, methods of assessment, and even classroom teaching activities have taken a dramatic turn.

**The Library**  
**University of Colombo**



*Library as a Roadmap to Interdisciplinary Research*

09<sup>th</sup> December 2021

## MESSAGE FROM THE ACTING LIBRARIAN

**Dr (Mrs.) D. C. Kuruppu**

Acting Librarian

University of Colombo

Sri Lanka



It is with great pleasure that I send this message on the occasion of the Annual Research Symposium 2021 of the University of Colombo, which is held under the theme, “Impactful Research through an interdisciplinary approach”.

With a vision to focus on modern technologies, The Library, University of Colombo conducts this year’s Annual Research Symposium, under the theme of “Library as a Roadmap to Interdisciplinary Research.” Research papers related to Blended Learning, Research Collaboration, Geospatial Data, GIS technology, User-Library perception will be presented at LRS 2021. Librarians have an indispensable role in interdisciplinary research by exploring information resources across disciplines, connecting groups to experts and resources, and improving collaboration and communication strategies.

I am very much thankful to Senior Professor Chandrika N. Wijeyaratne, Vice-Chancellor of the University of Colombo, for accepting our invitation to grace the occasion as the Chief Guest. I am thankful to Professor K. P. Hewagamage, Director, University of Colombo School of Computing for joining with us to deliver the Keynote Address. My sincere gratitude goes to all distinguished invitees, session chairs and reviewers for their invaluable contribution. I am delighted to express my special thanks to the Library Research Symposium Committee for their untiring efforts to make this event a success and I congratulate all the presenters of LRS 2021 for their research contribution.

Thank you.

09<sup>th</sup> December 2021

## MESSAGE FROM THE SYMPOSIUM CHAIR

**Mrs. Sajeewanie D. Somaratna**

Senior Assistant Librarian

University of Colombo, Sri Lanka



It is with deep pleasure that I pen down this message for the Library Research Symposium (LRS) 2021 that coincides with the centenary celebrations of the Library of the University of Colombo. The Library of the University of Colombo, which started with a small collection of books in 1921, the founding year of the Ceylon University College, stands tall and strong today by contributing immensely to the teaching-learning and research activities of the University of Colombo. The Library Research Symposium is being held every year consecutively since 2018, and this year it has been themed under *Library as a Roadmap to Interdisciplinary Research* which specifically emphasizes and communicates the importance of the role and position of the university library to facilitate impactful research among the university community. The contribution of libraries to interdisciplinary research is explicitly translated into continual access to current information resources made available across different disciplines, and connecting researchers to those information resources through various state-of-the-art practices and strategical library services.

I would like to express my sincere gratitude to the Vice-Chancellor of the University of Colombo, Senior Professor Chandrika N. Wijeyaratne, for gracing LRS 2021 as the Chief Guest. Subsequently, my heartfelt gratitude goes to the Keynote speaker Professor K.P. Hewagamage, Director of the University of Colombo, School of Computing (UCSC), for sharing an amazing learning experience on “Digital transformation of future library services: a new role of academic libraries in Higher Education system”. I also take this opportunity to thank all the presenters for their valuable contribution to interdisciplinary research and for sharing their research findings in this arena. My special appreciation goes to the Acting Librarian, Symposium convener, members of the organizing committee of LRS 2021, and all other academic, administrative and the Library staff for their contribution and support for achieving a very successful LRS 2021 under the current difficult conditions due to the COVID-19 pandemic.

Thank you.

09<sup>th</sup> December 2021

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## **Library Research Symposium 2021** **University of Colombo**

**09<sup>th</sup> December 2021 from 2.00 p.m. to 6.00 p.m.**

### **Programme**

- 2.00- 2.10 p.m.      Inauguration**
- 2.10- 2.20 p.m.      Welcome Address by the Chair LRS- 2021**  
Mrs. Sajeewanie Somaratna  
Senior Assistant Librarian, University of Colombo
- 2.20- 2.30 p.m.      Address by the Acting Librarian**  
Dr (Mrs.) D.C. Kuruppu  
Acting Librarian, University of Colombo
- 2.30- 2.50 p.m.      Centennial Address**  
*The Journey of the Library Across a Century*  
Dr (Mrs.) Pradeepa Wijetunge  
Librarian, University of Colombo
- 2.50- 3.00 p.m.      Launching of the Centenary Volume of the Library**  
**University of Colombo**
- 3.00- 3.10 p.m.      Address by the Chief Guest**  
Senior Professor Chandrika N. Wijeyaratne  
Vice-Chancellor, University of Colombo
- 3.10- 3.15 p.m.      Introduction to the Keynote Speaker**
- 3.15- 3.45 p.m.      Keynote Address**  
*Digital Transformation of Future Library Services: A New Role of Academic Libraries in Higher Education System*  
Professor K.P. Hewagamage  
Director, University of Colombo School of Computing (UCSC)
- 3.45- 3.55 p.m.      Vote of Thanks by the Convener – LRS 2021**  
Mr. T. Ramanan  
Senior Assistant Librarian, University of Colombo
- 4.00 - 4.50 p.m.      Technical Session 1**
- 4.50- 5.40 p.m.      Technical Session 2**



## INTRODUCTION TO THE KEYNOTE SPEAKER

### Professor K. P. Hewagamage

Professor in Computer Science, University of Colombo,  
Director, University of Colombo School of Computing (UCSC)  
Coordinator, National e-Learning Centre (NeLC) Project



Professor K. P. Hewagamage obtained his B.Sc. special degree in Computer Science (First Class Honors) from the University of Colombo and the Doctor of Information Engineering from Hiroshima University in Japan. He is a Professor in Computer Science in the Department of Information Engineering at the University of Colombo School of Computing (UCSC) and current Director of the UCSC.

Professor Hewagamage has key research interest in areas of Human-Computer Interaction, Software Engineering, e-Learning, and ICT for Education and Development. He authored more than 125 research publications during the last 20 years. He also received more than 20 National and International awards for his outstanding achievements in the field of Computer Science. Some of his noteworthy mentions are: *Professor Mohan Munasinghe Award* for the outstanding Computer Science graduate in 1994 at the convocation of University of Colombo; the best paper award at IEEE International Conference of Visual Languages in 1999; research excellence award by the University of Colombo in 2004, 2006 and 2012; UNESCO award of ICT for education in 2007; and the excellent paper award at the IEEE Ubi-Media Conference in 2018. He is a senior member of IEEE, a member of ACM, and an academic advocate of ISACA. He was a chair of IEEE Computer Society Chapter in Sri Lanka.

Professor K. P. Hewagamage was the Head of Department of Information Systems Engineering, of UCSC and coordinator of e-learning Centre of UCSC. He was also a coordinator of the National e-Learning Project funded by Swedish International Development Agency (SIDA) and was the principal investigator of many International projects. He was a strong instrumental in establishing International Collaboration between the University of Colombo and other foreign universities and agencies. He is a visiting researcher of Stockholm University, Sweden and Shimane University, Japan. With all his merits and expertise, Prof. Hewagamage has been constantly collaborating with the University Library.



## KEYNOTE ADDRESS

**Prof. K. P. Hewagama**

### **Digital Transformation of Future Library Services: A New Role of Academic Libraries in Higher Education System**

For many years, traditional libraries in the higher education sector have been disseminating knowledge using printed library materials such as collections of Books, Journals, Proceedings Research thesis, and Magazines. When digital facilities were introduced, libraries extended their collection to digital materials, including audio/video materials. Thereafter the libraries are further expanded with a digital system to manage the library materials and its services such as user management, lending, borrowing and inventory of items. All these initiatives could be considered as modernization of traditional library using digital facilities and it could be regarded as the digitization of basic services of a library. Hence, organizing the information such as creating a digital catalog and making softcopy out of physical books established the platform for digitization. Automated book management and open browsing through social networks also help to digitalize the platform and stakeholders to use the system more effectively. In order to maximize the benefits of digitalization, it is necessary to set up a new digital system which we call the digitalization of library service. For example, digital library service is the digitalization of traditional library services, allowing the coexistence of both services. As a result, academic libraries started playing a vital role in higher educational institutes. However, the library service of the next decade will be more advanced and they will be built on a digital architecture, and the process is known as digital transformation. The new business model of the library through digital transformation will provide opportunities for all stakeholders to collaborate and share teaching/learning as well as creating of new knowledge through interdisciplinary research. Digital transformation will support the federated architecture allowing the integration of both physical and online libraries towards a hybrid library. Thus the transformations leverage its capabilities through culture shifts, technology shifts, and workforce shifts using cutting edge technologies like artificial intelligence, augmented reality, and data analytics. This change will establish an international e-infrastructure of the research community using open journal systems, open scholarship portals, scholarly communication forums, and open educational resources (OERs). Hence, the library

could promote interdisciplinary research across different academic disciplines where the library will be a center to identify possible research gaps based on the current studies and real-world problems and to establish research groups. In the next generation of libraries, users will be able to create new micro knowledge on top of published library materials and disseminate or share it among readers in the library. However, Organizational barriers, lack of digital infrastructure, copyright issues, and lack of legislation and policies are considered as few core limitations for the digital transformation of libraries. Hence, digital transformation is the way forward to achieve operational excellence in the higher education system as well as to modernize the library services for a changing world. It will be an inevitable strategy for sustainability and enhancement of future library services.

Thank you.

9<sup>th</sup> December 2021

## **ICT skills of Library and Information Science (LIS) professionals for the adoption of Blended Learning: a case study at the University of Colombo**

M.A.L. Silva, P.K.S. Manatunga

Library, University of Colombo, Sri Lanka

Blended Learning (BL) is an emerging approach within the higher education sector in Sri Lanka. With the transformation, traditional work roles of LIS professionals are rechanging, and challenges may arise due to lack of ICT skills. Based on the above assumption, the study sought to investigate the ICT skills of LIS professionals for the adoption of BL at the University of Colombo, with specific objectives; to identify the ICT skills required; the relationship between the ways of acquiring ICT skills and socio-demographic characters and ICT skill related factors affecting for BL. A survey research design was deployed using census. The data received were analyzed with descriptive statistics, correlation, and factor analysis using SPSS version 23. Reliability analysis was performed to measure the internal consistency of the questionnaire ( $\alpha=0.800$ ). The majority (76.5%) of the LIS professionals use BL for knowledge sharing. All the respondents are competent in basic computer skills (Word Processing, PowerPoint, etc.) and novel technology skills (Google suit, Zoom, etc.), and acquire ICT skills by self-studying and web-based tutorials. Respondents need computers, laptops, the Internet, and the Wi-Fi connection to acquire ICT skills and they reported that poor Internet access affects their acquisition of ICT skills. Chi-Square test revealed that age and work experience have a weak negative correlation with use of web-based tutorials ( $r=-0.486$ ,  $p=0.028$ ;  $r=-0.535$ ,  $p=0.018$  respectively) and obtaining information from peers ( $r=-0.314$ ,  $p=0.009$ ;  $r=-0.379$ ,  $p=0.004$  respectively). Post hoc test revealed a significant association between acquiring information from peers with age group 51-60 years ( $p=0.0000$ ) and 21-30 years of working experience ( $p=0.0001$ ). Factor analysis revealed three main ICT related factors that affect BL; Digital readiness ( $\alpha=0.850$ ); attitude of students and policies ( $\alpha=0.887$ ), academic and humanistic standards of LIS professionals ( $\alpha=0.886$ ) and recommend to consider when adopting BL. The study concludes that LIS professionals are competent in ICT skills to adopt BL and recommend conducting training on programming languages, use of digital/interactive boards, and Tweeter. The current research opens up opportunities for future research on BL.

**Keywords:** *ICT skills, LIS professionals, Blended Learning*

## **An initiation for long term preservation of Geospatial Data at universities: a pilot study**

S. Alikhan, C. Wijesundara

Library, University of Colombo, Sri Lanka

Preservation of information for long-term use has become an essential activity in the information-overloaded society. Any information might become obsolete over time if it is not maintained properly. This scenario is applicable to Geospatial Data as well. The university researchers generate a great deal of Geospatial Data during their research activities, and this data is often unexploited or unshared after the project. To address these issues, the authors have formed this study into two phases. This abstract is primarily based on Phase-I, which investigates the state of the Geospatial Data produced by the universities, their technical characteristics, and researchers' willingness to preserve and share their data. The population of the study was the researchers of the University of Colombo and the University of Peradeniya. An online questionnaire was distributed among the researchers via an email list. The results indicated that 66% know the term "Geospatial Information", while others identified it as "Locational Information". The majority of the researchers created vector based Geospatial Data (65%) during their research activities. Almost all the researchers used either internal or external data storages to store their data. Approximately 83% of the participants believed that satellite images should be preserved as they are costly and hard to obtain. All the respondents agreed on sharing Geospatial Data, and more than half of the researchers (53%) prefer to share their data with constraints. Everyone agrees on preserving Geospatial Data through the involvement of the university or national/international level involvement. About 70% of the respondents stated that universities are responsible in establishing a centralised mechanism to store and share Geospatial Data created by their institutions. The perception of sharing information was positive, and everyone was willing to share their data. This can be identified as the main outcome of this research, as it supports determining the Phase-II of this research.

**Keywords:** *Data preservation, Data sharing, Geospatial Data, Sri Lanka, Universities*

**Visualizing the authorship and keywords relationships on Environmental Science publications based on SLJOL from 2016-2020**

M.A. Lankatilake,<sup>1</sup> T. Ramanan<sup>2</sup>

<sup>1</sup>Library, University of Colombo, Sri Lanka

<sup>2</sup>Library, Faculty of Technology, University of Colombo, Sri Lanka

The authors of the paper attempted to measure the local research on environmental issues in general by published in a Sri Lankan database named Sri Lanka Journal Online (SLJOL). This study therefore selected this database to execute their bibliometric survey to find out the predominant authors and keywords mentioned by authors. The prime objective of the study is to describe the authorship relations and co – occurrence of keywords used in research publications on environmental sciences published in the journals listed in the SLJOL. Out of 106 journals of the database 24 journals were selected which published papers related to Environmental Sciences and 156 articles were selected for this analysis. MS Excel, Mendeley reference software and Vosviewer software were used to analyze the data. Using Vosviewer network visualization analyses were executed to find out co-author relationships and co-occurrence of keywords. Total count of bibliometric data was performed. Co-authorship has been used to describe how authors are connected between them were visualized using Vosviewer. Of 382 authors, 46 authors who had strong collaboration were mapped in to 26 clusters. In addition to collaboration within the research clusters, collaboration between the research clusters could also be observed. 23 authors who are in 7 clusters contribute for cross cluster collaboration. There were 590 keywords extracted from those 156 papers. Out of these 590 keywords there were 81 keywords having a minimum of two occurrences. Most of the papers were published in subject areas such as water quality, ground water, diversity, conservation, climate change, pollution, mangroves and heavy metals. Urban Planning, Soil Contamination and Ecological Footprint were some of the least researched areas. In conclusion it could be mentioned that still there are several important areas where only a fewer number of research were recorded especially the environmental issues Sri Lanka facing at present. Therefore, comprehensive further studies could be recommended to find out the research gaps in the field of Environmental sciences in Sri Lanka

*Keywords: Bibliometric analysis, Environmental Science, VOSviewer, Sri Lanka Journal Online*

## Application of Geographical Information System in library services: a case study based on University of Colombo

S.G.N.C. Senanayake,<sup>1</sup> P.K.S. Manatunga,<sup>1</sup> L. Manawadu,<sup>2</sup> S. Wijeratne<sup>2</sup>

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Information systems play a major part in the planning and development of library services. Geographic Information System (GIS) is one of the most important computer-based information technology tool for spatial planning, which is widely used for planning and managing databases. The GIS-based library system provides each book of the library with its location details and then complete bibliographical data can be linked to the floor maps through location codes. If the GIS based library system (LibGIS) is applied, the search results include not only the text information about the book's location but also a visual map. LibGIS system would be able to show the simulated view of the library floors and the book location on the computer screen. Also, it could enhance the efficiency of the OPAC. The general objective of the study is to identify and explore the possibilities of using GIS in library services. The study population was consisted of a total number of 5286 students in the selected state university. A sample of 361 students was stratified randomly selected from the study population based on the recommendations on sample size by Krejcie and Morgan. The data collection methods use an online questionnaire survey using Google forms. This study was mainly based on GIS 3D maps, Correlation analysis and Factor analysis. Thematic & 3D maps, tables and graphs were employed in data visualizing. To find out the readiness to the adoption of the LibGIS system, Technology Acceptance Model (TAM) was used. According to the results readiness to adopt of LibGIS system positively correlated with organizational, technological, perceived ease of use, and perceived usefulness factors. The organizational factor was the most important and it was near perfect (0.966) positive relationship. Factor analysis was done by identifying factors for association with the LibGIS system. Using this analysis, six main factors related to the LibGIS system were identified. The system could be used to answer any queries related to finding the location of specific library materials and thus could provide a location-based inventory management tool.

**Keywords:** GIS, Library services, Library Information Systems, Mapping library collection

**Training need assessment: a must for developing an effective training programme for paraprofessionals, with special reference to the Library, University of Colombo**

S.M. Adhikari

Library, University of Colombo, Sri Lanka

Training Need Assessment (TNA) is an important approach in human resource development in finding the gap between the "Training" and "Needs of Training." Although the training is very important in libraries, it was observed that most of the library staff in the University of Colombo have only training opportunities in Information Technology skills. Therefore, the present study aims to explore the training needs of the staff at the Library, University of Colombo with specific objectives of exploring staff training programmes available, determining the satisfaction level of prevailing staff training programs, and identifying specific problems areas in the training needs. A survey research was conducted by administering questionnaires to forty paraprofessionals as census. The response rate was 90.36%. It was identified that training programmes on basic computer skills (Word processing, PowerPoint, and Excel) were available in the library and 97.22% were satisfied with those sessions. However, the respondents were not satisfied with the availability of training programmes and expected more opportunities to improve their skills. 91.66% have suggested new themes in Customer Care, Communication Skills, and Future Career Development, while 72.22% suggested Teamwork, Motivation, and leadership for training, and 69.44% requested training on 'Online work'. Further, 95% preferred trainers to be external experts, while 72.22% preferred internal resource persons. All the respondents requested trainings through biannual workshops. 83.33% mentioned that the lack of training programmes hinder their training opportunities. All the respondents requested training for their career development. Thus, the study concluded that there is an urgent requirement for staff training at the library, University of Colombo. The present study recommends appointing a Training and Development Officer; developing training policies; periodically evaluating the training needs; design, develop and execute training programmes; and monitoring capacity building.

**Keywords:** *Training, Need assessment, Library University of Colombo, Staff training*

**Awareness and usage of subscribed Electronic Resources: a case study of academic staff members, Faculty of Education, University of Colombo**

T. Sritharan

Library, University of Colombo, Sri Lanka

Electronic resources have emerged as vital sources for learning, teaching and research activities in the higher education institutes. The University of Colombo subscribes electronic resources for all the faculties annually. Therefore it is essential to analyse the awareness and usage of subscribed electronic resources by the academic community of this university. This study aims to evaluate the awareness, usage, level of satisfaction and the challenges faced by the academic staff members of the Faculty of Education in accessing subscribed electronic resources. The survey design was used to collect the data from all the academic staff members of the Faculty of Education (31) and 24 were returned producing a rate of 79%. The study revealed that most of the academic staff members (66.7%) are aware of “The Journal of Teacher Education”. Among the Consortium databases, most of the academic staff members (88.9%) are aware of Emerald database (88.9%) followed by Taylor and Francis (77.8%) and Oxford Journals (55.6%). It is remarkable that all the staff members (100%) are well aware of the JSTOR database. Among the subscribed resources “The Journal of Teacher Education” (83.3%), Emerald database (66.6%) and JSTOR (83.3%) are highly used by those staff members of the Faculty of Education. It was also found that the main purpose of their using subscribed resources was to conduct research (61.1%). 16.7% of them mentioned that they access resources when the need arises for the preparation of teaching and writing articles. Among the staff members, 61.1% of them are satisfied with the subscribed resources. Lack of resources (n=22), lack of training (n=22), lack of searching skills (n = 14) and lack of time (n=13) were identified as issues in accessing electronic resources. Majority of them (75%) suggested subscribing more journals and databases. Therefore, this study recommends to subscribe more journals and databases, to continue the subscription of JSTOR, to provide frequent training to all the academic staff members and to update the library website frequently. The support of the library staff should be enhanced in different ways to help the academic staff members of the Faculty of Education.

**Keywords:** *User awareness, Electronic resources, Subscribed resources, User satisfaction, Faculty of Education*



**A study of authorship patterns and collaborative research in Sri Lankan Health  
Research from 2016-2020**

K.K.N.L. Perera,<sup>1</sup> D. C. Kuruppu,<sup>2</sup> S. Jayasinghe<sup>3</sup>

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This research presents the findings of a pilot study conducted under ongoing research on authorship patterns and author collaboration patterns of Sri Lankan health research published between 2009-2020. This pilot study addresses few aspects of the principal analysis related to author collaboration of health-related research published in Sri Lanka between 2016 to 2020. A total number of 1644 health-related Sri Lankan research published by Sri Lankan authors indexed in three databases: SCOPUS, PubMed and Embase were selected for the study. According to the results, the total number of published articles shows an increasing trend over the years. The category containing single-author papers showed a minimum contribution (3%), whereas the category containing more than seven authors showed the highest contribution (25.1%). The Average Authors Per Paper (AAPP) shows an increasing trend while the Productivity Per Author (PPA) does not change significantly over time. The degree of author collaboration shows an increasing trend with time, with a higher increase in 2020. By considering the results it can be concluded that author collaboration in Sri Lankan health research is improving over the years, creating a positive picture on the growth of health research. This pilot study only considers the number of papers published and number of authors, to have an idea about author collaboration. However, there are many other factors which to be considered to have a clear idea about the nature of author collaboration which will be addressed through the main study such as local and international researchers' relationships, regional and global level funding mechanisms, peer review process, health system research areas, and institutional collaboration etc.

**Keywords:** *Author collaboration, Sri Lanka, Health Research, Bibliometric study*

**Undergraduates' perception towards the Library of the Faculty of Nursing,  
University of Colombo**

K.I.D.F. Senanayake

Library, Faculty of Nursing, University of Colombo, Sri Lanka

The university libraries play an important role in the educational progress, and every library attempts to provide a quality service to meet the information needs of its users. A descriptive survey study was conducted at the Faculty of Nursing premises with the purpose of providing a more subjective picture of undergraduates' perceptions towards the Library, Faculty of Nursing. The nursing undergraduates, who are currently enrolled in the faculty, were recruited purposively to this study. A self-administered google questionnaire was used to collect data. Collected data were analyzed using SPSS version 21. The response rate was 87.7%. Majority of the participants were females (n=159, 74.3%). Most of the students were in their 2nd year of study (n=75, 35%) and slightly more than 75% of the total participants (n=166, 77.6%) stay at the university hostels. The study findings revealed that the nursing undergraduates hold a positive perception (M= 3.7, SD=0.75) towards the Nursing Library staff. For the areas of physical/working condition (M=3.45, SD=0.86), locating materials/information (M= 3.41, SD=0.80), and the book collection (M=2.85, SD=0.71) of the library, they hold a moderate perception. Based on these study findings, it is suggested that the areas in which undergraduates showed a moderate perception have to be further improved to provide more efficient services in the future. Accordingly, it is recommended that the physical/working condition to be arranged in a place with adequate space to sit & read along with adequate lighting and ventilation. In addition, the Nursing Library should pay more attention when placing materials/information in the library, as well as the library book collection should be improved with more copies of lending and reference books of the latest editions.

**Keywords:** *Undergraduates, Perceptions, Library, University of Colombo*



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