

MBARARA UNIVERSITY OF SCIENCE AND TECHNOLOGY

**DIRECTORATE OF RESEARCH AND GRADUATE
TRAINING**

POSTGRADUATE BOOK OF ABSTRACTS

29th Graduation Ceremony

27th May 2023

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FORWARD

Welcome to the 29th Mbarara University of Science and Technology (MUST) Graduation Ceremony. We shall witness a total of 188 Postgraduate Graduands (27 Doctor of Philosophy, 158 Masters and 3 Postgraduate Diploma) being awarded their new qualifications. Our graduate programs are designed to be responsive, challenging and innovative. The graduate students come from all over the world to undertake Postgraduate Diploma (1 year) and various non-Clinical Masters Programs of 2 years duration to 3 years in the case of Clinical and Doctor of Philosophy Programs. Students spend time in training and education activities which include participation in courses, competence and skills training, seminars, conferences; as well as placements including industrial training and working visits. All programs consist of conducting research resulting into dissertations/theses. The abstracts presented here have been extracted from the primary research carried out by today's graduands.

Associate Professor Vincent Batwala

DIRECTOR

DIRECTORATE OF RESEARCH & GRADUATE TRAINING

1.0 POSTGRADUATE PROGRAMS

Faculty of Business and Management Sciences

1. Master of Business Administration (Duration 2 yrs)
2. PhD in Business Administration

Faculty of Computing and Informatics

1. Postgraduate Diploma in Business Informatics (Duration 1 yr)
2. Postgraduate Diploma in Health Information Technology (Duration 1 yr)
3. Postgraduate Diploma in Information Systems (Duration 1 yr)
4. Masters in Business Informatics (Duration 2 yrs)
5. Master of Science in Health Information Technology (Duration 2 yrs)
6. Master of Science in Information Systems (Duration 2 yrs)
7. PhD in Computing by Research (3 yrs)

Faculty of Interdisciplinary Studies

1. Postgraduate Diploma in Criminology (Duration 1 yr)
2. Postgraduate Diploma in Development Studies (Duration 1 yr)
3. Master of Arts in Conflict Analysis and Inclusive Development (Duration 2 yrs)
4. Master of Arts in Governance and Planning (Duration 2 yrs)
5. Master of Arts in Development Studies (Duration 2 yrs)
6. PhD in Development Studies (3 yrs)

Faculty of Medicine

1. Master of Medicine in Anaesthesia (Duration 3 yrs)
2. Master of Medicine in Community Practice/Family Medicine (Duration 3 yrs)
3. Master of Medicine in Dermatology (Duration 3 yrs)
4. Master of Medicine in Ear, Nose and Throat (Duration 3 yrs)
5. Master of Medicine in Emergency Medicine (Duration 3 yrs)
6. Master of Medicine in General Surgery (Duration 3 yrs)
7. Master of Medicine in Internal Medicine (Duration 3 yrs)
8. Master of Medicine in Obstetrics/Gynaecology (Duration 3 yrs)
9. Master of Medicine in Ophthalmology (Duration 3 yrs)
10. Master of Medicine in Paediatrics & Child Health (Duration 3 yrs)
11. Master of Medicine in Pathology (Duration 3 yrs)
12. Master of Medicine in Psychiatry (Duration 3 yrs)
13. Master of Medicine in Radiology (Duration 3 yrs)
14. Master of Public Health (Duration 2 yrs)
15. Master of Public Health with Research Ethics (Duration 2 yrs)
16. Master of Medical Laboratory Science (Duration 2 yrs)
17. Master of Science in Anatomy (Duration 2 yrs)
18. Master of Science in Biochemistry (Duration 2 yrs)
19. Master of Science in Medical Microbiology (Duration 2 yrs)
20. Master of Science in Pharmacology (Duration 2 yrs)
21. Master of Science in Physiology (Duration 2 yrs)
22. Master of Pharmacy (Clinical Pharmacy) (Duration 2 yrs)
23. Master of Science in Pharmacognosy & Natural Medicine Science (Duration 2 yrs)
24. Master of Science in Pharmaceutical Analysis (Duration 2 yrs)
25. Master of Nursing Science in Critical Care (Duration 2 yrs)

26. Master of Nursing Science in Community Midwifery & Reproductive Health (2 yrs)
27. Master of Nursing Science in Mental Health Nursing (Duration 2 yrs)
28. Master of Nursing Science in Pediatric Clinical Nursing (Duration 2 yrs)
29. Doctor of Philosophy (PhD) (Duration 3 yrs)

Faculty of Science

1. Master of Education in Curriculum, Instruction and Media Studies (Duration 2 yrs)
2. Master of Education in Educational Administration and Planning (Duration 2 yrs)
3. Master of Education in Educational Psychology (Duration 2 yrs)
4. Master of Science in Biology (Natural Resources' Ecology, Management & Conservation) (Duration 2 yrs).
5. Master of Science in Biology (Microbiology and Parasitology) (Duration 2 yrs)
6. Master of Science in Chemistry (Duration 2 yrs)
7. Master of Science in Mathematics (Duration 2 yrs)
8. Master of Science in Physics (Duration 2 yrs)
9. PhD in Biology (Duration 3 yrs)
10. PhD in Chemistry (Duration 3 yrs)
11. PhD in Physics (Duration 3 yrs)
12. PhD in Mathematics (Duration 3 yrs)
13. PhD in Curriculum and Media Studies (Duration 3 yrs)
14. PhD in Educational Administration and Planning (Duration 3 yrs)
15. PhD in Psychology (Duration 3 yrs)

Faculty of Applied Science and Technology

1. Master of Science in Biomedical Engineering (Duration 2 yrs)
2. Doctor of Philosophy (PhD) in Biomedical Engineering (Duration 3 yrs)

2.0 DOCTOR OF PHILOSOPHY PROGRAMS

2.1 FACULTY OF BUSINESS AND MANAGEMENT SCIENCES

2.1.1 Interactive Marketing Practices and Market Performance of Soft Drink Manufacturing Enterprises in Kigali City-Rwanda

Nimusima Perez, Kamukama Nixon, Kalibwani Rebecca

The purpose of the study was to establish the relationship between interactive marketing practices (IMP) and the market performance of soft drink manufacturing enterprises (SDMEs) in Kigali-city. It examined the mediating role of competitive advantage (CA) and the moderating effect of competitive environment (CE) on the association between IMP and market performance (MP). A multi-theoretical approach was applied in the direction of social exchange theory, dynamic capability theory, network theory and five forces model. The study was guided by critical realism paradigm and was cross-sectional in nature. The quantitative data were obtained from a sample of 322 SDMEs operating in Kicukiro, Gasabo and Nyarugenge districts of Kigali City. The researcher first stratified SDMEs by region (i.e districts as shown above) and by soft drink clusters and then selected each firm using simple random sampling from each stratum. CEOs were purposively selected for the qualitative study, whereas marketing; communication/public relations; finance; accounting and sales managers were selected for the quantitative study using simple random sampling. Questionnaire and interview guide were used to collect data and for data extraction and reduction, Principle Component Analysis and varimax rotation were used. Zero-order Pearson correlation and hierarchical regression techniques were employed for data analysis. The study results revealed a positive significant relationship between IMP and MP. Detailed analysis on demographic characteristics of unit of analysis indicate that traditional communication channels take precedence over interactive communication channels among SDMEs in Kigali City-Rwanda. CA was confirmed to be a true mediator, while CE moderated the relationship between IMP and MP. This study recommends that SDMEs disseminate their marketing information using interactive communication channels; put more attention on selecting strategic alternatives that better match their offers with market needs and to fully attend to their key industry forces in their competition management strategies and crafting environment-informed strategies to better enhance their performance. Having taken a cross-sectional design and looked at only one 'P' i.e promotion to predict MP and ignored other marketing mix components which are also important in overall value creation processes, future studies could investigate same relationships across time by adopting a longitudinal design, and measure variables differently or attend to other "Ps" and measure how they influence MP in another study context.

2.1.2 Market Accessibility and Households' Food Security in Acholi Sub Region-Uganda

Margaret Namubiru, Willy Ngaka, Frederick Nsambu Kijjambu

The purpose of this study was to establish the effect of market accessibility on households' food security through farmers' organization for market access; road network to market, and ICT utilization for market access. The study undertook a cross-sectional research design with quantitative and qualitative research approaches grounded on pragmatism as a philosophical research orientation. Data was collected from 384 households using a structured questionnaire and a focused group discussion guide. A hierarchical regression model was used in analyzing quantitative data using SPSS, while qualitative results were generated through thematic content analysis.

Both quantitative and qualitative findings indicated a positive and significant contribution of market accessibility to households' food security ($r=.424^{**}$). Moderation test findings further indicated a positive but insignificant effect. Findings on membership to farmer organization and households' food security indicated a positive and significant relationship between farmers' organizations and households' food security ($r=.215^{**}$, $P > 0.01$). Qualitative results revealed that the though significant, the contribution of farmers' organization to household food security is still limited by inaccessibility of markets and market information, storage facilities, low production, and low financial support. Conversely, road network has a positive and significant relationship with household food security ($r=.246^{**}$, $P < 0.01$). Focused group discussions revealed that many of the roads are paved and accessible during dry seasons. However, they become inaccessible in the rainy season. Evidence further revealed a significant and positive correlation between ICT utilization and households' food security ($r=.424^{**}$, $P > 0.01$). Therefore, market accessibility, is significant in contributing to household food security.

The study concludes that market accessibility is important in improving household food security, and household income is significant in influencing the effect of market accessibility on household food security. Nevertheless, the contribution of market is weak in explaining household food security in Acholi sub region. The study makes recommendations for improvement in market accessibility spearheaded by the government through supporting farmers' organizations, upgrading paved road network to tarmac in rural areas, speeding up the rural infrastructural connection process to scale up the use of ICT tools, and directing resources towards improving household income in rural areas.

2.2 FACULTY OF COMPUTING & INFORMATICS

2.2.1 A Model for Assessing the Urban Commercial Banks Employees' Cyber Security Ethical Behavior in Uganda

Nakato Ruth, Mayoka. G. Kituyi, Fred Kaggwa

Background: Banks have built many robust Cyber security measures and set up codes of conduct to deter undesirable behaviour, but unethically behaved employees overlook and bypass all these. Thus ethical issues continue to be a problem. There is an urgent need for banks to understand employee threats for Cyber security to inhibit unethical behaviour better. This research developed an ethical behaviour model that analyses Employees' character traits which may influence Cyber security ethical behaviour.

Objectives: The research was guided by four specific objectives: i) To study the Existing ethical behavior models and identify the model requirements. ii) To establish the influence of

ethical virtue constructs moderated by ethical climate on employees' Cyber security ethical behavior intention in Ugandan commercial banks. iii) To Develop a Cyber security ethical behaviour assessment model for Ugandan commercial banks. iv) To test and validate developed model. The study was guided by virtue ethical theory, supplemented by the Theory of Planned Behavior (TPB) and ethical climate theory.

Methodology: The research applied dual essential paradigms. behavioral-science paradigm in establishing the influence of Ethical Virtues moderated by ethical climate on employee's Cyber security ethical behaviour and the design science paradigm in developing an artefact in the form of a model for assessing employees' Cyber security ethical behaviour. Testing the model was done with the System Usability Scale. The researcher conducted exploratory research using a focus group of 10 beta testers from ABSA bank Mbarara and a cross-sectional survey using quantitative methods through an online questionnaire. And Data from a sample of 240 commercial bank employees from Centenary and ABSA banks' branches located in Kampala capital city of Uganda. The study purposively selected the commercial banks' employees with access to banks' sensitive information, including; bank tellers, Information Systems Security Officers, Financial Managers, branch managers, and loan officers.

Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed to analyze the indicators, constructs, and path relationships and to test for casual relations between the model's constructs. The study conducted a confirmatory factor analysis to determine causal patterns in the variables and assess them for validity and reliability. The moderating effects of Ethical climate were tested using Modgraphs

Results: The results reveal a positive but insignificant effect of prudence Beta 0.094, $p = 0.277$ on Behavioral Intentions; that there is a positive and significant influence of Temperance; Beta 0.255, $p = .000$; on Behavioral Intentions; There is a positive and considerable influence of courage; Beta 0.247, $p = .001$; on ethical behaviour, that there is a positive and significant influence of Justice; Beta 0.452, $p = .000$; on Behavioral Intentions. The results further showed that a Strong ethical climate gave rise to a positive effect on Ethical Behavior. Results further showed that a positive change in behaviour intentions leads to a positive shift in ethical Behavior towards Cyber security. The usefulness of the assessment report was rated excellent by 9 of the respondents.

Contribution: The contribution of this thesis is An Employees' Cyber security Ethical Behavior Assessment Model for Ugandan Commercial Banks (ECEBA), deployed to the internet via the URL <http://Cybersecurity.groxels.com>.

Recommendations: The research recommends banks use the developed model in conducting Employee pre-hire screening and periodic assessments of current employees. It could be a means of detecting an employee's ethical decision-making style and growing more ethical employees.

Policymakers should develop virtue ethical-based training programs with dedicated, continuous learning and teaching undertakings geared towards monitoring and enhancing the overall Cyber security ethical behaviour in the banks. Banks are encouraged to establish a moral climate to allow employees to continue observing ethical conduct among themselves. When the ethical environment is robust, employees experience less force to breach the banks' Cyber security. The results are a platform for the Government of Uganda through the Ministry of ICT to generate appropriate national policies related to Cyber security ethics as a strategy aimed at improving Cyber security ethical behaviour in the banking sector.

Keywords: Cyber security, Ethical Behavior, Ethical Climate, ethical Virtues.

2.2.2 Algorithms for detection of people crowds using wireless sensor networks

Obbo Aggrey, Nabaasa Evarist, Ariho Oius

People Crowds have attracted a lot of attention in recent decades. This can be attributed to the growth of the events industry that results in the damage of social services whenever people crowds are not controlled, the fear of negative effects of epidemics accelerated by uncontrolled people crowds such as high mortality rates and the breeding of political intolerance displayed through public demonstration. People crowds also comprise intelligent humans which means that they can possess the capability to bypass traditional crowd detection mechanisms. Their detection will therefore require special attention. On the other hand, advancements in micro-electromechanical technologies used in the manufacture of sensors, have led to the production of more effective lightweight sensor nodes with improved network coverage, and energy-efficient routing and aggregation protocols, resulting in a broadened application domain of wireless sensor networks. Despite the above-mentioned dangers, coupled with technological advances, not much work has been done in the area of people crowds detection using wireless sensor networks. In this work, the researcher investigated the strengths and shortfalls of existing crowd detection algorithms in relation to people crowds and developed algorithms for the detection of people crowds using WSNs. The developed People Crowd Detection (PCD) algorithms were simulated using MATLAB software and their performance was analyzed by establishing their complexities. The developed algorithms were of order $O(n)$ indicating a fair performance while at the same time highlighting room for improvement. The conclusion was that wireless sensor networks provide a basis upon which people crowds detection algorithms can be programmed and implemented for resource-constrained environments.

2.2.3 Model for enhancing security in a Bring Your Own Device (BYOD) environments

Richard Ntwari, Annabella E. Habinka, Fred Kagawa.

Mobile devices have become more prevalent in recent years, as has their growth rate. The rapid growth rate can be attributed to the evolution of mobile devices with the capabilities of a modern computer. These capabilities are accessed via mobile software known as Applications. Bring your own device (BYOD) is a trend among enterprise employees who use their personal devices to support business processes. However, the proliferation of mobile devices within the enterprise raises security risks to an organization's data in terms of confidentiality, integrity, and authenticity. As a result, the study considered developing a security model to address BYOD security issues. Protection Motivation Theory (PMT) guided the research.

A mixed study was carried out, in which a quantitative survey was carried out to collect data from students and qualitative in-depth interviews were carried out with key staff informants. The collected data was used to identify threats and develop a model. For both the quantitative and qualitative studies, a total of 412 students and 12 universities staff were involved respectively. In terms of model evaluation, the study sampled 10 expert reviewers to assess

the developed security model's viability in terms of mitigating security threats arising from BYOD.

SPSS version 25 was used to analyze quantitative data, and thematic analysis was used to analyze qualitative data. The quantitative study found that respondents were aware of threats but used only the bare minimum of controls to avoid them, whereas the qualitative study found that institutions had no control over private devices. Furthermore, no policies were in place to guide stakeholders on how BYOD should be implemented. Based on these findings, a BYOD security model was developed. The developed model's test results indicated that the model's perceived net benefit influenced usage and that the model was appropriate in mitigating BYOD security threats. Based on the study's findings, the developed security framework will assist educational institutions in mitigating BYOD security threats. Furthermore, in terms of BYODs, this model will contribute to the generation of new knowledge in the field of information security. The study suggests that stakeholders receive ongoing training in order to mitigate the security threats posed by mobile devices.

2.2.4 A Mobile Health Framework for Public-Private Mix in Tuberculosis Prevention and Care in South Western Uganda

Wilson Tumuhimbise, Angella Musiimenta, Fred Kaggwa, Daniel Atwine

Background: Ensuring that presumptive tuberculosis patients referred from private hospitals have reached their points of referral is key to achieving better tuberculosis control efforts. Although mobile health technologies have been recommended by the World Health Organization as emerging opportunities for closing gaps through enhancing public private mix, there is a lack of frameworks to guide the development of these interventions.

Methods: The user-centered design approach was adopted in this research to develop a mobile health framework for designing a mobile application to support the follow-up of presumptive Tuberculosis patients referred from private to public hospitals in southwestern Uganda. The research employed mixed qualitative and quantitative methods to achieve its objectives. The research involved 35 in-depth interviews with healthcare workers purposively selected from both private and public facilities and 35 interviewer-administered surveys with the same respondents.

Results: Mobile health may offer low-cost alternative approaches for supplementing and enhancing private hospitals' tuberculosis care efforts. A mobile health framework for guiding the design of a mobile health application to support the following up of presumptive tuberculosis patients referred from private to public hospitals was developed. Subsequently, a mobile health app (known as Tuuka) was developed to demonstrate the potential of the developed framework and to validate it. A policy framework emerged from lessons learned and suggestions for implementation of the developed mobile application in Uganda.

Conclusion: This thesis identifies mobile health interventions utilized for public private mix, demonstrates how a mobile health framework can be developed and presents how a policy framework for implementing the developed mobile health intervention.

Keywords: mobile health, public private mix, implementation science, CFIR, barriers, motivators, referral.

2.2.5 A Collaborative Knowledge Management Framework for Enhancing Value of Agricultural Information in Smallholder Farming Systems

Daniel Muhanguzi, John Ngubiri, Simon Kawuma

Information plays a key role in a smallholder farmer's life. It enhances their knowledge and strengthens their decision-making ability which translates to productivity and profitability. Smallholder farmers receive agricultural information from family and friends, extension agents, research institutions, middle men and input dealers among others. With the ubiquity of ICTs especially mobile phones and internet, smallholder farmers are increasingly adopting and subscribing to services that provide them market, weather and agronomic information. However, different sources use different channels and information provided is not well processed and aggregated for sufficient utilization by smallholder farmers. This is exacerbated by the variability in human capital and minimal formal methods to manage the information and knowledge smallholder farmers receive. Furthermore, there is inappropriate and insufficient local content and also poor information/knowledge sharing culture which affects the smallholder farmers' ability to extract value from the agricultural information. These challenges are further compounded by the lack of a suitable and reliable framework that can be leveraged to enhance smallholder farmers' ability to extract value from agricultural information.

In this study we utilized design science research methodology to develop a collaborative knowledge management framework that enhances smallholder farmers' ability to extract value from agricultural information.

The findings from the literature review indicate that agricultural information valuation is context specific and varies depending on the reason for valuation and therefore a value-in-use framework can be used to determine the value of agricultural information. Findings from the exploratory survey reveal that smallholder farmers still face challenges in extracting value from agricultural information as a result of low levels of education and training, poor quality information, poor design of information channels and high cost of Information. A Collaborative Knowledge Management Framework for Agricultural Information Value Enhancement (CKM-FAIVE) was developed to solve these challenges. Findings from the field evaluation of the framework elaborate that CKM-FAIVE solves usability challenges related to poor design of information channels. It facilitates provision of timely interactive feedback, storage of information and it is easy to use. CKM-FAIVE also solves information quality challenges by enhancing provision of current, accurate, relevant and timely agricultural information. CKM-FAIVE will aid information and knowledge service providers to assess important aspects that are required to enhance smallholder farmers' ability to extract value from agricultural information disseminated.

Based on the findings it can be concluded that integration of capacity building programs when rolling out new information services is paramount, design of information services should be human-centered, agricultural information should be sought and used collaboratively so as to maximize benefits of information and also a relevant framework is

needed to aid in assessment of important aspects that are required to enhance smallholder farmers' ability to extract value from agricultural information.

Future research should delve into longitudinal assessments of social factors associated with the success of CKM-FAIVE framework since such a study takes a considerable amount of time to be carried out. Furthermore, future studies should conduct a deep assessment of all the information quality dimensions and also make multiple instantiations based on the CKM-FAIVE framework to further strengthen it.

2.3 FACULTY OF INTERDISCIPLINARY STUDIES

2.3.1 Perceived Organizational Behaviour and Performance of Academic Staff at Bishop Stuart University

Birungi Speciouza, Charles Tushabomwe-Kazooba, Adrian Rwekaza Mwesigye

The purpose of the study was to examine the influence of perceived organizational behaviour on performance of academic staff (PAS) in Bishop Stuart University (BSU), a private university in Mbarara City in South Western Uganda. A cross-sectional design with mixed methods was used to conduct the study in BSU over the period of June - August 2018. Quantitative data were obtained from the academic staff whereas the top management and students' course leaders provided the qualitative data. Simple random sampling technique was used to select 142 from 219 academic staff and purposive sampling was used to select the 5 members of the university top management and the 24 student course leaders who formed three focus group discussions. A self-administered questionnaire, a key informant interview guide and a focus group discussion guide were used to obtain data from academic staff, university top management and student course leaders respectively. The findings revealed that additional increment in rigour of recruitment/training practices leads to 0.17 increment in PAS [$\beta = 0.17$, $p = 0.031$]. Findings on the influence of Monitoring and Evaluation on PAS showed that additional increase in the rigour of monitoring and evaluation (M & E) practices results into 0.58 increment in PAS [$\beta = 0.58$, $p < 0.001$]. Furthermore, the influence of reinforcement on PAS at BSU revealed that additional increase in reinforcement practices leads to 0.68 in PAS [$\beta = 0.68$, $p < 0.001$]. However, the key challenges at BSU were inappropriate financial rewards [Salaries and allowances] (83.8%) and lack of coordination in management (74.5%). It was proposed that the key remedy to the challenges was establishing well-organized mentoring programmes within each department or faculty to match new staff with committed, exemplary mid-career or established professionals, thus building a pool of professional mentors (94%). Therefore, perceived organisational behaviour positively influences PAS at BSU, though challenged by inappropriate financial rewards and lack of coordination in management that could be minimised by establishing well-organized mentoring programmes. Thus, this study recommends that when organizational behaviour is enhanced and the remedies suggested upheld, then the PAS in BSU would be high.

2.3.2 Young Adult Banyankore Girls' Response to Social Construction of Body Image in the Ankore Region, Uganda

Ruth Kaziga Kamugungunu, Charles Muchunguzi, Susan Kools

Introduction: Young adult girls become increasingly aware of their bodies through images presented to them through social structures during the developmental stages of childhood and adolescence. With body image closely linked to self-esteem and existing social-cultural factors influencing development in children, there is a prospect of distortion of the images presented in society. This study addresses the existing sociocultural influences on the body image of young adult Banyankore girls and their responses. Objectives: The primary objectives of this study were: 1) describing the self-perception of young adult Banyankore girls; the construction of body image, 2) exploring the contradictory societal expectations of body image where the older adolescents live and 3) identifying facilitators and barriers to body image constructions. The study was guided by socio-cultural theory supplemented by the feminist theory on the female body and Higgins' self-discrepancy theory.

Methods: The study adopted the narrative inquiry approach with a sample size of 30 young adult girls recruited from the community and various learning institutions. 4 narrative interviews of young men, 5 key informants, and 2 focus groups of parents of young adult girls. The data were collected using purposive sampling supplemented by the snowball approach and thematic saturation was reached to verify developing themes. The results were analyzed using the six phases of thematic analysis by Braun and Clarke.

Results: The responses formed different, salient themes based on the three objectives of the study. Exploring the first objective generated themes including beauty expectations, comparisons, relationships and dietary habits. These two themes included contradictory gendered expectations, contradictory beauty product advertising messages, shifting standards of physical attractiveness, and emerging lifestyle trends. Lastly, in addressing aim 3, five themes were generated, including parental influence, peer influence, media influence, and the fashion industry as the social-cultural factors that influenced their body image constructions, thus influencing their feelings towards their bodies.

Conclusion: Socio-cultural factors, including parents, peers, media, and the fashion industry have a great influence on the body image and health behaviours of young adult women. Beauty ideals are transforming from traditional norms and expectations to Western influences that are consumed through media and fashion trends, yet traditional social expectations are still present, especially for rural young women. Young adult Banyankore girls are caught in the middle, often experiencing the conflicting pressures of both. Feelings of self-doubt and low self-confidence may stem from not fitting certain beauty standards and may contribute to the adoption of unhealthy behaviours, including overeating, restrictive dieting, and skin bleaching. These behaviours potentially lead to long-term health problems.

Recommendations: Government-sponsored programs that provide education and positive media messages may be beneficial to building young women's self-esteem. At the same time, there is a need for the government to provide mandatory training for general practitioners on mental health related to self-esteem and body image. Here general practitioners can in turn advise parents and caregivers on how to confidently inspire their children from a very early age, encouraging high self-esteem. Using social media as a prevention technique can encourage researchers to engage in content analysis, permitting researchers to visually

measure the daily images to which young people are exposed while online. Qualitative tools like Photo Voice are useful in giving young people a platform and voice to discuss their experiences and interactions with body biases.

2.3.3 Captivity and post captivity experiences of formerly abducted young mothers and their social reintegration in post conflict Northern Uganda: Voices from Kitgum District

Wendo Mlahagwa, Roberts K. Muriisa

Uganda's 25 year insurgency in the north led by the Lord's resistance army led to the abductions of many children who became forceful conscripted in the army. Among the children were girls who not only were they forced to commit atrocities against their own communities but were also sexually exploited and became mothers at a tender age (Formerly Abducted Young Mothers-FAYMs). Upon return to their communities they face stigma and rejection as a result of those captivity and return experiences and have faced social reintegration challenges. There are a number of reintegration interventions running in Northern Uganda but reintegration of these young mothers is limited. This study explored and analyzed the community centered dynamics that affect the social reintegration of the formerly abducted young mothers (FAYMs) in Kitgum district. This study sought answers to the question as to why the FAYMs have continued to face social reintegration difficulties despite their taking part in reintegration programs. The study aimed at examining how the captivity and return experiences have shaped FAYMs' long term social reintegration; investigating relationships between them, their families and communities; finding out the contribution of various initiatives in their social reintegration and examining their resilience and coping mechanisms.

The methodology for this study is qualitative and in particular phenomenological in nature. Contrary to economic reintegration which would call for some quantitative indicators, social reintegration is an intangible phenomenon. Therefore, its examination required qualitative approaches to probe the determinants of social reintegration challenges of the FAYMs basing on their lived experiences. Field study was conducted in 2018. Using phenomenology research design, I conducted narrative interviews with the FAYMs which were corroborated with key informant interviews from social workers, local and cultural leaders and in-depth interviews from the community.

The study found out that war time events had serious impact on both physical and psychosocial state of the FAYMs- inhibiting positive relations with their communities. Rejection, stigma and discrimination continue to inflict on them a character of self-discrimination and social isolation. These two conditions breed violence and aggression and exacerbate further community resentment and inhibit positive relationships that expect to emerge with social reintegration programs. A number of NGOs (Non-Governmental Organizations) have put in place reintegration programs which were envisaged to lead to FAYMs' economic and psychosocial transformation. The programs however were limited by their short term nature donors' dependence. In addition, this study found out that there is limited synergy between different institutions in facilitating social reintegration. The study explored the contribution of the mediation and reconciliatory role of the cultural institutions in social reintegration of the FAYMs. However, given the devastation of the war and its resultant effects the cultural institutions are hindered in executing their duties as it should

have been. The study also further found that despite the economic survival challenges the FAYMs are going through, some have overcome them through their commitment to associations of women which have improved their wellbeing. The FAYMs pointed out that if supported they can enhance FAYMs' social reintegration in a more sustained manner.

The study concludes that the stigma, resentment and discrimination of the FAYMs in their communities have contributed to lack of trust towards their communities and the persistent belief that the FAYMs have spirits that bring misfortunes is exacerbating the gap between them and their families. The study therefore suggests the need for continued community sensitization towards their acceptance. There has been limited direct government involvement, relegating reintegration role to poorly funded NGOs and no much support have been given to cultural and local leaders to enhance support of social reintegration of the FAYMs. This calls for a multiplicity of actions alongside FAYMs own determination and agency. In other words, synergies between the NGOs, cultural institutions alongside local leaders could lead to improvement in reconciliation of FAYMs to their communities using a socio-ecological approach. There is need for locally driven reintegration initiatives (as opposed to reliance on donor funded short term initiatives) at community level that target both the formerly abducted and the community for successful social reintegration outcomes.

2.3.4 Exotic tree growing and livelihoods among Rural Communities of Kigezi sub-Region, South Western Uganda

Jennifer Turyatamba Tumushabe, Rogers Bariyo, Ronald Twongyirwe

This thesis examines effects of exotic tree growing on the livelihood among rural communities in Kigezi Sub region of South Western Uganda. Specifically, the study was guided by four specific objectives: (i) To document and characterize exotic tree plantation growing in the rural communities in the Kigezi ; (ii) To examine the linkages of agriculture land use practices and exotic tree growing in rural communities in the KigeziSub region; (iii) To examine the livelihood outcomes associated with exotic tree growing in the Kigezi Sub region; and (iv) To examine farmers' perceptions on the effects of exotic tree growing on food crop production in Kigezi Sub region. Basing on post-positivism philosophy, cross sectional design using mixed methods, data was obtained from 389 tree growers, 24 top government and international organizations as key informants and 4 focus group discussions; two in each district. Landsat (TM/ETM+) Satellite Images and digital photographs were used to obtain additional information on characterization of tree growing. Data from questionnaires were entered and analyzed with help Statistical Package for Social Sciences version 23. Data from key informants were recorded, transcribed and verbatim quotes obtained. The findings show that the majority of the tree growers were males, male heads, married, involved in farming, and belonged to a forest group and travelled an average distance of 4.2km to market and had household members between 1 and 12. An overall trend of tree growing increased since 2000 and the major tree species included *Pinus patula*, *Eucalyptus grandis*, *Eucalyptus camadulensis*. Overall activity was crop growing especially in Kanungu district and most of eucalyptus and pine trees are planted on mountain slopes and the majority planted exotic trees on degraded lands. Livelihood effects associated with exotic tree growing included income from selling trees and products such as carbon offsets. Positive perceptions led to increased crop production as opposed to negative perceptions towards tree growing. These findings imply that livelihood effects of pine and eucalyptus tree are diverse ranging from monetary to social benefits and food production. Stakeholders in Ministry of

Agriculture, Animal Industry and Fisheries are recommended to strengthening the existing policy reforms and interventions to harness positive livelihood outcomes.

2.4 FACULTY OF MEDICINE

2.4.1 Incidence, risk factors and risk prediction of adverse drug reactions among older inpatients at Mbarara Regional Referral Hospital, Southwest Uganda

Tadele Mekuriya Yadesa, Paul Alele, Robert Tamukong, Freddy Erick Kitutu

Background: Adverse drug reactions (ADRs) affect different age groups but the elderly are the most vulnerable population. The identification of the risk factors for ADRs in this group of patients is crucial to develop reliable prediction models that enable prevention of ADRs. This study determined the incidence and risk factors of hospital-acquired ADR (HA-ADR) in older adults and developed and validated an ADR risk prediction model.

Methods and materials: First, a systematic review on incidence and risk factors of ADRs in hospitalized older adults was conducted. Next, the first prospective cohort was conducted at Medical, Oncology and Surgery wards of Mbarara Regional Referral Hospital (MRRH) from the 9th of November 2020 to the 7th of May 2021. Clinically and statistically significant risk factors identified during the derivational study were used to develop an ADR risk prediction model named as ‘Prediction of Adverse Drug Reactions in older Inpatients (PADROI)’. Lastly, the PADROI model was validated in another prospective cohort (validation study) at MRRH from 5th of July to 17th of September, 2021.

Results: From the systematic review of 80,695 participants, the pooled prevalence of ADR was 22% (95% CI: 17%, 28%; $I^2= 99.23%$); 29% (95% CI: 16%, 42%) in high income countries and 19% (95% CI: 14% -25%) in low and middle income countries. The derivational study involved 523 older adults 60 to 103 years of age. The prevalence and incidence rate of HA-ADR was estimated to be 48.9% and 78 ADRs/1000 person-days respectively. ADRs affecting the gastrointestinal tract were the most frequently (40.6%) identified categories. Eight independent predictors of HA-ADR were identified: being 60-75 years of age, an ADR history in previous 1 year, taking PIM, being on polypharmacy, having $CCI \geq 6$, having heart failure or kidney disease and a hospital stay >10 days. In the validation cohort, PADROI model showed an excellent AUROC (0.917), and high sensitivity (87.1%) and specificity (90.3%).

Conclusion: The current prevalence of HA-ADR is higher than what has been previously documented. The majority of the ADRs were preventable. Disease-related factors followed by medication-related factors were shown to be the most important predictors of HA-ADRs. In the validation study, the PADROI has demonstrated an excellent prediction ability for ADRs. Thus, we recommend larger and multi-centered cohorts of older adults to be undertaken applying PADROI model.

Keywords: Prevalence, incidence, risk factors, prediction, adverse drug reaction, older adults

2.4.2 Antimicrobial and Antihyperglycaemic activity of *Corchorus olitorius* L

Nakaziba Rebecca, Paul E. Alele, Jasper W. Ogwal-Okeng

Background: Plants have over the years been used to treat ailments with undeniable success. *Corchorus olitorius* is a vegetable with a variety of traditional medicinal benefits but there is scanty documentation of neither its medicinal uses nor its pharmacological activity in Uganda. This study purposed to document its traditional medicinal uses, assess its antimicrobial and antihyperglycaemic activity, as well as its toxicity in a laboratory setting.

Methods: A cross-sectional ethnobotanical survey was conducted in Oyam district Northern Uganda, to document the traditional medicinal uses of *Corchorus olitorius*. Descriptive data was analyzed using SPSS statistics 20. The sample was then collected, identified, air dried and serial extracted using diethyl ether, methanol and distilled water. The crude extracts were securely stored under refrigeration and used for the assays. The antimicrobial bioactivity assays were performed using the agar-well diffusion technique. The crude extracts were further subjected to TLC for separation and the components also assayed for antimicrobial bioactivity. This was followed by GC-MS analysis to identify the bioactive components. The antihyperglycaemic activity and toxicity tests were performed using laboratory animals and the results analyzed by the Prism Graphpad, one way ANOVA and multiple t' test. All results were presented in the form of tables and figures.

Results: *Corchorus olitorius* was traditionally used to treat joint pain/stiffness and to strengthen bones. The antimicrobial bioactivity testing demonstrated bioactivity against *Escherichia coli*, *Staphylococcus aureus*, and *Streptococcus pneumoniae* while the GC-MS analysis revealed methyl esters. The antihyperglycaemic test exhibited moderate activity and there were no toxicity effects associated with *Corchorus olitorius*.

Conclusions and Recommendation: *Corchorus olitorius* is traditionally used to treat joint and bone related ailments. It is bioactive against bacteria and a moderate antihyperglycaemic agent with no toxic effects. Further pharmacological investigations and possible pharmaceutical development should be considered.

2.4.3 Stigma, Depression and Substance use among African Urban Refugees Living in Mbarara City, Southwestern Uganda

Ronald Bahati, Godfrey Zari Rukundo, Herbert Elvis Ainamani, Cathy Denise Sigmund

Introduction: Globally, the refugee crisis has become of a public health concern. Although many of the studies in refugee population have focused on the refugees within refugee camp or settlement settings. Studies assessing the mental well-being of the refugees living in urban settings in low- and middle-income countries are scanty. This study examined the relationship between stigma, depression and substance use among African urban refugees living in Mbarara City, southwestern Uganda. It also explored the perceptions of the local community towards urban refugees.

Objective: To determine the prevalence of stigma, depression and substance use among African urban refugees living in Mbarara City, southwestern Uganda and to examine the association between stigma, depression, and substance use. The study also explored the perceptions of the local community towards urban refugees.

Methods: The study used both quantitative and qualitative methods, employing a cross-sectional survey design. African Urban refugees who had settled in Mbarara City for at least twelve months before the study totalling 343 were assessed on the prevalence of stigma, using the Discrimination and Stigma Scale – 12. Depression, using the Patient Health Questionnaire – 9. Substance use was measured using two scales (1) Alcohol Use Disorders Identification Test -10 and (2) Drug Abuse Screening Test – 20. Chi square tests were conducted for each of the study variables across gender. Logistic regression analysis was used to test the associations between, stigma and depression, stigma and substance use, depression and substance use in step one. Socio-demographic characteristics of the study participants were analyzed as covariants in step two. To examine community perception about refugees, Focus Group Discussions and Key Informants' interviews were conducted. Thematic analysis was adopted for qualitative data.

Results: Most of the participants 84% (n=288) reported experiencing stigma. The overall prevalence of depression was 80% (n=276). The prevalence of alcohol use was 43% (n=146) and the prevalence of use other substances was 43% (n=146). Stigma was significantly associated with depression ($p < 0.001$; OR=1.08; 95% CI; 1.05 to 1.10), alcohol use ($p < 0.001$; OR= 1.03; 95% CI; 1.02 to 1.5) and use of other substances ($p < 0.001$; OR= 1.04; 95% CI; 1.02 to 1.06). Results also showed a significant association between depression and substance use ($p < 0.001$; OR= 1.24; 95% CI; 1.17 to 1.31), $p < 0.001$; OR=1.32; 95% CI; 1.23 to 1.41) for alcohol and use of other substances respectively. Confounding variables of age, level of education, marital status, and occupation were also found to be associated with the major study variables. The local community perceived refugees as people who increased competition for labor and basic needs. Refugees were perceived as scammers, criminals and agents of insecurity. Community also perceived refugees as people who were given preferential treatment by government, civil society organizations and the international community.

Conclusions: Urban refugees in Uganda experience high prevalence of stigma, depression, alcohol and other substance use. Depression and substance use among urban refugees are moderated by other confounding variables especially age, education level, and economic status paired with stigma. Society perceived refugees with a lot of contempt and suspicions, although the community appreciated the acceleration of the substance consumer market especially of food stuffs and housing services brought about by the presence of refugees in Mbarara city.

Keywords: Stigma, Depression, Substance Use, African Urban Refugees

2.4.4 Screening and Characterization of antimicrobial peptides from fish mucus in three major lakes of Uganda

Hedmon Okella, Ogwang Patrick Engeu, Kato Charles Drago

Antimicrobial peptides (AMPs) constitute a broad range of bioactive compounds in diverse organisms, including fish. Currently, several peptide antibiotics have been approved for clinical use. Still, skin mucosal AMPs of African catfish and African lungfish are largely unexplored despite their potential in contributing novel drug candidates. Accordingly, the African Catfish Antimicrobial peptides (ACAPs) were investigated. Native peptides were extracted from fish mucus scrapings in 10 % acetic acid (v/v) and ultra-filtered using a 5 kDa

molecular weight cut-off membrane. The ultrafiltrate were purified using C₁₈ Solid-Phase Extraction cartridges. Later, their antibacterial activity was determined using the Agar Well Diffusion and broth-dilution methods utilizing *Staphylococcus aureus* (ATCC 25923) and *Escherichia coli* (ATCC 25922). Sephadex G-25 gel filtration was further utilized in bio-guided isolation of the most active fractions prior to peptide identification using Orbitrap Fusion Lumos Tribrid Mass Spectrometry. Discriminant Analysis Machine and Deep learning algorithms were utilized in predicting the antimicrobial scores of each peptide. Toxicity of the AMPs was assessed using rabbit blood cells alongside *HLPpred-Fuse* and *ToxinPred* servers. The AMPs possible mode of action was assessed using SevenGo Duo SG-23 digital conductivity meter, *QuantiChrom* Alkaline phosphatase kit, and molecular docking engines prior to their chemical synthesis. The skin mucus extracts from fish in three major lakes of Uganda exhibited antimicrobial activity on **E. coli** and **S. aureus**. Lake Albert's African catfish demonstrated the highest antimicrobial activity with the lowest MIC of 2.84 and 0.71 µg/mL on **S. aureus** and **E. coli**, respectively. Sephadex G-25 peak I mass spectrometry revealed seven short peptides (11–16 amino acid residues) of high antimicrobial scores (0.561–0.905 units). In addition, these peptides had a low molecular weight (1005.57–1622.05 Da) and had a percentage hydrophobicity above 54%. Partially purified extracts were non-hemotoxic ($p=0.447$). Peptide ACAP-V demonstrated the highest binding and global energies against Monomeric sarcosine oxidase (PDB Id: 2gb0; -9.40 kcal/mol) and NADH peroxidase (PDB Id: 1nhp; BE: -88.84 kcal/mol) respectively. Synthesized ACAP-IV and ACAP-V had the MIC of 520.7 and 625.0 µg/mL on *E. coli*. Collectively, the 7 African catfish antimicrobial peptides were identified as potential novel drug candidates. Future research is recommended to validate their activity *in vivo* on a wider range of bacteria.

Keywords: African catfish, African lungfish, Aquatic, Antimicrobial peptides, Cell lysis, Electrolytes, Hemolytic, Drug-leads, *In silico*, MIC, Molecular docking, Skin mucus, Uganda

2.4.5 Intra-psychoic factors, coping skills, psychological well-being, and caregiving satisfaction among caregivers of patients with cancer at the Uganda Cancer Institute and Mbarara Regional Referral Hospital

Kansiime Rachel, Simon Kizito, Milton Mutto, Godfrey Zari Rukundo

Background: The needs and challenges of informal caregivers for patients with cancer have been studied to a greater extent in developed countries. However, in low and middle-income (developing) countries such as Uganda, there is a paucity of information. According to available literature, informal caregivers share similar experiences in their caregiving journey. Caregiving to a patient with cancer is a difficult situation that disrupts the lives of caregivers. This includes significant physical strain and a decrease in physical well-being. Because of all the challenges they face, it may hinder the satisfaction they derive from the caregiving relationship. Although this is true, not all caregivers get psychologically distressed or fail to experience caregiving satisfaction. The current study explored the role the intra-psychoic factors of personality, hardiness, and coping play on psychological well-being and caregiving satisfaction among caregivers of patients with cancer in Uganda.

Objective: To determine the role Personality, hardiness, and coping play on the psychological well-being and caregiving satisfaction of caregivers of patients with cancer in Uganda.

Methodology: The study adopted a cross-sectional design that employed quantitative methods. Instruments used to collect data were; NEO-FFI for personality, the adjusted hardiness scale for hardiness, General Health Questionnaire (GHQ-28) for psychological well-being, the Coping Orientation to Problems Experienced Inventory (COPE) for coping, and the adjusted caregiver reaction assessment scale for caregiving satisfaction. All the questionnaires utilised in this study were subjected to structural validation and were found to be valid and reliable in an African-Ugandan sample of caregivers of patients with cancer. A multi-level analysis was done to assess the associations between the different factors.

Results: Analysis of the socio-demographic characteristics of the cancer caregivers showed that there were significant age differences between the male and female caregivers and that cancer caregiving is mainly done by younger females and older males. There were significant differences in the occupation of the caregivers which implies that the occupation of the caregivers influences the caregiving experience. There were gender differences in the caregivers' religious affiliations, stage of cancer, and caregiver relationship with the patient. The personality domains of extroversion, neuroticism, openness, and introversion do influence the psychological well-being of cancer caregivers and all four domains of personality do not influence caregiving satisfaction on the first dimension of the caregiving satisfaction scale but extroversion, openness, and introversion influence caregiving satisfaction on the second dimension of the caregiving satisfaction scale. The domains of commitment, control, and challenge were found to influence the psychological well-being of caregivers of patients with cancer, and all the domains of hardiness (commitment, control, and challenge) were found not to influence caregiving satisfaction on the first dimension of the caregiving satisfaction scale but all the domains influenced caregiving satisfaction on the second dimension of the caregiving satisfaction scale. The coping domains of problem-solving, denial, and venting were found to influence psychological well-being whereas all the domains of coping (problem-solving, denial, and venting) were found not to influence caregiving satisfaction on the first subscale of the caregiving satisfaction scale. The coping domain of venting was found to influence caregiving satisfaction on the second dimension of the caregiving satisfaction scale.

Conclusion: The results of this study showed that personality, hardiness, and coping significantly had an association with the psychological well-being of cancer caregivers and significantly had an association with caregiving satisfaction for the functional cancer caregiver. It is therefore recommended that coping and hardiness training programs coupled with psychological support sessions be provided for cancer caregivers. This will offer increased enrichment and support and reduce the psychological distress among cancer caregivers hence enhancing their mental health.

Keywords: Personality, Hardiness, Coping, psychological well-being, Caregiving satisfaction, Cancer caregivers, Uganda

2.4.6 Assessment of the Challenges of Intrapartum Referrals and use of Mobile Phone Technology to Improve Maternal-Fetal Outcomes in South Western Uganda

Hamson Kanyesigye, Jerome Kabakyenga, Joseph Ngonzi

Background: In resource limited settings, intrapartum referrals develop adverse maternal-fetal outcomes partly due to delays in accessing appropriate care at referral hospitals. There is paucity of understanding and knowledge on the profile of referrals and local challenges faced during implementation of referral process including lack of communication and feedback between health facilities. Phone-call based interventions may bridge such communication challenges.

Study aims: This study aimed at assessing challenges faced during implementation of maternal referral process from health centre IVs in Isingiro district to Mbarara regional referral hospital, the effect of phone-based intervention on maternal-fetal outcomes among intrapartum referrals, and the acceptability of the phone-based intervention by the healthcare workers.

Methods: The study comprised of three sub-studies done at Mbarara regional referral hospital (MRRH) and two health centre IVs (HCIVs) in Isingiro district between December 2019 and April 2021. For sub-study I, a mixed methods study was conducted involving both intrapartum referrals and healthcare workers. Sub-study II was a quasi-experimental study where the main exposure variable was a phone call communication intervention between MRRH and HCIV in Isingiro district. We compared distribution of clinical characteristics and adverse maternal-fetal outcomes between intervention and control groups using Chi square or Fisher's exact test. We performed logistic regression to assess association between independent variables and adverse maternal-fetal outcomes. For sub-study III, we assessed acceptability of the intervention using a theoretical frame work of acceptability of medical intervention.

Results: Sub-study I had 161 referrals: 104(65%) were below 26 years, 16(10%) had no formal education, 11(7%) reported no income, 151(94%) had no professional-escort, and 137(85%) used taxis. The challenges included lack of communication between health facilities, inconsistencies of: electric power, medical supplies, support supervision and, harassment by colleagues. Self-reported solutions included use of phone call communication, audit meetings, support supervision and increasing staffing levels.

For sub-study II, we enrolled 177 participants: 75 in intervention group and 102 in control group. Three quarters (75%) of participants in control group delayed on admission waiting bench of MRRH compared to (40%) in intervention group [$p < 0.001$]. There were significantly more adverse maternal-fetal outcomes in control group than intervention group (obstructed labour [$p = 0.026$], low Apgar score [$p = 0.013$] and admission to neonatal unit [$p < 0.001$]). The phone call intervention was protective against adverse maternal-fetal outcome [aOR = 0.22; 95% CI: 0.09 - 0.44, $p = 0.001$].

The intervention was highly acceptable by the healthcare workers at both the initiating and the receiving health facilities.

Conclusions and recommendations: Most of the intrapartum referrals had poor social-economic status, used taxis, and lacked professional-escort. Health workers suffered harassment, lack of communication and shortage of supplies. The phone call intervention was

acceptable by HCWs, it reduced delay to patient admission at MRRH, and was protective against adverse maternal-fetal outcomes. We recommend incorporating the phone call communication intervention in the routine practice of managing emergency maternal referrals.

2.4.7 Postpartum Depression in Southwestern Uganda: Associated factors, lived experiences of mothers who recovered from a clinical diagnosis and validation of a screening tool

Atuhaire Catherine, Grace Nambozi, Laura Brennaman, Godfrey ZariRukundo

Background: Postpartum depression (PPD) is one of the major maternal health challenges across the globe that significantly causes maternal morbidity with severe consequences on the well-being of mothers, new-born, families and communities. The birth of a newborn is considered a joyful event, inhibiting mothers from expressing their depressive feelings. If PPD is not detected using validated tools, well understood and managed, mothers with PPD are at greater risk of suffering from postpartum psychosis, experiencing suicidal ideation or even committing suicide. Although the Edinburgh Postnatal Depression Scale (EPDS) has been recognized as a reliable screening tool for PPD worldwide, no study has validated this tool in Uganda. Again, despite the high burden of PPD in the low income settings, there is scanty PPD pooled data in the African setting. This study determined the prevalence and factors associated with PPD in southwestern Uganda, exploring lived experiences of Ugandan women with a previous clinical PPD diagnosis and validating the EPDS to determine its appropriateness in the Ugandan context.

Methods: To meet objective 1, a cross-sectional study was conducted between November 2019 and June 2020 among 292 mothers who were at six weeks' postpartum. Mothers were selected from three health facilities and enrolled using stratified consecutive sampling. Postpartum depression was clinically diagnosed using the MINI 7.0.2 based on criteria from the DSM-5. The factors associated with PPD were assessed by using a structured interviewer-administered questionnaire. The phenomenological investigation adopted an explorative approach through in-depth interviews to meet objective II. Data were collected from 30 postpartum mothers who were purposively selected, between 9th December 2019 and 25th September 2020. This work was analyzed using thematic data analysis that was steered by Colaizzi's six-step phenomenological approach of inquiry. A descriptive, cross-sectional study that targeted mothers six weeks' postpartum mothers to meet the third objective was conducted. During data collection, mothers were first screened using the EPDS in a private room and then clinically diagnosed in another private room using the MINI 7.0.2.

Results: In objective I, overall prevalence of PPD was 27.1% (95% CI: 22.2-32.5) in southwestern Uganda. Factors associated with PPD were low perceived social support, HIV positive status, rural residence, obstetrical complications and the baby crying excessively. In objective II, five themes emerged from the qualitative analysis: 1) somatic experiences including insomnia and headache, breast pain, poor breast milk production, weight loss and lack of energy; 2) difficulties in home and family life including overwhelming domestic chores, lack of social support from other family members, fighting at home and financial constraints due to COVID-19 pandemic; 3) negative emotions including anger, self-blame, despondency and feelings of loneliness and regrets of conceiving or marriage; 4) feelings of suicide, homicide and self-harm including suicidal ideation and attempt, homicidal ideations

and attempt and feelings of self-harm and 5) coping with postpartum depression including spirituality, termination of or attempt to leave their marital relationships, acceptance, counselling and seeking medical treatment, and perseverance. In objective III, the sensitivity, specificity, positive predictive value and negative predictive value of the EPDS established by this study were 86.8%, 92.1%, 80.5% and 94.9% respectively. The cut-off point ≥ 10 was the most acceptable point as it was 86.8% sensitive and 92.1% specific in detecting mothers suffering from PPD.

Conclusion and Recommendations: Despite the limited dearth of literature in Africa (there are only reports from nine countries out of 54 on the continent), the PPD prevalence remains high, which suggests that it is still a neglected illness and calls for immediate interventions. Prevalence of PPD in Mbarara and Rwampara districts is higher than what has previously been reported in Uganda, indicating an urgent need to identify pregnant women who are at increased risk of PPD to mitigate their risk or implement therapies to manage the condition. Midwives who attend to these mothers need to be empowered with available methods of mitigating prevalence and consequences of PPD. Suicidal and homicidal thoughts are important parts of the postpartum depression experience, and these may put the lives of the mothers, their spouses and their babies at a great risk. Poor relationship quality, intimate partner violence and lack of financial resources contribute significantly to the negative emotional experiences of mothers with PPD. The EPDS is a valid screening tool if used at a cutoff score of ≥ 10 in southwestern Uganda. It has a good diagnostic performance to correctly detect PPD among postpartum mothers.

2.5 FACULTY OF SCIENCE

2.5.1 Teaching-Learning Facilities and Students' Performance in chemistry in Selected Secondary Schools in Kasese Municipality

Clive Maate, Adrian Mwesigye

The low performance in chemistry subject at the ordinary secondary school level has been a matter of concern for educationists and several studies have been conducted with little emphasis on establishing the relationship between teaching-learning facilities and students' performance in chemistry. This study was guided by three objectives; to establish the effect of Teaching-Learning Facilities on students' performance in chemistry subjects in selected secondary schools in Kasese Municipality, to analyse the correlation between Teaching methods and students' performance in Chemistry subjects in selected secondary schools in Kasese Municipality, and to establish the effect of primary school background knowledge on students' Performance in chemistry in selected secondary schools in Kasese Municipality. A descriptive survey design using both quantitative and qualitative methods was employed where 325 participants responded to the self-administered questionnaire and 38 key informants responded to a semi-structured interview schedule. The response rate was 97.3%. Quantitative data were analysed using SPSS version 26 where descriptive inferential statistics and Bayesian statistics were significant in establishing the relationship between teaching-learning facilities and students' academic performance in chemistry subject. These results are in agreement with ecological system theory since teaching-learning facilities account for 33.5% when the f-ratio is 6.671, teaching methods account for 25.7%, other general factors account for 18.9%, students' background knowledge from primary school accounts for

33.4%, students attitudes 24.8% and combining the variables identified in the questionnaire all accounts for 75.3% while other variables not mentioned like school governance, parents household income, government policies and others account for the remaining 24.7%. Recommendations further studies should be done to establish the quality of science laboratories and the frequency of practical lessons in secondary schools. SeSamat program should be extended to primary schools since primary background accounts for 33.4%. This implies that salaries for primary school teachers should be enhanced.

2.5.2 Parental Engagement and Students' Academic Performance in Government Grant-Aided Universal Secondary Education Schools in Sheema District, South-Western Uganda

Duncans Mugumya, Adrian Mwesigye, Emmanuel Karoro

Globally, Parents' Engagement (PE) in their children's education has been found to result in improved academic success. This study's purpose was to examine the impact of PE on Student Academic Performance (SAP) in Government Grant-Aided USE (GGAUSE) schools in Sheema District, South-Western Uganda, with objectives: (1) To examine the levels of PE in students' academic activities; (2) To establish the differences in the levels of PE in the academic activities of learners based on demographic characteristics; (3) To determine the extent to which PE in students' academic activities affects SAP; (4) To investigate the challenges of PE in Students' Academic Affairs (SAA); and (5) To explore strategies that can be employed to avert the challenges of PE in SAA. The researcher used a contemporaneous mixed-methods strategy that included both qualitative and quantitative data gathering and analysis. Senior four (S.4) students, parents of S.4 students, teachers teaching in S.4, and top management, chairpersons and treasurers of both Parents' Teachers' Association (PTA) Executive and Board of Governors (BOG) of all the ten GGAUSE schools comprised the population of the study. Study participants were selected using probability and nonprobability sampling methods, based on the category to which they belonged. The sample size for the quantitative study was determined using Krejcie and Morgan's (1970) table of sample selection, which guarantees a sound decision model. Using SPSS, quantitative data were examined to obtain Pearson correlation coefficients, Kruskal Wallis Tests, and linear regression coefficients performed to determine the impact of each predictor variable on the dependent variable. Using thematic analysis, various themes and sub-themes on PE issues and methods were derived from qualitative data. The results indicated a statistically significant difference in PE in provision of basic needs ($X^2_{(4)} = 30.994$, $p < .05$), communication ($X^2_{(4)} = 29.317$, $p < .05$), decision making ($X^2_{(4)} = 18.906$, $p = .001$), infrastructure development and maintenance ($X^2_{(4)} = 11.412$, $p = .022$), provision of a conducive learning environment at home ($X^2_{(4)} = 25.291$, $p < .05$) and adequate learning resources at home ($X^2_{(4)} = 41.890$, $p < .05$). Differences in PE were statistically significant in provision of learning materials among parents of various educational levels ($X^2_{(5)} = 27.901$, $p < .05$), but not statistically significant in provision of basic needs ($X^2_{(4)} = 1.287$, $p > .05$), communication ($X^2_{(4)} = 1.697$, $p > .05$), decision making ($X^2_{(4)} = .597$, $p > .05$), infrastructural development and maintenance ($X^2_{(4)} = .417$, $p > .05$), provision of a conducive learning environment at home ($X^2_{(4)} = 1.798$, $p > .05$), and provision of adequate learning resources at home ($X^2_{(4)} = 1.049$, $p > .05$) among parents with 1—2, 3—4, and 5 and above children. There was a statistically significant effect of PE in provision of basic needs ($t =$

5.242, $p < .05$), communication ($t = 6.116$, $p < .05$), decision making ($t = 5.834$, $p < .05$), infrastructural development and maintenance at school ($t = 5.525$, $p < .05$), provision of conducive learning environment ($t = 6.819$, $p < .05$) and adequate learning resources ($t = 6.167$, $p < .05$) on SAP. However, the combined effects of PE aspects did not significantly predict SAP. The challenges of PE in learners' academic activities schools generated three themes: Home Environment-Related Challenges (HERC), School Environment-Related Challenges (SERC), and Government-Related Challenges (GRC). Each of these generated several subthemes. Social and economic tactics, leadership and management strategies, and legislation and regulation were grouped as the overcoming the obstacles strategies. These data suggest that PE in their children's education has a positive effect on their academic success. However, PE faces a number of obstacles that demand the ardent attention of stakeholders in order to promote the successful PE in their children's academic issues. Therefore, it is recommended that the government and other key stakeholders develop and execute policies that might increase PE in the academics of students.

2.5.3 Entry Scores, Study Habits and Academic Performance of Students in Primary Teachers' Colleges in South Western Uganda

James Nuwagaba, Adrain Mwesigye

The study set out to investigate the influence of entry scores and study habits on academic performance of students in Primary Teachers' Colleges in South Western Uganda. A cohort longitudinal survey research design was employed using mixed-methods of data collection. Close ended questionnaires with some open-ended items, interview guides, focus group discussion guides and documentary analysis guides were used to collect the data. Results showed that most students' academic performance was average at both entry and exit, some improved performance in Mathematics and others declined in performance in English Language. Results also showed that students had demonstrated good study habits in most study habits dimensions and bad study habits in a few study habits dimensions. Results further showed that students exhibited an exit performance that was independent of their entry scores and study habits. Results finally indicated that there were many inter related determinants of academic performance in PTCs but all standing on the college administrator. Based on the findings, it was concluded that students are academically average at entry and exit, they possess good study habits in some areas and bad ones in others, there is no significant influence of entry scores and study habits on academic performance and there are several factors that determine academic performance, administration style being the major factor among several factors which determine the trend of academics in Primary Teachers' colleges. It was recommended that the government should adjust the policy concerning entry into Primary Teachers' Training Institutions (PTTIs) to consider other factors like interest, attitude etc. rather than entry scores alone, college heads in collaboration with government and other partners should allocate more resources to Primary Teachers' Training Institutions and Principals should be helped to adopt leadership styles that enable other factors which determine academic performance to thrive.

2.5.4 On planet formation by multi-species pebble accretion

Geoffrey Andama, Jurua Edward, Ndugu Nelson, Anguma Simon Katrini

The diversity of the observed extrasolar planetary bodies is an evidence that the formation of these systems followed different pathways. The formation of planetary systems takes place in protoplanetary discs which have been observed to exhibit diverse and ubiquitous substructures, subsequently providing a suitable avenue for planet formation. In the general classical picture of pebble-based core growth, planetary cores grow by accretion of single pebble species. The growing planet may reach the so-called pebble isolation mass, at which it induces a pressure bump that blocks inward drifting pebbles exterior to its orbit, thereby stalling core growth by pebble accretion. Furthermore, thermal ablation of pebbles may limit the mass of the solid core to values below pebble isolation mass, placing more stringent constraints on gas giant formation. Presently, pebble-based planet formation models mostly focus on single pebble species model without taking into account grain size distribution and the effect of turbulence diffusion of pebbles across pressure bumps in the disc, thus limiting our understanding of the diversity of the observed exoplanets. In this study, global 1D viscous disc numerical simulations were performed featuring both smooth and perturbed discs mimicking disc rings, where pebble-based planet formation was studied based on grain size distribution, taking into account grain growth, fragmentation and drift limits. The results showed that core growth rates and final core masses were sensitive to three key parameters: threshold velocity at which pebbles fragment on collision; turbulent viscosity; and distribution of pebble species, which yielded a diversity of planetary cores. With accretion of multiple pebble species, planetary cores were able to grow pretty fast, reaching over 30 – 40 M_E in mass. The results suggest that accretion of multi-species pebbles could explain: the estimated 25 – 45 M_E heavy element abundance inside Jupiter's core; massive cores of extrasolar planets; disc rings and gaps at wider orbits; early and rapid formation of planetary bodies. Numerical simulations with global pressure bumps resulted in confinement of dust material for several million years, depending on the strength of perturbations that produce the pressure bumps within the disc. A variety of cores formed in bumpy discs, with massive cores at locations where core growth was not feasible in a smooth disc, and small cores at locations where massive cores could form in a smooth disc. The simulations have demonstrated that pressure bumps generated by a planet and/or other physical phenomena can completely thwart planet formation from the inside parts of the disc. While inner disc parts are most favourable for pebble accretion in a smooth disc, multiple wave-like pressure bumps can promote rapid planet formation by pebble accretion in broad areas of the disc. By simulating core growth via pebble accretion, the timing of the onset of pebble ablation and the corresponding pebble ablation masses were probed. The results showed that pebble ablation starts at core mass in the range 0.3 – 0.5 M_E , and this takes place as early as 0.1 Myrs or as late as 1 Myrs of disc and core evolution, depending on the disc turbulence strength and grain fragmentation velocities. In addition, pebble ablation took place within 15 au and within 20 au for high and low grain fragmentation velocities, respectively. Overall, pebble ablation is prevalent in any disc environment and its timing is critical for the diversity of planetary bodies from pebble ablation perspective.

2.5.5 Deep-space radiation effects on fluorine-doped SnO₂ thin films for spacecraft passive thermal control coating application

Oryema Bosco, Edward Jurua, Malik Maaza, Itani G. Madiba

This thesis investigated the effects of γ -rays and proton irradiations on the microstructural, morphological, and optical properties of fluorine-doped tin oxide (FTO) thin films for application as a passive thermal control coating in future miniaturized lightweight spacecraft. It also analyzed the variations in electrical properties of the proton irradiated FTO thin films. The FTO thin films investigated were commercial-grade types deposited on glass substrates. Gamma irradiation was carried out at room temperature and atmospheric pressure by exposing the films to different integrated absorbed doses of γ -rays from a ⁶⁰Co gamma source. Meanwhile, proton irradiation was performed with different fluences of 7 MeV protons using the 5 MV linear electrostatic Pelletron accelerator. The thesis also analyzed the discrepancy between the numbers of atomic displacements from the direct computation using "VACANCY.TXT" output files and the damage energy-based calculations using the Stopping and Range of Ions in Matter (SRIM) code version 2013 operated in the Full Cascade (FC) mode. The ions considered for the SRIM simulation were He, C and O ions.

The irradiation-induced variations in microstructural properties of the films were characterized using a Bruker AXS D8 Advance x-ray diffraction (XRD) technique. Surface morphology was analyzed using the atomic force microscopy (AFM) technique. Meanwhile, variations in optical transmittance of the films were investigated using a Cary 5000 ultraviolet-visible-near infrared (UV-vis-NIR) spectrophotometer. The XRD results revealed some slight enhancements in percentage crystallinity of the films after irradiation, slight peak shifts, and significant variations in the values of crystallite sizes, full-width at half maxima (FWHM), lattice strains, lattice spacings, and dislocation densities with increasing doses. AFM measurements revealed changes in the average grain sizes of irradiated films, and a decrease for γ -irradiated films and an increase for proton irradiated films in average surface roughness with increasing doses. The optical transmittance and bandgap values were seen to decrease with increasing fluence for the proton-irradiated films. No significant changes in optical transmittance and bandgaps of the γ -irradiated films.

The SRIM simulations showed that the direct computation using "VACANCY.TXT" output files predicted more vacancies compared to calculation based on damage energy approach. It also revealed that the ions lost most of their energies in collision with atomic electrons due to ionization and excitation, and very little to nuclear events that produce atomic displacements or vacancy defects. The simulations also revealed that nuclear stopping powers increase at low ion energies. In most cases, the electronic stopping powers are several times greater than the nuclear stopping powers. Comparison of SRIM and irradiation calculated vacancies and incident ion distribution profiles generally showed perfect agreements between the two codes.

2.5.6 Cellulose-Bimetal Nanocomposite Adsorbent for Defluoridation of Groundwater from Sukulu Hills, Uganda

Moses Egor, Emmanuel Ntambi, Samson Rwahwire, Thalappil Pradeep

Adsorption is an efficient, cost-effective, and sustainable method of producing clean water, particularly in resource-constrained settings. The goal of this study was to assess fluoride concentration, determine its optimal concentration in groundwater from Sukulu Hills, a phosphate mining area in Eastern Uganda. The study also aimed at developing a cellulose-based composite adsorbent to remove fluoride from potable water. Water samples from boreholes and spring wells were collected and tested for fluoride using the ion selective electrode method. The synergistic effect of various renewable materials and active sites of metal oxyhydroxides was used to create an adsorbent that is physically stable under use conditions. Nanoscale oxyhydroxides of aluminium and iron were scaffolded into a matrix of carboxymethyl cellulose to form a nanocomposite adsorbent, which was prepared in water at room temperature, resulting in a water-stable porous solid. This material was used in batch and cartridge adsorption experiments to remove excess fluoride from water. Various analytical techniques, including scanning electron microscopy and x-ray diffractometry, were used to characterise the adsorbent surface before and after fluoride uptake. The pH of the field water samples ranged between 6.0 and 7.2, the electrical conductivity was 148–750 μ S/cm, and the total dissolved solids was 75–378 mg/L, all of which were within the World Health Organization normal range for drinking water. Fluoride concentrations in borehole water ranged from 0.4 to 3 mg/L, while in springs it ranged from 0.2 to 2.4 mg/L. 14% of the samples exceeded the World Health Organization guideline value of 1.5 mg/L fluoride. With Tororo's five-year average annual maximum temperature of 31°C, a modified Galagan's equation gave the recommended fluoride level in drinking water for the area as 0.4 mg/L, which all samples exceeded. The adsorbent was amorphous in structure, with a surface area of 134.3 m²/g and aluminium and iron were distributed uniformly in the cellulose matrix. The batch adsorption experiments revealed that 80% of fluoride was removed within 3 minutes of contact, and the maximum Langmuir uptake capacity was 75.2 mg/g, which was higher than most reported materials. Fluoride levels in fluoride-spiked laboratory tap water were effectively reduced from 10.4 to 0.3 mg/L by the adsorbent. Optimal fluoride removal was achieved at pH 4–9; however, the adsorbent's effectiveness was reduced in the presence of competing ions in the following order: PO₄³⁻ > SiO₃²⁻ > CO₃²⁻ > HCO₃⁻ > SO₄²⁻. A regeneration test revealed that the adsorbent could be reused up to four times, hence lowering the cost of treated water. A cartridge experiment demonstrated the adsorbent's applicability in a domestic point-of-use water purifier. At the scale of community implementation projects, defluoridation with the material was shown to be sustainable and affordable, with a cost of USD 3.3 per 1,000 L of treated water. The findings of this study show that, by relying on groundwater for domestic use, the people living around the Sukulu Hills face a considerable risk of suffering from fluorosis. The adsorbent presented in this study provides a promising sustainable method of defluoridation that can be scaled up to a community level setup.

Keywords: fluoride, cellulose, adsorption, defluoridation

2.5.7 Pesticides in Vegetable Growing – A Case Study of Pesticide Use and Their Residues in Vegetables in Kabale District, Uganda

Hannington Ngabirano, Grace Birungi

There has been limited information on pesticides and their residues in vegetables regardless of their widespread application in vegetable growing. This study investigated pesticides in vegetable growing, quality of market vegetables and their suitability for human consumption in Kabale District South-western Uganda. Interviews were used to collect information on vegetables grown, pesticides used, and pesticide use practices. Pesticide residues in vegetables were determined using LC–MS/MS, GC-MS/MS and UV-Vis. Persistence of the pesticide residues was determined in terms of half-life. From the questionnaire data, Brassica oleracea; var. capitata (cabbage), Brassica oleracea; var. botrytis (cauliflower), Solanumlycopersicum, (tomato) and Beta vulgaris (beet root) were the most sprayed vegetables. The most sold pesticides for vegetable application included cypermethrin, dimethoate, dichlorvos, metalaxyl, profenofos, malathion and mancozeb. About pesticide use practices, only 18 % of the farmers were able to correctly interpret instructions on pesticide container or bag labels. And some farmers (42 %) sprayed mixed pesticides in the vegetables. None of the farmers had attended any training on pesticide use. The pesticide residues (ppm) detected in the sprayed vegetables varied between 0.00403 to 0.05350 for cypermethrin, 0.17478 to 62.60874 for dimethoate, 0.12890 to 3.55681 for metalaxyl, 0.00107 to 0.59722 for profenofos, 0.03144 to 0.63328 for malathion, 0.00240 to 0.34102 for dichlorvos and 0.00001 to 0.00244 for mancozeb. The residues exceeded MRLs in 59.52 % of the sprayed vegetable samples, 18 % of the unsprayed samples and 8 % of the market samples. The quality indices for the pesticide residues in the market vegetables were optimal in 14.29 %, good in 75 %, adequate in 3.57 % and inadequate in 14.29 % of the samples analysed. Pesticide persistence in the vegetables ranged between 3.14 – 5.4 days. Limited farmers' training could have been responsible for the presence of high pesticide residues in the vegetables after harvest. Vegetables containing pesticide residues above MRLs are of poor quality and unsuitable for consumption due to associated harmful effects. Thus, efforts aimed at improving pesticide use such as enforcing pesticide use policy, establishment of farm field schools for training farmers on pesticide use and pesticide residue monitoring in food production systems in Uganda would contribute to reduction of pesticide exposure.

Keywords: Pesticides, Vegetables, Pesticides residues, Vegetable quality index, Persistence

2.5.8 Mesoporous Sorbents from Biowaste for Sustainable Fluoride Removal from Water

Walter Ojok, Emmanuel Ntambi, Wasswa John, William Wanasolo, Brenda Moodley, James Bolender

The problem of fluoride contamination and remediation challenges limits attaining good health and human well-being globally. In this study, the hydrochemistry of crater lakes (n =

15) in the Ndali-Kasenda cluster was deciphered using standard methods with WHO regulatory limit exceedance by F⁻, pH, Fe²⁺, Mn²⁺, and TDS. The hydrogeochemical signature of the lakes is mainly of Ca-HCO₃ and MgHCO₃ type due to rock-water interaction in the area's geology. Principal component analysis identified the primary processes that control the crater lake hydrogeochemistry as weathering of rocks reactions, ion exchange, and evaporation processes. Hazard quotient (HQ) for non-carcinogenic health risks associated with exposure to Ndali- Kasenda fluoride levels via ingestion revealed that infants and children are susceptible to health risks due to ingestion of Ndali-Kasenda water. Hence there is urgent need to take ameliorative action in this area to protect the inhabitants from exposure to excess fluoride in drinking water. This study aimed at developing and evaluating the effectiveness of mesoporous sorbents from biowastes for fluoride remediation from contaminated water. A series of mesoporous sorbents were synthesized from cassava and cattle horn core biowastes by benign chemical methods, characterized, and applied as potential sorbents for fluoride. First, hematite (α -Fe₂O₃) and gamma alumina (γ -Al₂O₃) nanocomposites were synthesized using cassava starch as a soft template. Furthermore, a simple chemical method was employed to synthesize multi-walled carbon nanotubes decorated with hydroxyapatite from cattle horn core (MWCNT-CH). The as-synthesized nanocomposites were characterized using the Micro metrics Tristar II surface area and porosity analyzer, fourier transformed infrared spectroscopy (FTIR), scanning electron microscopy (SEM), transmission electron microscopy (TEM), powder X-ray diffraction (XRD), Malvern zeta sizer and energy dispersive spectroscopy (EDS). The Brunauer-Emmett-Teller (BET) surface area analysis indicated that the nanocomposites are mesoporous, with the highest surface area of 214.563 m²/g portrayed by γ -Al₂O₃ nanocomposite. Spectroscopic and microscopic analysis confirmed the formation of crystalline MWCNT-CH, α -Fe₂O₃, and γ -Al₂O₃ nanocomposites containing new functionalities with stable structures.

For their application, the solid-liquid sorption process for removal of fluoride from aqueous media using the as-synthesized MWCNT-CH, α -Fe₂O₃ and γ -Al₂O₃ nanocomposites was evaluated in batch mode. Central composite design (CCD) in response surface methodology (RSM) was used to optimize fluoride sorption to study the effect of initial fluoride concentration, contact time, pH, and sorbent dose. It was established that fluoride sorption was favored by weakly acidic media (pH 5 – 7.0), thereby signaling the importance of the ionic and π -anionic electrostatic interactions. Furthermore, an optimization study indicated that fluoride removal increased with an increase in contact time up to 137.5 minutes for γ -Al₂O₃ and 95 minutes for MWCNT-CH and α -Fe₂O₃ respectively, beyond which further increase in time had an insignificant effect on the process due to over-saturation of the active sites on the biosorbent surfaces with fluoride ions. Based on the RSM optimization, an optimum fluoride removal efficiency of 85.26 %, 93.6 %, and 80.21 % was achieved using the as-synthesized α -Fe₂O₃, γ -Al₂O₃, and MWCNT-CH nanocomposites, respectively at an initial fluoride concentration of 10 - 55 mg/L, sorbent dose of 0.55 g, pH of 5.25 -7.5 and contact time of 95 - 137.5 minutes. Sorption equilibrium data were well modeled by the Freundlich isotherm ($R_2=0.9916$) for α -Fe₂O₃, indicating multilayer sorption on a heterogeneous surface of the sorbent with a varied affinity for fluoride, while Langmuir

isotherm modeled sorption of fluoride onto MWCNT-CH ($R_2=0.95913$) and $\gamma\text{-Al}_2\text{O}_3$ ($R_2=0.97827$) better than other models. The heterogeneity of the sorbent surfaces was attributed to the diverse nature of the composites, which entails highly charged cations Fe^{3+} , Al^{3+} , and the graphitic functional carbon groups in the as-synthesized sorbents. Pseudo-first order fitted the experimental data well for the initial period of the first steps, but pseudo-second order provided the best correlation for all the sorption systems in this study over a long period for all three sorbents indicating chemisorption. The sorption mechanism of fluoride onto the nanocomposites was deciphered using FTIR spectroscopy, confirmed the ion exchange involving the -OH functionality and anionic π -electrostatic interaction with the sorbent surfaces. The sorption thermodynamics study showed that the process was spontaneous, exothermic, and entropy-driven physisorption.

Keywords: Fluoride sorption, cassava starch, response surface methodology, alumina, multiwalled carbon nanotube, hematite

2.5.9 Analysis of the Payne-Whitham Traffic Flow Model using the Finite and Boundary Element Methods

Ronald Mwesigwa, David Angwenyi, Evarist Nabaasa, Johnes Obungoloch

The aim of the study was to apply the finite and boundary element methods, for determining the solution to the traffic flow equation where one of the objectives was to compare the two solutions. In its original form, the Payne-Whitham model is a coupled system of two partial differential equations, that has been reduced to one equation, and later solved using two numerical techniques, the finite element and boundary element methods. The finite element method is based on the Galerkin approach while the boundary element method is based on the dual reciprocity and time-discretization approaches.

For each method, a number of test problems that mimic the flow of vehicles along the road, have been solved and the results presented in figures and tables. Computer programs written in MATLAB were used to generate the results and illustrating them. The results show what happens to the numerical solution when the step size is increased or reduced, in space and time. The errors have been computed in all cases, where the time steps were fixed, and a reduction in step length made. On the other hand, errors were measured for some combinations of step sizes, in space and time. The stability of both methods was tested in general sense, and also illustrated on two of the test problems. Additionally, the two-dimensional case was introduced as a basis for further study, and one test problem solved using each of the methods.

In conclusion, the choice of the grid size affected the size of the errors, where smaller grid sizes produced smaller errors for both methods. The results indicated that BEM produced errors bigger than those of FEM, though these were comparable. Both methods were consistent and met the stability conditions, basing on the results obtained. The two methods were able to converge, though FEM provided a higher rate of convergence.

3.0 MASTERS PROGRAMS

3.1 FACULTY OF MEDICINE

3.1.1 MASTER OF MEDICINE IN ANESTHESIA

3.1.1.1 Prevalence, factors associated, and adverse maternal outcomes of spinal induced hypotension among mothers undergoing caesarean section at Mbarara Regional Referral Hospital

Sserunkuuma Bruno, George Kateregga, Joseph Kyobe Kiwanuka, Stephen Ttendo

Background: Hypotension after spinal anesthesia for caesarean section remains common and is a serious complication which may lead to serious outcomes like cardiac arrest, morbidity and mortality.

Objectives: The study aimed to determine the prevalence, factors associated, and adverse maternal outcomes of spinal-induced hypotension following caesarean section at Mbarara Regional Referral Hospital.

Methods: A hospital based cross-sectional study at Mbarara Regional Referral Hospital for the period of August 2022 to October 2022 was conducted on 394 mothers who underwent spinal anaesthesia during caesarean section. Systematic random sampling was used where we enrolled each second woman who had been delivered by caesarean section under spinal anaesthesia. Participant socio-demographic, baseline clinical, obstetric characteristics, intraoperative data and anaesthetic characteristics were obtained from the participant's medical record. The prevalence of spinal-induced hypotension was the proportion of women with spinal-induced hypotension. Logistic regression analysis was used to determine the factors associated with spinal-induced hypotension. The adverse maternal outcomes of spinal-induced hypotension were reported as proportions and frequencies.

Results: Participants had a mean age of 26.71 ± 5.7 years and most women were multigravid (II-IV). The prevalence of spinal-induced hypotension was 67.5% (95% CI 62.7-71.9). At multivariable logistic regression, having a spinal block height proximal to T6 [aOR 1.92 95% C.I (1.09-3.39), $p=0.024$], being given intrathecal bupivacaine dose above 10mg [aOR 1.74 95% C.I (1.04-2.89), $p=0.034$], emergency caesarean section [aOR 2.32 95% C.I (1.20-4.46), $p=0.012$], and not receiving a prophylactic vasopressor [aOR 1.66 95% C.I (1.02-2.68), $p=0.039$] were independently associated with Spinal-induced hypotension. Seven of our participants got high spinal.

Conclusion: The prevalence of spinal-induced hypotension among mothers undergoing caesarean section at MRRH is high. We recommend routine administration of prophylactic vasopressor during all caesarean sections and clinicians to recognize these factors associated with spinal induced hypotension.

3.1.1.2 Oral morphine versus rectal ketamine in pain management during burn wound dressing in the paediatric population at Mbarara Regional Referral Hospital: An open label randomized clinical trial

Alice Gertrude Atai, Andrew Kwikiriza, George Kateregga

Background: Pain management among children with burns is associated with pain and distress if anaesthesia is not optimised. Inadequately treated pain can lead to longer hospital

stays, higher costs, and lower patient satisfaction. Morphine has been widely used for the management of pain in children; however, the use of opioids for pain control should be avoided if possible due to acute opioid tolerance, hyperalgesia and adverse effects. Rectal Ketamine may be safely administered to patients for procedural sedation and analgesia. Therefore, the purpose of this study was to compare the efficacy of oral Morphine and rectal Ketamine in pain management during burn wound dressing in the pediatric population.

Method: This was a randomized open-label clinical trial care protocol in procedural burn and wound dressing in the pediatrics population at MRRH. Study participants were randomly assigned to one of the treatment groups, either oral Morphine or rectal Ketamine with the ratio of 1:1. Overall, we enrolled 44 participants with 22 in each treatment arm. Assessment of baseline vital signs, including pulse rate, blood pressure, respiratory rate, temperature, oxygen saturation (SPO₂), pain assessment (FLACC) and sedation scores (RASS) among others. Patients were then followed up every hour for 8 hours for outcomes of interest.

Results: The mean age of the study participants was 2.56 (± 1.59) years. The overall mean intra-procedural pain difference score for children who received oral Morphine was 2.7 ($SD \pm 2.2$) compared to 0 ($SD \pm 0$) among those who received rectal Ketamine and the mean difference of 2.7 was statistically significant ($p < 0.0001$). Hyper-salivation was the only significantly different adverse event (effects) among children, with more occurrence in the rectal Ketamine treatment arm ($n = 8, 36.3\%$) compared to 1 (5%) in the oral Morphine treatment arm, $p = 0.009$. There were no other significant adverse effects noted in either treatment arm.

Conclusion: Administration of rectal Ketamine is better at pain management and patient's safety compared to oral Morphine with minimal transient side effects. Rectal Ketamine is associated with an increased incidence of hyper-salivation compared to Oral Morphine. We therefore recommend use of rectal Ketamine as an alternative to oral Morphine for analgesic purposes during routine dressing of burns in children at Mbarara Regional Referral Hospital.

3.1.3 MASTER OF MEDICINE IN DERMATOLOGY

3.1.3.1 Clinico-Bacteriological Characteristics of Childhood Impetigo & Nasal Carrier State of Primary Caretakers Presenting at Skin Clinic, Mbarara Regional Referral Hospital, Uganda

Daniel Estomih Kimaro, Mulyowa K Grace, Stephen Mirembe

Background: Impetigo is a contagious, skin infection that affects approximately 162 million children worldwide. It is primarily caused by *staphylococcus aureus* and *Streptococcus pyogenes*.

Objectives: The study aim was to determine clinical presentation, bacteriological cause of childhood impetigo and nasal carrier state of primary caretakers presenting at the skin clinic in MRRH.

Methods: A descriptive hospital based-cross-sectional study conducted from May 2022 to July 2022. Children with impetigo were consecutively enrolled with their corresponding caretakers. A clinical diagnosis and presentation of impetigo was made through physical examinations. Skin swabs from children with impetigo were taken for culture and antibiotics

Susceptibility patterns by interpreting zone diameters using Kirby Bauer disc diffusion techniques according to Clinical and Laboratory Standards Institute (CLSI) guidelines. Nasal swabs from caretakers were obtained for culture to determine the carrier state.

Results: A total of 182 participants were enrolled. The mean age of children with impetigo was 5.9 ± 4.37 years. Majority of impetigo cases occurred in the age group 1-6 years with female to male ratio of 1.4:1. Nonbullous form of impetigo was the predominant type 73.6% (134/182). The majority of impetigo lesions were located mainly on extremities 55.2% (74/182), face 13.4% (18/182), buttocks and neck at 11.2% (15/182). The highest number 46.7% (85/182) of children with impetigo presented within a week of symptoms. *S. aureus* 71.4% (130) and *S. pyogenes* 10.4% (19/182) were commonest causative organisms for impetigo. *S. aureus* was antibiotic sensitive in vitro to ceftriaxone 78.5% (102/130), oxacillin 75.4% (98/130) and clindamycin 71.5% (93/130) and resistance noted to penicillin 90.8% (118/130), chloramphenicol 86.2% (112/130) and tetracycline 83.1% (108/130). Positive culture for nasal carriers of Primary caretakers were higher about 79.7% (145/182) with *S. aureus* found to be predominant. 79.1% (110/129) caretakers in whom *S. aureus* was isolated had the same organisms isolated in their children 84.6% (110/130).

Conclusion: Nonbullous impetigo was the commonest form of impetigo in children. *S. aureus* was the major causative organism for impetigo in our setting. Most of the children with impetigo, their caretakers were carriers and majority harbor *staphylococcus aureus* isolates. We recommend a case-control study to establish such association.

3.1.3.2 Prevalence of Chronic Urticaria, Skin Prick Test Reactivity, and Effect on Quality of Life among patients attending Skin Clinic at Mbarara Regional Referral Hospital

Mastura Abubakar, Mulyowa K Grace, Stephen Mirembe, Gladys Aloyo

Background: Chronic urticaria (CU) is a skin condition that is characterized by the presence of wheals and angioedema or both for more than six weeks.

Our aim in this study was to look for the prevalence of CU, skin prick reactivity and effect on QOL in CU patients.

Methods: We used a cross-sectional study design with 143 participants with a ratio of 1:3(1 CU: 3 comparative cases), of whom 36 had CU and 107 were the comparative group with other skin conditions to assess skin prick reactivity and the effect of CU on QOL. Hospital records from the previous 24 months enabled us in establishing the prevalence of this condition.

To assess the quality of life in both CU patients and controls, the DLQI and CU-QOL tools were used. The two groups' quality of life was compared first, and then those with CU alone were assessed using a disease-specific questionnaire. The skin prick test was performed only on patients with CU, and the prevalence of the skin prick test reactivity was calculated by dividing the proportion of patients who reacted to at least one allergen in the skin prick test by the total number of patients with CU.

Results: The prevalence of CU was 2.22%, with a CI of (1.9-2.6), and skin prick reactivity was 73.6% overall. The skin prick test was more sensitive to house dust mites and animal dander at 32.4% than to food allergens which were 11% to 26%. Chronic urticaria had a significant impact on QOL, with 77.8% of patients having poor QOL, the majority of whom

were female. Long disease duration (more than 2 years) had a significant impact on QOL in both cases and controls. Itching, sleep disturbances, and appearance had the greatest impact on QOL, while swelling had the least impact. Limits and looks had a larger effect on QOL in females than in males in this study.

Conclusion: The burden of CU is substantial with many patients having poor QOL, with sleep, itching, and appearance significantly affected. Most patients with CU had positive allergies to house dust mites and animal dander in contrast to the commonly expected food allergies.

Keywords: *chronic urticaria, skin prick test, quality of life.*

3.1.3.3 Prevalence, Clinical Manifestations of Pregnancy Dermatoses, and their effect on Quality Of Life among Women attending Mbarara Regional Referral Hospital

Rukiya Abdillahi Ali, Myowa, Mirembe, Mugenyu Gi

Introduction: To accommodate and support the fetus throughout the pregnancy, pregnant women experience major immunologic, metabolic, endocrine, and vascular changes. Due to these modifications, they are more likely to develop a variety of physiological and pathological skin disorders. Pregnancy dermatoses may have a negative effect on both physical and psychological functioning as well as overall quality of life.

Objective: To determine the prevalence, describe clinical manifestations of pregnancy dermatoses and assess the quality of life of affected women attending the ANC clinic at MRRH.

Methods: A cross-sectional descriptive study conducted at the ANC clinic at Mbarara Regional Referral Hospital Southwestern Uganda, from February 2022 to May 2022. Ethical clearance was sought from the Research Ethics Committee. Four hundred and twenty-seven pregnant women were systematically sampled irrespective of gestational age and gravidity. A thorough skin examination and detailed history were conducted. Quality of Life was evaluated using the Dermatology Life Quality Index. When necessary, tests like mycology and skin biopsies were performed.

Results: The overall prevalence of pregnancy dermatoses at Mbarara Regional Referral Hospital was 92.7% (95% CI: 87.7 -93.3). Dermatoses were grouped into physiological skin changes 392 (91.8%), dermatoses altered by pregnancy 95 (22.2%), and specific dermatoses of pregnancy 12 (2.8%). The most predominant physiological skin changes were pigmentary seen in 389 (91.1%) followed by glandular changes seen in 135 (31.6%). Atopic eruption of pregnancy was the most predominant pregnancy-specific dermatoses seen in 11(2.6%). The most frequent dermatoses altered by pregnancy were acne observed in 48 (11.2%) of the cases. Pregnancy-specific dermatoses significantly reduced QOL with a mean DLQI score of 12.8 compared to those without (p value<0.001)

Conclusion: The prevalence of pregnancy dermatoses at MRRH was high. Physiological skin changes were more common than pregnancy-specific dermatoses. Pregnancy-specific dermatoses had a huge effect on the Quality-of-life

Keywords: Pregnancy dermatoses, prevalence, quality of life, Sub-Sahara Africa

3.1.4 MASTER OF MEDICINE IN EAR, NOSE AND THROAT

3.1.4.1 Patterns and factors associated with Hearing Loss among adult patients with Type 2 Diabetes Mellitus at Mbarara Regional Referral Hospital

Gure Ali Khalif, Nakku Doreen, Amina Seguya

Background: Type 2 Diabetes Mellitus (T2DM) is associated with various complications in ENT practice and the pathophysiology is linked to vascular and neuropathic disorders. Otolaryngology manifestations may include hearing loss and vestibular disorders and if unaddressed they negatively affect the overall QOL and productivity. It is therefore imperative to establish the patterns of HL and associated factors among T2DM patients so that early intervention is effected.

Objective: To determine the proportion, patterns of hearing loss and its associated factors among adult patients with type 2 diabetes attending Mbarara Regional Referral Hospital, Southwestern Uganda.

Methods: Using consecutive sampling, we undertook a cross-sectional study at Mbarara Regional Referral Hospital among 260 adult patients with T2DM. A semi-structured questionnaire was utilized to gather data on demographics and medical factors. Otoscopy and pure tone audiometry were subsequently done. Data were analyzed using STATA v15.0 and results reported using frequencies and means for continuous data and regression analysis for categorical data. HL was reported as per WHO recommendation.

Results: Majority of the participants were female (69.6%) with a mean age of 54.7 years (SD: 12.5). 53.1% of participants had T2DM <5 years, 55.8% had concurrent hypertension and 74% were in poor glycemic control at study time. Almost all had normal otoscopic findings. The overall proportion of HL was 29.2% (76 of 260). Bilateral SNHL was the most common type of HL at 86.1% (31 of 76) with a combined mild to moderate degree of loss in more than 87% of the cases. Increasing age and lack of formal education were significantly associated with a higher risk of HL ($p= 0.003$ and 0.03 respectively) while factors like comorbidities, duration of DM diagnosis and glycemic control were not. On multivariate analysis, age >60 years and a lack of formal education showed the highest risk for HL.

Conclusion: The overall proportion of HL among T2DM patients at MRRH is low and majority of mild to moderate SNHL type. The risk of HL is generally increased by advancing age and a lack of formal education.

Keywords: Patterns of hearing loss, Type 2 diabetes mellitus

3.1.4.2 Quality of Life and factors associated with Sleep Disordered Breathing among Children with Adenotonsillar Hypertrophy at Mbarara Regional Referral Hospital

Faisal Farah, Nabukenya Jamilah, Doreen Nakku

Background : Children frequently experience pediatric sleep disordered breathing, a syndrome characterized by frequent loud snoring, gasping, and writhing while they are

asleep. It's a terrible issue that has an adverse effect on both the parent and child's quality of life.

The prevalence of pediatric sleep disordered breathing is estimated to range from 5.1 to 13.3% worldwide in both developing and developed countries. Adenotonsillar hypertrophy (ATH), a frequent disease in children, is the cause of about 80% of sleep disordered breathing cases in pediatric ENT patients.

Objectives : To determine the prevalence of sleep disordered breathing, its associated factors and quality of life among children presenting with adenotonsillar hypertrophy at Mbarara Regional Referral Hospital (MRRH).

Methods: In this prospective cross-sectional study, a total of 173 children aged 1 to 12 years with clinically diagnosed tonsillar or radiographically confirmed adenoid hypertrophy were recruited in the ENT clinic at MRRH between November 2021 and May 2022. Then Pediatric sleep (PSQ) and Obstructive sleep apnea (OSA-18) questionnaires were given to the total of 173 children to diagnose SDB and evaluate their quality of life.

Results: At Mbarara Regional Referral Hospital, the prevalence of sleep disordered breathing in children was 16.8%, and there was a significant correlation between the risk of SDB and inferior turbinate enlargement (odds ratio: 4.16 (95% CI 1.21 - 14.31; P value = 0.023). Additionally, children who are exposed to cigarette smoke at home are more likely to develop SDB (odds ratio: 3.21; 95% confidence interval: 0.99 to 10.37). Children with SDB have a lower quality of life than those without, with physical symptoms being the most severely affected area.

Conclusion: Sleep disordered breathing affected 1 in 6 children with clinically identified and radiologically verified adenoid or adenotonsillar hypertrophy at MRRH. The likelihood of developing SDB in youngsters is significantly increased by inferior turbinate hypertrophy and exposure to tobacco smoke. Poor QOL is linked to sleep disordered breathing in children who are affected.

Keywords: Sleep disordered breathing, adenotonsillar hypertrophy, quality of life.

3.1.4.3 Incidence, factors associated with Gestational Rhinitis and its effects on Quality of Life among Mothers attending Mbarara Regional Referral Hospital

Gitau Alice Wangari, Victoria Nyaiteera, Ngonzi Joseph

Introduction: Globally, Gestational Rhinitis (GR) is reported in as many as 30% of pregnant women, with regional variations in prevalence and incidence. In sub-Saharan Africa, it has been documented in 6.3% of pregnant women in Nigeria.

Because gestational rhinitis is diagnosed post-partum yet it has effects on the pregnancy and quality of life of mothers, it is imperative that its incidence, associated factors and its effect on quality of life be determined in our setting to guide screening antenatally and interventions.

Objective: To determine the incidence of GR and its associated factors and to establish its effect on the quality of life among pregnant women attending MRRH.

Methods: A prospective cohort study was conducted at the Mbarara Regional Referral Hospital from July 2021 to July 2022. Data was collected from 220 mothers in their second

and third trimester of pregnancy who had no prior history of allergies, the STOP BANG questionnaire was used to assess for risk of OSA and SNOT 22 HRQOL tool was used to assess QOL. The mothers were followed up throughout the pregnancy up to 2weeks after delivery for the diagnosis of GR to be reached or ruled out. During follow-up, we recorded the baby's weight, gender, mode of delivery, foetal outcome, and assessed for resolution or persistence of GR symptoms at 2weeks postpartum.

Results: The incidence of gestational rhinitis at Mbarara Regional Referral Hospital was found at 34.1% (95% CI 28.0 – 40.9). The risk of having GR was higher in mothers who had a positive family history of allergies, mothers in second and third trimesters, mothers who delivered a female child and those with a positive history of hormonal contraceptive use. The quality of life among mothers with GR was markedly affected compared to mothers without GR with an overall p-value of <0.001. This difference was marked in the nasal symptoms' domain with a p-value of <0.001 and least in psychological function p-value 0.0065.

Conclusion: GR has a high incidence among mothers presenting in the antenatal clinic and antenatal ward at MRRH and its incidence is highly likely in mothers with a positive family history of allergies, history of hormonal contraceptive use, baby girl gender as well as gestation ages between 16 – 28 weeks and 38 – 40weeks, with an accompanying poor QoL in the affected mothers.

Keywords: Gestational rhinitis, Incidence, quality of life.

3.1.5 MASTER OF MEDICINE IN EMERGENCY MEDICINE

3.1.5.1 Factors associated with prolonged patient stay in Emergency Department of Mbarara Regional Referral Hospital

Abdirahman Hersi Hassan, Kenneth Bagonza, Randall Ellis

Background: Prolonged Length of Stay (PLOS) in the ED is a global challenge that predisposes patients to increased risk of morbidity, mortality, reduced satisfaction, the socio-economic burden on the patients, and increased constraints on health facility resources. PLOS can cause overcrowding and ED overcrowding is an international worry and signifies a global crisis that can influence the quality of service. The objective of this study was to determine the prevalence and factors associated with Prolonged Length Of Stay in the Emergency Department.

Methodology: An institution-based cross-sectional study was conducted from August 15 to September 20/ 2022. 422 research participants were randomly enrolled during study period. The information was gathered via semi-structured interviewer-administered questionnaires and chart reviews. Microsoft Excel windows 10 were used to enter the data, while STATA version 16 was used for analysis. With a 95% confidence interval, descriptive statistics were used to describe the prevalence of Prolonged Length Of Stay in Emergency Department. The factors related with length of stay were identified using bivariate and multivariate logistic

regression analysis, and the significant level was determined at p-value 0.05 on AOR and 95% confidence interval.

Results: The prevalence of PLOS in Emergency Department was 80.33%, The finding of this study showed that waiting for laboratory result (AOR =3.69(2.16-6.27)), dependent oxygen (AOR = 3.55(1.48-8.53)), and waiting for surgery (AOR =2.18(1.20-3.97) were significantly associated with PLOS in the ED.

Conclusion: The present study identified that prevalence of PLOS was very high. Therefore, appropriate interventions are warranted to be designed and implemented emphasizing the aforementioned associated factors.

3.1.5.2 Factors associated with the Modes of Transport, and Short-Term Outcomes among patients presenting to Mbarara Regional Referral Hospital Emergency Department

Joseph Emuron, Prisca M. Kizito, Edgar Mulogo

Introduction: Prompt and appropriate transportation of patients from the point of acute event to a health facility influences outcome. This study aimed at identifying the factors associated with modes of transport, and document short term outcomes among patients presenting to Mbarara Regional Referral Hospital (MRRH) Emergency Department (ED).

Methods: A prospect cohort study was conducted in the ED of MRRH, a teaching hospital for Mbarara University located in Mbarara city, Uganda. A questionnaire was administered to patients of all age groups who were externally referred to the ED during the month of July and August 2022. Patients were excluded if they were internally referred within the hospital, mentally altered without a care taker and if they came to ED on a procedure or treatment appointment. Enrolled Patients were followed up for 24 hour to determine the short-outcome. Data was entered into an excel spread sheet and uploaded to stata version 17. Descriptive statistics were computed. Inferential statistics were performed testing for associations between modes of arrival and independent patient variables.

Results: Of the 315 study participants enrolled, 84% of the study participants arrived by non-ambulance, and majority of study participants (67%) had non-injury-related complaints. 115 (36.07%) were triaged as Red, 168 (53.33) yellow and the remainder were Green.

Positive association was found between ambulance arrival and previous history of ambulance use (OR 6.7, 95% CI 2.77- 16.98). Location outside Mbarara city was positively associated with car mode of transport (OR2.5, 95% CI 1.44-4.47) while surgical presentation was negatively associated with car mode of transport (OR0.45, 95%CI 0.28-0.74).

Age less than 18 years (OR5.08, 95%CI 1.17-14.57), daily income of less than 7200 Ugandan shillings (OR 2.24, 95%CI 1.08-4.78), green triage category (OR 3.48, 95%CI 1.12-10.77) and self/scene referral (OR 2.23, 95%CI 1.07-4.64) were positively associated

with motorcycle use. The predominant outcome was greater than 24 hours ED length of stay in both modes.

Conclusion: The study suggests need for investment in expanding accessibility and utility of ambulance services. Dedicated parking space for common modes of transport with clear flow should be improved at the ED premises. Operators of non-ambulance modes of transport should be targeted in community health education and trainings programs related to emergency response.

3.1.5.3 Factors associated with Timely Access to Emergency Care Services among Patients presenting to Rushere Community Hospital, Kiruhura District, Uganda

Kithula Haggai Sunday, Bagonza Kenneth, Kawungezi Peter

Background: Emergency medical illnesses contribute to a significant proportion of mortality globally, particularly in low-income countries where the burden is four times higher than in high-income countries. Timely access to emergency care has the potential to address a significant portion of deaths and disabilities in low and middle-income countries.

Objective: The study aimed to investigate the factors affecting timely access to emergency care in Rushere Community Hospital, Kiruhura District, Uganda.

Methods: A cross-sectional study was conducted involving 266 participants from June to August 2022. Systematic random sampling was used to select participants and data was collected using a structured questionnaire. Descriptive statistics, binary and multivariable logistic regression analyses were performed to identify the magnitude and factors associated with timely access to emergency care.

Results: The study found that only 14% of the participants had timely access to emergency medical services, with medical emergencies being the most prevalent (51%). The majority of the attendees were adults (80.4%) and equally divided between males and females (50.4% and 49.6% respectively). The study found that having a source of income and living in an urban area, were positively associated with timely access to emergency care. On the other hand, being in contact with a first Lay responder and having peer support was negatively associated with timely access to emergency care.

Conclusion: The study highlights the importance of income status, urban residency presence of peer support and contact with a first responder as key factors affecting timely access to emergency care in Rushere Community Hospital, Kiruhura District, Uganda.

3.1.5.4 In-Hospital Mortality and its association with Patients' Socio-Economic factors among Severely Injured Patients at MRRH

Lucy Wairimu Kariuki, Harborne Derek, Randall Ellis

Background: Trauma is a burden to many African countries and is more challenging in severely injured patients. This is especially true for low and middle income countries in Sub-

Saharan Africa. Social Economic Status (SES), which was measured by three factors; education level, income, and occupation, has been shown to influence the severity of injuries sustained by patients and their clinical outcomes. However, it is not yet clear how each of the socio-economic factors that contribute to the SES individually affects mortality.

Objective: This study, therefore, sought to find out the association between individual socio-economic factors with in-hospital mortality among severely injured patients at Mbarara Regional Referral Hospital (MRRH) Emergency Department.

Methods: A prospective cohort design was employed that looked at all the severely injured patients that arrived in the emergency department. Severity was determined by a combination of RTS and ISS scores. Mortality was confirmed after a 14-day follow-up. Values were analyzed using chi-square and binomial regression and means were compared using the student t-test.

Results: Majority of the participants were males n=71 (94.7%), aged below 55 years n=60 (80.0%). They predominantly had a severe GCS (<8) n=33 (44.0%), and a critical ISS n=53 (70.7%). They were mainly peasants or manual laborers n=57 (76.0%), with an average income of less than 7000 UGX per month n= 46 (61.3%). More than half n=48 (64.0%) of the participants had never attended school or had stopped at primary school. In the 75 patients with severe injuries analyzed, we observed a 14-day mortality rate of 22.7%. Statistically, the socio-economic factors were found not to be associated with in-hospital mortality; education, income, or occupation. The mean time between the time of injury to death was not significant across all socio-economic groups.

Conclusion: This study showed no association between in-hospital mortality with patients' socio-economic factors in those with severe injuries nor a significant difference in time between injuries to death across the socio-economic groups. We recommend a further multicenter study involving private and non-profit hospitals among all types of injuries to fully exclude the association.

3.1.5.5 Factors Associated with Mortality of Critically Ill Patients Managed in the Resuscitation Room of Mbarara Regional referral Hospital- Uganda

Bashir Ruzige, Justine Odakha Athieno, Joseph Kyobe Kiwanuka

Background: Critically ill patients are resuscitated and managed in the emergency departments before being disposed to the respective wards. In Mbarara Regional Referral Hospital-Emergency Department (MRRH ED), there is limited data about mortality rate and factors associated with mortality after resuscitation of these patients.

Methods: We conducted a prospective cohort study from August to October 2022 of all critical patients in the Emergency department as defined by Modified Early Warning Score (MEWS) or Red Triage color code. These patients were resuscitated, and then followed up for a period of 30 days of in hospital admission or until they were discharged or died whichever occurred first. Descriptive statistics were used to describe the clinical characteristics and bivariate and multivariate analysis to evaluate the association between the different factors and mortality. The results were presented using 95% confidence interval and a P value of < 0.05 was considered statically significant.

Results: 140 patients were enrolled in the study, but 3 had incomplete data and 2 were lost to follow-up, leaving 135 patients eligible for analysis. The median age of the study participants was 36 years, with an interquartile range of 69 (16-85). The majority of the patients (67.9%) were male, and most came to the emergency department during weekdays (70.8%) and during the day (62.8%). More than half of the patients (53.3%) had a chief complaint of altered level of consciousness, with most cases being due to trauma (40.1%). Nearly half of the patients (49.6%) were attended to by an Emergency Medicine Physicians. Only 14.6% were admitted to the ICU. Most patients received IV crystalloids (86.7%) and needed supplemental oxygen (88.2%). Only 20.7% required intubation and ventilation. The overall 30-day in-hospital mortality rate was 44.4% and the 24-hour mortality rate was 20%. Factors associated with mortality include having a comorbidity, low Glasgow Coma Scale (GCS) between 3-8, persistently high MEWS of ≥ 5 after resuscitation, intubation and ventilation and receiving vasopressors. The overall average hospital length of stay was 11 days.

Conclusion: The 44.4% 30-day mortality rate reflects a big challenge MRRH ED faces while caring for these critically ill patients. Approximately two thirds die in the first two days of admission after resuscitation. Factors associated with this mortality include having a comorbidity, low GCS between 3-8, a persistently high MEWS of five or more after resuscitation, intubation and ventilation and receiving vasopressors. The high mortality rate observed in this study highlights the importance of early identification, management and monitoring of critically ill patients in the ED setting.

Keywords: *Critically ill patient, MEWS, Mortality rate, Resuscitation, Triage*

3.1.6 MASTER OF MEDICINE IN GENERAL SURGERY

3.1.6.1 Patterns and short-term treatment outcomes of Children admitted at Mbarara Regional Referral Hospital following un-intentional trauma

Abdurahman Ahmed Duale, Kisitu Daniel Kyengera, Felix Oyania, Martin Situma

Abstract Background: Unintentional injuries (UIs) pose a major public health challenge globally. This study was aimed at determining the patterns, causes and short-term treatment outcome of UIs among children admitted at Mbarara Regional Referral Hospital (MRRH).

Methods: a hospital based descriptive prospective cohort study was conducted among 185 patients from 1st January 2021/ to 31st May 2021 at The Surgery and Paediatrics Departments. All patients admitted to MRRH with a diagnosis of unintentional injury comprised the study population. Interviewer-administered questionnaires were used to collect the data, and thereafter, patients were followed up for 30 days. These questionnaires were used to record the patterns, causes, and 30-day short-term treatment outcomes. Data was double entered using Epidata 4.2 and exported to Stata 15.1 for data cleaning and analysis. Frequencies and percentages were provided for categorical data and mean with standard deviation (SD) or median (IQR), for continuous data.

Results: Of the 185 UIs included in the study, Road Traffic Accident (RTA) and falls were the most common causes accounting for 54.6% and 27% respectively. Most of the Pattern of UI's were head/neck/face injuries (31.0 %) followed by fractures (30.3%), The majority of

UIs occurred among males compared to females (67% vs 33%) and the mean age was 9.3 years (SD = 5.19). Moderate to severe UIs accounted for 29% (ISS scale) and 22.9% (GCS). The patterns of UIs significantly differed by age across cause, occurrence on the face and severity by GCS score. Overall, mortality rate was 9.2%. The mortality in our study was almost doubled in children aged <5 years (14.6%). In relation to cause, poisoning had the highest mortality (21.4%), followed by burns (15.4%) and RTA (9.9%). There was no death seen among children who had animal bites.

Conclusion:

Pediatric unintentional injuries constitute a risk to children in Mbarara and its surroundings; the UI-related mortality rate at MRRH in this study is 9.2% and is generally comparable with what was reported in the other studies, with the highest causes of deaths being poisonings and burns, where RTAs and falls were the most common causes of unintentional injuries, there is a need for targeted prevention strategies for these types of injuries.

Keywords: Western Uganda, Mbarara Regional Referral Hospital, Un-intentional Injuries, patterns, Short-term Treatment Outcomes, Pediatric Injuries, Road Traffic Accident, Injury, Severity

3.1.6.2 Clinical and Sonographic Patterns, and Associated factors of Lower Limb Dry Gangrene among patients presenting at Mbarara Regional Referral Hospital

Barasa Emmanuel, Omo Alfred, Tayebwa Edson

Background: Dry gangrene is one of the leading indication for lower limb amputation, especially in developing countries where availability and accessibility of CT angiography and revascularization capabilities are still limited. About 39.2% of primary amputations performed annually at our center are for dry gangrenes and are frequently based on clinical assessment and seldomly Doppler ultrasound reports of severe specific peripheral arterial occlusion.

In most cases, where arterial Doppler ultrasound scans were unavailable, amputations were performed basing on visible demarcation of gangrene patterns. This practices are frequently associated with gangrene recurrence on the same limb stump, resulting into subsequent re-amputations due to inaccuracy of mere physical assessment. We conducted clinical assessment of dry gangrene patterns, and analyzed Doppler ultrasound reports of these cases, with the aim of highlighting relationship between patterns of lower limb dry gangrene, and specific occluded peripheral arteries, in order to strengthen preliminary diagnoses and appropriate therapeutic decision making, to maximally save the gangrene limb, without significant postoperative ischemic complication at these kind of centers.

Methods: A cross section of 36 patients with lower limb dry gangrene were enrolled consecutively, from June 2022 to November 2022. Participants' dry gangrenes patterns and arterial Doppler ultrasound reports of the lower limbs were assessed.

Results: Majority of participants had dry gangrene of the toes (61.1%), foot gangrene 27.8%, and both leg & foot (11.1%).

Arterial Doppler ultrasound studies revealed frequencies of occlusions in the femoral artery 38.9%, popliteal artery 66.7%, posterior Tibial artery 88.9%, Peroneal artery and anterior Tibial artery as 97.2% and 100% respectively. There was a greater relationship between femoral occlusions and foot, foot & leg gangrene (OR 6.2 and 3.2 respectively) whereas

popliteal occlusion was more related to toe and foot gangrene (OR 1.6, p-value 0.05).

Conclusion: Participants with predominantly foot and toe dry gangrene, were due to popliteal and infra-popliteal arterial occlusions.

Recommendation: This study therefore suggests that early recognition of lower limb gangrene patterns, in relation to specific arterial occlusion, should prompt urgent health care seeking by communities and appropriate therapeutic decision making by clinicians, in order to prevent loss of major lower limb parts and re-operations.

3.1.6.3 A Cost Analysis study of the Direct, Indirect Costs and Financial Coping Strategies for the Management of Hirschsprung Disease at Mbarara Regional Referral Hospital and Holy Innocents Children's Hospital

Binde Ahmed Hamad, Felix Oyania, Edgar Mugema Mulogo

Background: Surgical management of Hirschsprung's disease in children is usually a staged procedure, thus necessitating multiple contact visits with the health facilities and this imply cost burden to the households. Currently there is limited information on the costs borne by caretakers of children with Hirschsprung's disease, seeking surgical intervention. This study analyses the average direct, indirect costs and coping strategies related to surgical management of children with HD.

Methods: A cross-sectional study using cost analysis was conducted among caretakers of patients who completed surgical treatment of HD between January 2017 to December 2021. The average direct and indirect costs incurred by caretakers presenting at a public and private hospital were computed.

Results: A total of 69 patients (M: F = 7:1) were enrolled in the study. The median age at diagnosis was 60.5 (IQR 3 - 151.25) days for children and 2- staged pull through procedure was the common surgery performed. The participants incurred a mean direct cost of UGX 900,000/= (SD 572075.2) and 2,000,000/= (SD 1204972) per stay from MRRH and HICH, respectively, and a mean indirect cost of UGX 60,000/= (SD 60417.46) and 100,000/= (SD 99154.92) per visit from MRRH and HICH, respectively. The findings highlighted that, significant costs were more closely related to direct medical costs such as purchasing medicine, conducting investigations during hospitalization. Forty-five percent (31/69) borrowed money, and 48% (33/69) sold possessions to pay for the hospital care and 15% (10/69) of the patients received some form of charity.

Conclusion: Despite the availability of 'free care' from government hospital and non-profit services in PNFP, this study found that surgical management of Hirschsprung disease imposed substantial cost burden on families with Hirschsprung disease patients. Borrowing, selling assets and using of savings were the reliable coping strategies used to pay for the child's HD surgical care.

3.1.6.4 Pre-Operative Surgical Asepsis in the Theatre Operating Rooms at Mbarara Regional Referral Hospital

Onsongo Edwin Ondicho, Dan K. Kisitu, Joel Bazira

Background: Pre-operative surgical asepsis is one of the key procedural factors towards the prevention of surgical site infection. It involves the implementation and strict adherence to operating theatre guidelines pertaining to equipment sterilization and storage, surgical hand scrubbing, proper gowning and gloving and surgical site preparation. Although there might be a number of set protocols to ensure asepsis within the Operating Theatre (OT) at MRRH, there is a lot of breach in these protocols some of which are as a result of the increased demands for surgical care which tend to out compete the capacity of what the hospital was designed to support. The rest might be individualised to the surgical teams and the others to the institution itself.

Objective: To assess pre-operative surgical asepsis within the operating rooms at MRRH with focus being on the proportion of asepsis, the common organisms involved in pre-operative contamination and the factors that affect pre-operative asepsis.

Methods: A cross sectional study was conducted at MRRH from June 2022 to September 2022. 71 surgical cases were included in the study with 4 swabs aseptically taken from each case specifically from the patients' surgical site, the surgeon and assistant surgeon's glove-gown interface and the cheater forceps. Swabs were then analysed with asepsis reported as the absence of any disease-causing organism in all four swabs within a surgical case.

Results: The proportion of pre-operative surgical asepsis was found to be 77.5% (95% CI: 66.0-85.9). Two organisms were isolated, the commonest being *Staphylococcus aureus* present in 16.9% of the cases while *Klebsiella* was isolated in 7% of the cases. The cheater forceps was the most contaminated with micro-organisms cultured in 11/71 swabs while the patients' surgical site had no organisms cultured in all 71 swabs. Factors that were found to affect pre-operative surgical asepsis included the surgeons' and assistant surgeons' gloving technique with p-values of 0.011 and 0.001 respectively. The antiseptic used by the assistant surgeon for scrubbing was also statistically significant with a p-value of 0.047.

Conclusion: There is inadequate pre-operative surgical asepsis in the operating rooms attributed to contamination with *Staphylococcus aureus* and *Klebsiella*. Contamination is more likely with surgical hand scrub using non-medicated bar soap and with the surgeons and their assistant surgeons who used the open gloving technique

3.1.6.5 Factors associated and effects of malnutrition on early postoperative outcomes of abdominal surgery at Mbarara Regional Referral Hospital, Southwestern Uganda

Omongo Bosco Ekwan, David Mutibwa, Carlos Manuel Dreque

Background: Malnutrition remains a major challenge contributing to poor early postoperative outcomes of abdominal surgical patients, particularly in developing countries. This study aimed at determining the prevalence of malnutrition, its associated factors and effects on early postoperative outcomes on adult abdominal surgical patients at Mbarara regional referral hospital.

Methods: this hospital-based prospective cohort study was carried out among 105 patients from April to August 2022. The MUAC was used for nutritional status screening and all patients with a MUAC <24cm were considered malnourished. Baseline data was obtained from all the participants through interviewer administered questionnaire and thereafter patients followed up using postoperative checklist. Data was double entered on Microsoft excel and exported to STATA 15 for data cleaning and analysis. Bivariate (for variables in both objectives 2 and 3) and multivariate (for variables in objective 2) analyses were then done to assess any association between major independent and dependent variables. The measure of association was relative risk (risk ratio) and variables with p values of <0.05 were considered significant.

Results: of the 105 patients, the average age was 44.1 years with a SD of 17.3, the majority of the participants were males, 64.8 % (n=68) and peasant farmers, 55.2% (n=58). The prevalence of malnutrition estimated using the baseline data was 39% (95%ci: 29.7-49.1). Patients that had not eaten food (fasted) for more than 3days (ar r: 5.6, 95%ci: 1.15-27.16, p = 0.033) were more likely to be diagnosed with malnutrition among adult abdominal surgical patients at Mbarara regional referral hospital.

Malnutrition was associated with poor early postoperative outcomes, with increased rates of wound infections (p=0.007), enterocutaneous fistula (p=0.011), readmissions (p=0.028), mortality (p=0.016) and overall adverse postoperative outcomes (p=0.003) noted among the malnourished compared to the normal nourished patients

Conclusion: the prevalence of malnutrition was high and the duration spent without eating food (fasting) of more than 3 days predicted malnutrition. Malnutrition was associated with poor early postoperative outcomes among abdominal surgical patients. Enhanced efforts are needed to implement strict routine nutritional status screening of all patients in addition to optimization of malnourished abdominal surgical patients whenever possible prior to surgery.

3.1.6.6 Histological Patterns, Clinical Presentation and Definitive Treatment Modalities of Musculoskeletal Tumors amongst Patients at Mbarara Regional Referral Hospital

Otwany Bonny, Kisitu Danie Lkyengera, Odongo Charles Newton

Background: Musculoskeletal (MSK) tumors present a huge challenge to healthcare workers in low income countries because of limitations in diagnostic and treatment facilities coupled with late presentation to healthcare facilities complicating management especially the malignant types. Early diagnosis and multidisciplinary approach is key to MSK tumor management which is still a challenge in the resource limited setting. This study described the histological patterns, clinical presentations and definitive treatment modalities of MSK tumors among patients at MRRH.

Methods: A prospectively conducted cohort study at MRRH Surgery department and Oncology Unit for a period of seven months where 56% were consented and recruited in the study. Investigations done including radiology and biopsy for histopathological analysis and patients managed by various modalities.

Results: There were more male participants with a male to female ratio of 1.2:1, predominant histological types were osteosarcomas and soft tissue sarcomas, majority 94.6% were malignant. Average age for patients was 36.9±21.6. Majority of tumors, 39 (69.6%) were in the lower extremity and more on the right side for both lower 25(44.6%) and upper 13(23.2%) extremities. Most commonly affected long bone was femur (12.5%). Malignant soft tissue tumors were most commonly involving the thigh. All participants reported

swelling followed by pain. Majority of the participants had surgical intervention with wide local resection and amputation as the forms of surgery performed followed by chemotherapy and radiotherapy was the less commonly used treatment modality.

Conclusion: The commonest histological type of MSK tumor was osteosarcoma and soft tissue sarcomas, lower limb more affected with femur and thigh the most commonly involved in malignant bone and soft tissue tumors respectively. Swelling and pain were the commonest clinical presentation and surgery was the commonest definitive treatment modality with amputation most commonly used in osteosarcoma, and radiotherapy was the least commonly used treatment modality at MRRH.

3.1.6.7 Etiology and patterns of paediatric long bone fractures at Mbarara Regional Referral Hospital

Ogwang Raphael Ochieng, Kisitu Dan Kyengera, Tungotyo Martin

Background: Fractures account for 10-25% of trauma related injuries in the pediatric population most result from accidental injuries due to falls around the home and road traffic accidents. They are a major public health concern in the developing world causing significant morbidity and loss of time for both the children and parents/guardians who have to take care of the fractured children.

Objective: This study aimed at determining the etiology and patterns of pediatric long bone fractures.

Methodology: 77 participants under the age of 18years all with long bone fractures were recruited after obtaining informed consent and assent. Data was stratified and analyzed based on age and sex, anatomic location of the fracture, fracture pattern and severity based on the AO PCCF classification system and settings where the child was at the time of injury. Data was then presented in form of tables and graphs.

Results: 77 participants who sustained 98 fractures were recruited in the study. Males were 59 (76.6%) and females were 18 (24.3%) with a male to female ratio of 3.3:1. Mean age was 9.7 ± 5 years ranging from 2 days to 17 years. Peak incidence of fractures was observed within the 13-17 year age category where 32.5% (n=25) of the participants fell. Most fractures occurred within the homestead 36 (46.8%) followed by the road 29 (37.7%). Majority of participants 42.9% (n=33) were victims of RTAs mostly involving motorcycles as the roads were close or part of the homestead. Fractures of the upper limb 51.0% (n=50) were the most frequent with those of the lower limb accounting for 49.0% (n=48). Majority of the fractures were simple (81.6%), closed (90.8%) and involved the mid shaft of the long bones (51.8%).

Conclusion: Pediatric long bone fractures were more common in males with adolescents the most affected. RTA and falls caused the most burden of these injuries. Motorcycles were the commonest cause of RTA where children were mostly pedestrians or pillion passengers. Most fractures occurred within the homestead followed by the road. Majority of the fractures involved the forearm; were simple, closed and involved the mid shaft of the long bones.

3.1.6.8 Quality of life of children with Anorectal Malformation after completion of surgical treatment at Mbarara Regional Referral Hospital

Mucunguzi Denis, Oyania Felix, Situma Martin

Background: Anorectal malformations (ARMs) affect approximately one in every 5000 live births, including both males and females and comprises a wide spectrum of diseases involving the distal anus and rectum, as well as the genitourinary tract. These defects range from minor and easily treated conditions with an excellent functional prognosis to those that are complex, difficult to manage, often in association with other anomalies and poor functional prognosis. This study assesses the QoL of children after surgical treatment for ARMs.

Methods: The study was a cross-sectional study conducted at MRRH among children who had completed surgical treatment for ARMs between 2014 to 2021. The PedsQL 4.0 inventory was used to test health-related QOL in children using multidimensional parent proxy reporting (for children aged 3 months–7 years) and child self-reporting (for children aged 8–17 years) with respect to the 23 parameters.

Results: A total of 88 patients. (F: M = 1.15:1) were enrolled in the study. The median age of participant (years) was 4.5 (IQR 3 -7) for children and PSARP was the common surgery performed. Recto-vestibular fistulas, 49 (55.2%) were the most prevalent subtype of ARMs recorded in this study. The mean physical functioning score was 96.7 in males and 98.9 in females. The overall mean emotional functioning score was 91±2. The mean social functioning score was 92±3.0. The mean school functioning score was 95.7 in males and 98.5 in females.

Conclusion: The overall quality of life among the participants was good with an average PedsQL score of 94. Associated anomalies, surgery redo and years after completion of surgeries were identified as factors associated with poor quality of life of children after completion of surgical treatment for ARMs at Mbarara Regional Referral Hospital.

3.1.6.9 Patterns, Treatment Methods and Short-Term Treatment Outcomes of Intra-Abdominal Masses among patients presenting at Surgical Department of Mbarara Regional Referral Hospital

Byamugisha Sadic, Carlos Manuel Cabrera, Tayebwa Edson

Background: Intra-abdominal masses are increasingly becoming common across the globe and pose diagnostic as well as surgical challenges due to delayed presentation of patients with intra-abdominal masses. Thus, this study determined the patterns, treatment modalities and short-term outcomes of surgical intra-abdominal masses among patients presenting at surgical department of Mbarara Regional Referral Hospital.

Methods: This was a hospital-based prospective cohort study at surgical department where 116 participants were consecutively recruited in the study at surgical department between May 2022 and October 2022. Data on socio-demographic, medical, patterns, treatment modality and short-term outcome characteristics were collected. Descriptive statistics were presented. All analyses were done using Stata 17.0.

Results: During the period of this study, 116 patients presented with intra-abdominal masses, the majority were males, 55.2% (n=64) with the mean age was 52.1 (SD = 53.6) years and median age was 50.2. Participants presented with symptoms that were varying based on age, in adults mostly they presented with abdominal pain, 79.3% (n=92), abdominal swelling, 69% (n=80) and reached hospital after an average of 2-3 years in those who had gradual

enlargement of intra-abdominal masses 75% (n=87) while others with acute masses would reach hospital in 7 days 26.7% (n=31) with symptoms, 18.1% (n=21) while in children mostly presented with palpable abdominal masses 62.1% (n=72) which were being identified by the care takers and 37.9% (n=44) had both symptoms of abdominal pain and intra-abdominal masses could be detected by doing abdominal examination. Most participants were presenting with ultrasound scan results and was the baseline investigation that was preferred 72.4% (n=84), then CT scan with 56.0% (n=65). Preoperative biopsy was done by 5.2% (n=6) patients majority presented without biopsy results.

The majority of the masses were malignant, 56.9% (n=66) and benign, 43.1% (n=50) and mostly in the stomach, 22.4% (n=26), appendicular masses 19.0% (n=22), colon, 17.2% (n=20). Histologically adenocarcinoma was the predominant malignant mass 72.7% (n=48) with most of them identified in the stomach 36.4% and others in the colon and pancreas.

The majority underwent total excision/segmental resection, 46.6% (n=54) and incision and drainage, 19.0% (n=22). In the follow up period, the majority of the patients were discharged home, 84.5% (n=98), 4 (3.4%) had more than one relaparatomies done and only 1.7% (n=2) died.

The study included 3 participants whose lapotomy masses were unrespectable only biopsy was obtained and closed them with the insertion of feeding jejunostomies.

Conclusions and Recommendations: Most intra-abdominal masses were malignant, and were mainly located in the stomach and colon and the key treatment modalities were total excision and incision and drainage which had high good treatment outcome. Detailed research should be conducted to document and characterize these masses through staging so as a treatment protocol can be developed.

3.1.6.10 Clinical Presentation, Early Treatment Outcomes and their Predictors in Children with Intussusception at Mbarara Regional Referral and Holy Innocent Hospitals

Kisuki Milton, Situma Martin Samuel, Oyania Felix, Odongo Charles Newton

Background: Intussusception remains a common cause of intestinal obstruction in children and results in significant morbidity and mortality if not promptly treated. Delay in presentation is attributed to the nonspecific clinical features of intussusception delaying definitive intervention there by influencing the outcome. This study therefore aimed at describing the clinical presentation, treatment modalities, early outcomes and their predictors in patients managed at Mbarara regional referral hospital and Holy Innocent's Children's Hospital.

Methods: This was a retrospective cohort study at Mbarara Regional Referral Hospital and Holy Innocents Children's Hospital in South Western Uganda. We retrieved a total of 123 records of children who were diagnosed with intussusception between January 2017 to December 2021 and obtained secondary data about clinical presentation, treatment modalities and treatment outcome. Descriptive statistics were used to present demographic characteristics of the patients, their clinical presentation, and early treatment outcomes. Bivariate analysis was conducted to determine the predictors of the poor outcomes and variables with p-value <0.05 were entered into a multivariate model and significance was

set at <0.05, CI 95%. All analysis was done using Stata version 13.

Results: Of 123 children with intussusception, Ileo-colic (77.5%) was the most frequent type of intussusception seen. The male to female ratio was 2.2:1 and the majority presented under 1 year of age (68.3%). Vomiting and bloody stools were the main presenting symptoms, 92.7% and 73.2% respectively with 24.4% having the classic triad of bloody stools, vomiting and colicky abdominal pain and were all treated surgically. Majority (53.9%) had good outcome and 46.1 % had poor outcomes. At multivariate analysis, children with resected bowel and stoma formation (AOR: 6.48, 95% CI: 1.70-24.62) and those with age less than 1 year (AOR: 6.40, 95% CI: 1.59-25.79) were the predictors of poor outcomes.

Conclusion: Intussusception in our setting is characterized by late clinical features; vomiting and bloody stools, with Surgery as the main treatment modality .Good outcomes were achieved despite the late presentation however age of child less than one year bowel resection and stoma techniques demonstrated significant prediction of poor outcome.

Keywords: Intussusception, Clinical presentation, Treatment modalities, Outcome, predictors.

3.1.7 MASTER OF MEDICINE IN INTERNAL MEDICINE

3.1.7.1 Epileptiform Electroencephalogram Patterns and associated factors among adults attending the Epilepsy Clinic at Mbarara Regional Referral Hospital, Uganda

Maneno Yusuph Mwangalaba, Kayanja Adrian, Godfrey Zari Rukundo

Background: Epilepsy remains to be a significant public health problem and a growing medical burden. Electroencephalogram plays important role in the assessment and management of epilepsy. In low-resource countries, access to EEG tests is limited. Identification of epileptiform pattern on EEG helps to characterize the epilepsy which aid in appropriate choice of treatment of epilepsy. Determination of factors influencing epileptiform EEG is important for the selection of patients who are likely to benefit from this test.

Objective: To determine the prevalence of epileptiform EEG patterns and associated factors among adults attending the epilepsy clinic at Mbarara Regional Referral Hospital, Uganda

Methods: This is a retrospective cross-sectional study that was done at the epilepsy clinic of Mbarara Regional Referral Hospital. All adult patients with a clinical diagnosis of epilepsy and having EEG records or reports were studied. STATA version 13 was used for analysis. Prevalence was presented as a simple proportion and the factors associated were analyzed using logistic regression.

Results: One hundred and fifty-one patients with epilepsy who underwent EEG examination were included in the study. The age ranged between 15 and 86years and had a median age of 24 years (IQR: 19-33). There were (80)53% males of the participants. The majority had at least one seizure episode in the preceding month before the EEG examination 99(66%) and the vast majority were on Antiepileptic Drugs (AEDs), 125(85%). Overall, EEG was abnormal in 75 (49.67%), and 52(34.44%) had an epileptiform pattern. Patients with seizure

frequency of more than two in the preceding month before EEG examination, were more likely to have epileptiform EEG patterns than those with less seizure frequency, OR 2.37(95% C.I. 1.2-4.74), p-value=0.038.

Conclusion: This study found that the prevalence of epileptiform EEG patterns among patients with epilepsy who underwent EEG tests was 34.44%. Seizure frequency before EEG examination was the only factor found to be independently associated with the occurrence of epileptiform EEG patterns.

Key words: Epilepsy, Electroencephalogram, epileptiform, patterns, Uganda.

3.1.7.2 Blood Pressure Variability and Early Clinical Outcomes amongst Patients with Stroke admitted at a Tertiary Hospital in Uganda: a prospective cohort study in southwestern Uganda

Nicholas Kulaba, Adrian Kayanja, Cumara B. O'Carroll, Anthony Muyingo.

Background: Greater blood pressure variability has detrimental effects on clinical outcome after a stroke, its effects are controversial and has not been evaluated in Sub-Saharan Africa (SSA).

Methods: We conducted a prospective cohort study of CT head confirmed ischemic and hemorrhagic stroke admitted within 7 days of onset of motor weakness. Blood Pressure Variability (BPV) indices; Standard Deviation (SD) and coefficient of variation (CV) of systolic and diastolic blood pressure between day 0 and day 7 were calculated with subsequent modified Rankin Scale (mRS) score on day 14 post-stroke. Kaplan Meier curve was plotted for mortality and each Standard Deviation Systolic Blood Pressure (SDSBP) tertiles. Cox proportion hazard regression was fitted to determine the predictors of mortality at day 14 of stroke onset with 95% CI and p value<0.05 used as statistical significance.

Results: Out of 120 patients, 51.7% were female, 52.5% had ischemic stroke and the overall median age was 65 (IQR 54-80) years. Nineteen (15.8%) patients died within a median survival time of 7 days, while 32 (26.7%) died by day 14 after stroke. Patients with hemorrhagic stroke had SDSBP of 16.44 mmHg while those with ischemic stroke had SDSBP of 14.05 mmHg. Mortality rate for SDSBP tertile1 was 9.7%, SDSBP tertile2 was 12.0% and SDSBP tertile3 was 14.6%. Blood pressure variability SDSBP tertiles (3 & 2) had an adjusted hazard ratio (aHR): 3.9, p= 0.024 [95%Confidence Interval (C.I.) 1.2-12.9] and 2.7, p = 0.022 (95%C.I: 1.2-6.2) respectively. RBS of > 10 had an aHR =3.3 p= 0.004 (95%CI 1.5-7.5), CRP of >10mmol/L had an aHR = 11.3 p<0.001 (95%CI: 4.2-30.6) and female sex had an aHR=2.1, p=0.040 (95% C.I: 1.0-4.5).

Conclusion: High Blood Pressure Variability, stroke related hyperglycemia, high C-reactive protein and female sex conferred statistically significant hazards for mortality in the first 14 days after stroke.

Keywords: Blood pressure variability, stand deviation and stroke

3.1.7.3 Prevalence and Factors associated with Peripheral Arterial Disease among people living with HIV Aged 40 Years or greater in Southwestern Uganda: a Matched Case-Control Study

Mohamed Mukhtar Abdirahman, Conrad Muzoora, Samson Okello

Background: Peripheral arterial disease (PAD) is increasingly recognized as an important cause of cardiovascular morbidity and mortality. High triglyceride glucose index is a recognized indicator of subclinical atherosclerosis and promotes systemic arterial atherosclerosis. The burden and risk factors of PAD among people living with HIV (PLWH) has not been well defined in our setting, despite having a high burden of HIV infection. Therefore, the aim of this study was to determine the Prevalence and Factors associated with Peripheral Arterial Disease among PLWH matched with HIV negative controls.

Methods: This was nested case control study, we used data of 296 (148-HIV positive and 148-HIV negative controls) from Uganda non-communicable disease and aging cohort (UGANDAC) which comprised of HIV-positive adults, aged at least 40 years, stable on ART for at least 3 years, and age-and sex-matched HIV-negative controls. Our primary outcome was prevalence of peripheral arterial disease as resting ABI ≤ 0.90 . The data was analyzed for prevalence with statistical significance set at $p < 0.05$, factors were analyzed using conditional multivariate logistic regression and Pearson's correlation was used to determine association between ABI and triglyceride glucose index.

Results: A total of 296 participants were included in the final analysis, 148 HIV infected and 148 non-HIV infected. The median age of the study cohort was 50 years (IQR 47-54) in both HIV positive and HIV negative control groups. We found the prevalence of PAD to be 2.7% (95% CI: 1.0-7.0) in PLWH and 1.35% (95% CI: 0.3-5.3) in the HIV-negative group. However, there was no significant difference in both groups. Additionally, we discovered a weak negative correlation (-0.1135) between the ABI and the triglyceride glucose index however, the correlation was not significant (P-value 0.0511). Among PLWH, the use of protease inhibitors-based regimen was independently associated with PAD (AOR: 33.3 with significant P-value 0.041). And having a history of diabetes mellitus was linked to PAD both in PLWH and HIV-negative group (AOR 70 with significant P-value 0.001).

Conclusion: In this study, we found a low prevalence of PAD in both PLWH and HIV negative controls, with no significant difference in prevalence in the two groups. Among PLWH, the use of protease inhibitors-based regimen was independently associated with PAD among HIV-infected patients. And having a history of diabetes mellitus was linked to PAD both in PLWH and HIV-negative group. We also found no correlation between the ABI and the triglyceride glucose index.

3.1.7.4 Incidence and Predictors of Corrected QT Interval Prolongation among Drug-Resistant Tuberculosis individuals treated with Bedaquiline-Containing Regimen in Uganda

Lodiong Jackson Dumo Lodiong, Edwin Nuwagira, Boniface Amanee Elias Lumori

Background: Bedaquiline-containing regimens have recently been approved by the World Health Organization (WHO) and the Uganda Ministry of Health due to its excellent

effectiveness against drug-resistant tuberculosis. However, there is a significant chance of QTc interval prolongation and unanticipated cardiac death. By administering a Bedaquiline (Bdq)-containing regimen to Ugandan drug-resistant tuberculosis patients, we aimed to determine the incidence and predictors of QTc interval prolongation.

Methods: Patients who received a Bdq-containing regimen for drug-resistant tuberculosis between 2020 and 2021 in referral facilities in Mulago, Mbarara, and Masaka were the subjects of this retrospective record review study. We gathered clinical and demographic information. The QTc interval prolongation was calculated using Fridericia's method after electrocardiograms (ECGs) were analyzed. When the QTc interval rose by 60 milliseconds from the baseline or when the follow-up QTc interval was more than 500 milliseconds, it was used to denote QTc interval prolongation. We determined the cumulative incidence and incidence rate of QTc interval prolongation. To identify the predictors of QTc interval prolongation, the Cox regression model was used.

Results: The average age of the 153 participants was 37 (SD: 12), 109 (71.24%) of them were men, and 62 (40.52%) of them had a history of the human immunodeficiency virus. Sixty-four (41.83%) had tuberculosis in the past, whereas 87 (55.66%) were first-timedagnosed. The majority (97.39%) had multi-drug resistant tuberculosis, and 115 (75.16%) were on all oral Bedaquiline-containing regimen. The earliest occurrence of QTc interval lengthening was at 6 weeks, with a cumulative incidence of 36 (23.54%) and an incidence rate of 1.95 person-years. The probability of QTc interval lengthening was substantially predicted by female gender (adjusted hazard ratio of 2.18 and 95% CI 1.01-4.71, $p=0.048$), and history of alcohol use (adjusted hazard ratio of 3.22 and 95% CI 1.70-6.12, $p0.001$).

Conclusions: With DR-TB, over one-fourth of the participants exhibited QTc interval prolongation. We advise women receiving a Bdq-containing regimen to have biweekly ECG monitoring, and we advise against drinking alcohol while receiving therapy for DR-TB. The mortality profile of patients receiving a Bdq-containing regimen should be the main topic of future studies.

Keywords: Drug-resistant tuberculosis, Bedaquiline-containing regimen, QTc interval prolongation, Electrocardiography, Uganda.

3.1.7.5 Prevalence and factors associated with asymptomatic deep venous thrombosis among admitted medical patients at Mbarara regional referral hospital

Siraj Senoga, Peter Kangwagye, Conrad Muzoora

Background:DVT and pulmonary embolism are a leading cause of preventable morbidity and mortality among hospitalized patients. Diagnosis of most of these events especially asymptomatic DVTs are missed and quite a number of DVTs and PEs are diagnosed at post-mortem.The major risk factors other than age include surgery, hospitalization, immobility, trauma, pregnancy and puerperium, hormone use, cancer, obesity, and inherited and acquired hypercoagulable states.

Objective:The main objective of this study was to determine the prevalence and factors associated with asymptomatic deep venous thrombosis among admitted medical patients at Mbarara regional referral hospital.

Methods: This was a cross-sectional study in which admitted medical patients at Mbarara regional referral hospital in south western Uganda were enrolled by systematic random sampling until a sample size of 218 was reached. Patient's characteristics and clinical parameters were captured. Study participants underwent compression ultrasound (B mode imaging) of both lower limbs using Sonosite M-Turbo ultrasound machine. Excel software was used for data entry and Stata version 14 for data analysis. We used proportions to determine the prevalence of asymptomatic DVT and logistic regression model was used to determine the factors associated with asymptomatic deep venous thrombosis. A p value of < 0.05 was considered to be statistically significant.

Results:The prevalence of asymptomatic deep venous thrombosis among admitted medical patients was low at 5.5% (95% CI of 3.14 – 9.48). All DVTs were found in the proximal deep veins. Age \geq 45 years had 7.11 higher odds of asymptomatic DVT (95% CI 1.17-43.56, p-value 0.033) and duration of hospital stay at the time of study had 34 times higher odds of asymptomatic DVT (95% CI 6.14-188, p-value <0.001).

Conclusion:: Asymptomatic DVT was shown in 5.5% of patients admitted on the general medical ward at Mbarara regional referral hospital in south western Uganda. Factors associated with asymptomatic DVT included age \geq 45 years and duration of hospital stay \geq 2weeks. Routine screening and thromboprophylaxis for DVT should be encouraged among this population.

3.1.8 MASTER OF MEDICINE IN OBSTETRICS/GYNAECOLOGY

3.1.8.1 Prevalence and Factors Associated with Abnormal Obstetric Shock Index among Immediate Postpartum women following vaginal delivery at Mbarara Regional Referral Hospital

Agaba David Collins, Joseph Ngonzi, Masembe Sezalio, Lugobe Henry Mark

Background:Early recognition of haemodynamic instability due to haemorrhage that follows delivery and prompt intervention are necessary in order to reduce adverse maternal outcomes due to postpartum haemorrhage. The Obstetric shock Index (OSI) has been recommended as a simple, accurate, reliable, and low-cost early diagnostic measure that identifies hemodynamically unstable women.

Objectives: The objectives of the study were to determine the prevalence of and factors associated with abnormal obstetric shock index among women in the immediate postpartum period following vaginal delivery at Mbarara Regional Referral Hospital.

Methods: We conducted a cross-sectional study at the labour suite and postnatal ward of Mbarara Regional Referral Hospital from 22nd January 2022 to 28th April 2022. We included

women who had delivered vaginally through systematic sampling, and measured their blood pressures and pulse rates at 1 hour postpartum. We excluded mothers with hypertensive disorders of pregnancy. Sociodemographic and clinical data were obtained through interviewer-administered questionnaires. The prevalence of abnormal OSI was the proportion of participants with an $OSI \geq 0.9$ (calculated by dividing the pulse rate by the systolic BP). Logistic regression analysis was used to evaluate associations between abnormal OSI and independent variables.

Results: out of 427 women enrolled into the study, 83 (19.44%), 95% CI (15.79-23.52) had an abnormal obstetric shock index. At multivariable logistic regression, being referred [aOR 2.34, 95% CI (1.41-3.89), $p=0.001$], having had an episiotomy/perineal laceration [aOR 1.90, 95% CI (1.15-3.13), $p=0.012$] and having a visually estimated blood loss >200 mls [aOR 1.78, 95% CI (1.06-3.01), $p=0.028$] were independently associated with abnormal OSI.

Conclusion: The prevalence of abnormal OSI among women in the immediate postpartum period following vaginal delivery at MRRH is high. We recommend that clinicians should have a high index of suspicion for haemodynamic instability among women in the immediate postpartum period and should prioritise mothers who are referred, those that get episiotomies/perineal lacerations and those with estimated blood loss > 200 mls for close monitoring.

3.1.8.2 Association between Maternal Near Miss and Adverse Perinatal Outcomes among Women Delivering at Mbarara Regional Referral Hospital

Jjuuko Mark, Kanyesigye Hamson, Lugobe Henry Mark, Kato Kalyebara Paul

Background: Uganda has a high neonatal mortality rate at 27 deaths per 1000 live births, majority of which occur in the perinatal period. Perinatal deaths include still births and early neonatal deaths many of which are preceded by low birth weight, low APGAR score, prematurity, and admission to neonatal care units. Maternal complications have been implicated in some of these adverse perinatal outcomes hence the study aimed at investigating the association between maternal near miss and adverse perinatal outcomes.

Objectives: To compare the proportion of adverse perinatal outcomes between maternal near miss and non-near miss as well as to determine the association between maternal near miss and adverse perinatal outcomes among women delivering at Mbarara Regional Referral Hospital.

Methods: We conducted a prospective cohort study of women admitted for delivery on maternity ward of Mbarara Regional Referral Hospital from April 2022 to August 2022. We excluded mothers admitted with intrauterine fetal death. The primary exposure was maternal near miss and the outcome was adverse perinatal outcomes. Maternal near miss included antepartum hemorrhage leading to shock, uterine rupture, Eclampsia, severe pre-eclampsia with clinical or laboratory indication for termination of pregnancy, chorioamnionitis with clinical signs of shock, coma and cardiac arrest. Data on the exposure and outcome variables were extracted from patients' admission charts. Multivariable analysis with log binomial regression was used to determine the association between maternal near miss and adverse perinatal outcomes.

Results: 55 maternal near misses and 165 non-near misses were included in the study. Maternal near misses had higher proportions of adverse perinatal outcomes than non-near miss. Maternal near misses were 4 times as likely to have adverse perinatal outcomes as compared to non-near misses (aRR=4.02: 95% CI;2.32-6.98). Other risk factors independently associated with adverse perinatal outcomes included primigravidity, and gestational age less than 34 weeks.

Conclusion: Maternal near miss is associated with adverse perinatal outcomes. Other risk factors for adverse perinatal outcomes were primigravidity, and gestational age less than 34 weeks. We recommend maternal near miss reviews to identify gaps in care to improve outcomes in maternal near misses.

3.1.8.3 Prevalence, severity and factors associated with thrombocytopenia among women in third trimester attending the antenatal care clinic of Mbarara Regional Referral Hospital

Saturday Pascal, Mugenyi Godfrey

Background: Knowledge of the platelet counts in pregnancy in third trimester enables clinicians prepare adequately for delivery. Low platelet counts are associated with postpartum hemorrhage, episiotomy and incisional hematomas thus assessment of their level may assist in patient preparation and anticipation of such challenges.

Objectives: The objectives of the study were to determine the prevalence, severity and factors associated with thrombocytopenia among women in third trimester attending the antenatal care clinic at Mbarara Regional Referral Hospital.

Methods: We conducted a cross sectional study in the antenatal care clinic of Mbarara Regional Referral Hospital from 12th April 2022 to 20th July 2022. We used systematic sampling to reach our target sample size. We determined their platelet counts and used an interviewer-administered questionnaire to obtain sociodemographic, medical and obstetric factors. The prevalence of thrombocytopenia was the proportion of participants with thrombocytopenia and severity was described as mild, moderate or severe depending on platelet counts among the thrombocytopenia cases.

Results: A total of 440 participants were enrolled for the study with a mean age of 27 (± 6). The prevalence of thrombocytopenia was 13% (57/440), 95% CI (10.0 – 16.5). Of the 440 participants, 383 (87.1%) had normal platelet counts, 51 (11.6%) had mild thrombocytopenia and 6 (1.4%) had moderate thrombocytopenia. We had no case with severe thrombocytopenia. At multivariable logistic regression, gestational age at or more than 37 weeks was independently associated with thrombocytopenia [aOR 2.44, 95% CI (1.26-4.74), p=0.008].

Conclusion: Approximately 1 of every 10 women attending the antenatal clinic ≥ 28 weeks of gestation had thrombocytopenia. We recommend doing complete blood counts for pregnant women ≥ 37 weeks of gestation and a prospective cohort study to assess the impact of thrombocytopenia on women delivering at Mbarara Regional Referral Hospital. Our study may have underestimated the magnitude of some factors since we used patients' documents and history to acquire the information.

Key words: Thrombocytopenia, third trimester, Antenatal care clinic

3.1.8.4 Prevalence and factors associated with early-onset preeclampsia among women with preeclampsia at Mbarara Regional referral Hospital.

Dean Kisombo, Yarine Fajardo, Julius Mugisha, Leevan Tibaijuka

Background: Early-onset preeclampsia (diagnosed before 34 weeks of gestation) is the most severe variant associated with increased adverse maternal-fetal outcomes.

Objective: The general objective of the study was to determine the prevalence and factors associated with early-onset preeclampsia among women with preeclampsia at Mbarara Regional Referral Hospital.

Methods: We conducted a cross-sectional study at the High-risk ward and Clinic of Mbarara Regional Referral Hospital from 22nd April 2022 to 30th August 2022. We consecutively enrolled women who had a diagnosis of preeclampsia and knew their date for the last normal menstrual period (LNMP) or had a first trimester ultrasound scan report. Participants socio-demographic, clinical, and obstetric data were obtained through interviewer administered questionnaires and laboratory findings were obtained from the participant's medical record. The prevalence of early-onset preeclampsia was the proportion of women with diagnosed with preeclampsia before 34 weeks of gestation divide by the total number of women diagnosed with preeclampsia during the study period expressed as a percentage. Logistic regression analysis was used to determine the factors associated with early-onset preeclampsia.

Results: A total of 144 women with preeclampsia were enrolled with mean age of 27.7 ± 6.2 years. The prevalence of early-onset preeclampsia was 42.4% (61/144), 95% C.I (34.5-50.7). At multivariable logistic regression, having prior history of preeclampsia [aOR 3.53 95% C.I (1.07-11.65), $p= 0.039$] and having multiple pregnancy [aOR 8.39 95% C.I (1.34-52.33), $p=0.023$] were independently associated with early-onset preeclampsia.

Conclusion: At MRRH, prevalence of early-onset preeclampsia is high. We recommend prioritization of women with prior history of preeclampsia and those with multiple pregnancy for preconception care, preventive therapy and a regular screening for early-onset preeclampsia.

3.1.8.5 Association between HIV serostatus and premalignant cervical lesions among women attending cervical cancer screening clinic at Mbarara Regional Referral Hospital

Justus Kirabira, Musa Kayondo, Stephen Mayanja Bawakanya, Rogers Kajabwangu

Background: Uganda has approximately 1.2 million people aged 15 to 64 years living with HIV. It is estimated that 1%–2% of women worldwide develop High grade Squamous Intraepithelial Lesion (HSIL) each year. Several studies have shown a higher prevalence of premalignant cervical lesions among HIV-positive women compared to the HIV-negative women. HIV-positive women are 2.55 times more likely to have their HPV infection progress to HSIL than HIV-negative women.

Objective: To determine the association between HIV status and premalignant cervical lesions among women attending cervical cancer screening clinic at Mbarara Regional Referral Hospital.

Methods: We conducted a comparative cross sectional study at cervical cancer screening clinic of Mbarara Regional Referral Hospital from 31st March 2022 to 30th June 2022. We systematically enrolled 210 HIV positive and 210 HIV negative women. Participants were subjected to a structured interviewer administered questionnaire, Pap smears were taken and subjected to microscopic examination to observe premalignant cervical lesions. Multivariate logistic regression was performed to determine association between HIV-status and premalignant cervical lesions.

Results: Premalignant cervical lesions were identified in 72 (17%) of the participants with 47 (23%) in HIV-positive women and 25 (12%) in HIV-negative women. The difference between the two groups was statistically significant p-value <0.003. The commonest category of premalignant cervical lesions identified was LSIL, consisting of 35 (16.7%) HIV-positive women, and 20 (9.5%) HIV-negative women. The prevalence of each category of the premalignant cervical lesions, identified in the study, was higher among HIV-positive women than the HIV-negative group. HSIL was more common in HIV positive women compared to the HIV negative women with 3.3% Vs 0.5% respectively. HIV was significantly associated with premalignant lesions (aOR: 2.37, 95% C.I: (1.27-4.42), $p=0.007$).

Conclusion: Premalignant Cervical lesions are more common among HIV positive women compared to HIV negative women. LSIL are the commonest premalignant cervical lesions. HIV-infection is independently associated with premalignant cervical lesions.

Recommendations: Strengthening the screening programs for cervical cancer and/or premalignant cervical lesions in HIV-positive women.

3.1.8.6 Prevalence and factors associated with prolonged hospital stay following Caeserean Delivery at Mbarara Regional Referral Hospital

Atupele Subira Mlangwa, Wasswa George, Imelda K Tamwesigire, Kajabwangu Rogers

Background: Despite the recommendation that normal hospital stay following caesarean delivery happen within 3-5 days, there are contextual variations in length of hospital stay following caesarian delivery. This study determined the prevalence and factors associated with prolonged hospital stay following caesarean delivery at Mbarara Regional Referral Hospital (MRRH).

Methods: This was a hospital-based Cross-sectional study at maternity ward among 427 women systematically recruited following caesarean delivery between April 2022 and June 2022. Socio-demographic, Medical, Obstetric, Surgical characteristics and length of hospital stay data were collected. Descriptive statistics were presented for Socio-demographic characteristics of mothers. Prevalence of prolonged hospital stay was presented as a proportion of the mothers with more than 5 days following caesarian delivery. Bivariate and multivariate analyses were conducted and variables with $p<0.2$ were entered into multivariate model with factors associated with prolonged hospital stay considered at $p<0.05$ at multivariate model. All analyses were done using Stata 17.0.

Findings: Of the 427 mothers, the prevalence of prolonged hospital stay was 13.8% (n=59). All HIV status mothers had a normal hospital stay compared to HIV negative mothers (0% vs

14.6%). All mothers with DM (n=2), SSI (n=7) and puerperal sepsis (n=7) or administered with both spinal and general anaesthesia (n=6) experienced prolonged hospital stay (100.0%, p<0.05). Mothers with lower education level than post-secondary (Secondary: AOR=2.5, 95%CI: 1.04-6.04, p<0.05; no formal education; AOR=2.1, 95%CI: 0.32-14.22, p>0.05), diagnosed with pre-eclampsia/eclampsia (AOR=87.0, 95%CI: 15.90-475.87, p<0.001), obstructed labor (AOR=13.2, 95%CI: 4.98-34.70, p<0.001), duration of surgery \geq 1 hour (AOR=2.9, 95%CI: 1.28-6.57, p<0.05) or mothers who underwent caesarean hysterectomy (AOR=17.3, 95%CI: 1.81-164.69, p<0.05) were more likely to have a prolonged hospital stay.

Conclusions: The prevalence of prolonged hospital stay following cesarean delivery at MRRH was generally high and was associated with less than tertiary education, HIV positive, DM, SSI and puerperal sepsis, pre-eclampsia/eclampsia, obstructed labor, longer duration of surgery and caesarean hysterectomy. Stakeholders, particularly clinicians should pay attention to the conditions to minimize congestion and human resource overload at maternity ward at MRRH.

3.1.9 MASTER OF MEDICINE IN OPHTHALMOLOGY

3.1.9.1 Prevalence, clinical presentations and factors associated with Keratoconus among Secondary School Students in Mbarara City

Abel Ebong, John Onyango, Simon Arunga

Introduction: Keratoconus is a progressive corneal disease in which central or paracentral corneal stromal thinning occurs, accompanied by a cone-shaped corneal protrusion leading to various degrees of visual impairment and even to blindness. Studies have shown a large epidemiological difference in different countries and ethnicities. Currently there is paucity of data on the prevalence, clinical presentation and factors associated with keratoconus among students in Mbarara City. This study aimed at addressing this gap.

Purpose: To determine the prevalence, clinical presentations, and factors associated with keratoconus among secondary school students in Mbarara City, Southwestern Uganda.

Methods: This cross-sectional study was conducted in 5 selected secondary schools in Mbarara City in March and April 2022. We used a multistage sampling design to select the participants. All students were done keratometry using the KR-9000 autorefractokeratometre and those with keratometry readings less 47.00 D were further assessed for scissoring reflex in both eyes using a Keeler retinoscope. Students with a positive scissoring reflex and keratometry readings equal to or greater than 47.00 D in either eye were then sent to Mbarara University and Referral Hospital Eye Centre where they were done a slit lamp biomicroscopic examination.

Results: of the 815 students, the prevalence of keratoconus was 0.37% (n = 3) (95% CI, 0.15 – 1.27). All the students diagnosed with keratoconus were males. All students diagnosed with keratoconus were from one school. All students had bilateral keratoconus, and 2 (66%) had severe keratoconus. Most (66%, n =2) of the students diagnosed with keratoconus were unaware of their disease. The study found that keratoconus was significantly associated with

allergic conjunctivitis. We however did not find any association between age, sex, and tribe with keratoconus.

Conclusion: The prevalence of keratoconus among secondary students in Mbarara City is like what has been reported in different studies in Africa among adolescents and youth populations, but significantly lower than that in the Middle East and Asia. Allergic conjunctivitis with associated eye rubbing is a significant risk factor for keratoconus.

3.1.9.2 Prevalence of Low Corneal Endothelial Cell Density and Correlates of Corneal Endothelial Cell Density among Adults attending Mbarara University and Referral Hospital Eye Centre

Namwase Shamiim, Simon Arunga, Sam Ruvuma

Aim: A low corneal endothelial cell density risks onset of corneal decompensation, which may result in irreversible blindness. We aimed at determining the prevalence of low corneal endothelial cell density and correlates of corneal endothelial cell density among adults attending Mbarara University and Referral Hospital, Eye Centre.

Methods: This was a hospital based cross sectional study looking at 404 participants aged 18years and above. Those who met the inclusion criteria were consented. Visual acuity, slit lamp examination, IOP, Corneal diameter, Tear film Break up Time (BUT), Keratometry, A Scan and Pachymetry were done. The mean cell density (MCD) was measured using a contact confocal microscope. Descriptive statistics were used to calculate low ECD prevalence and average ECD. Correlates of ECD were assessed using linear regression.

Results: Of the 404 participants that were studied, 187 were males and 217 were females. Five participants (1.2%) were found with a low endothelial cell density ($ECD < 1000 \text{ cells/mm}^2$). The mean endothelial cell density among participants was $2763.6 \text{ cells/mm}^2$ (range $1050.6 - 4189.6 \text{ cell/mm}^2$) with a declining trend with increasing age irrespective of gender. There was no significant difference in endothelial cell density among males and females. The significant correlates with endothelial cell density were; age, history of smoking, history of ocular surgery, tear film instability, corneal diameter, central corneal thickness, axial length and arcus senilis.

Conclusion: To the best of our knowledge, this study was the first of its kind in the region to study corneal endothelial cell density. The elderly, smokers and those with past ocular surgery are the most vulnerable. The low prevalence could be due to a lack of reference values for the black African population so as to guide on a more precise cut-off value. We identified several easy to measure variables that influence ECD which can be measured using easily available and affordable machines and these could be used to predict corneal endothelial cell density.

3.1.9.3 Validity of Autorefractor (Kr-9000) Compared to Conventional Retinoscopy in Determining Refractive Errors among patients five years and above attending Mbarara University and Referral Hospital Eye Centre

Kitsao Gona Moses, Arunga Simon, John Onyango

Background: Globally, 2.2 billion people have vision impairment and out of them, 123.7 million have moderate to severe distance vision impairment or blindness due to unaddressed refractive error (myopia or hypermetropia). Uncorrected refractive errors are recognized as a public health burden for they affect people without consideration of age, gender, or ethnicity with 90% of people living in low-income settings. Many eye hospitals in low resource settings conduct community-based outreach activities largely focused on detection of cataract and refractive error, however using retinoscopy and subjective refraction in large scale screening of refractive error is not cost effective because you require ophthalmologist or optometrists who have retinoscopy skills. Therefore, this study aimed at validating autorefractor (KR – 9000) compared to conventional retinoscopy as the gold standard in determining refractive errors among patients ≥ 5 years attending Mbarara university and Referral Hospital Eye Centre (MURHEC).

Aim: To determine the validity of autorefractor (KR – 9000) compared to conventional retinoscopy in determining refractive errors among patients ≥ 5 years attending Mbarara University and Referral Hospital Eye Center.

Methods: This was a hospital based descriptive cross sectional study conducted at MURHEC from June to July 2022. A sample size of 244 (488 eyes) participants ≥ 5 years were recruited. A total of 488 eyes underwent retinoscopy first and then autorefraction by KR – 9000. Participants 5 – 17 years underwent cycloplegic refraction using tropicamide 1% on both retinoscopy and autorefraction. Refraction (both retinoscopy and autorefraction) was done by principal investigator and findings confirmed by an experienced optometrist.

Results: A total of 488 eyes out of the 244 participants were enrolled. 144 (59.0%) were females and 100 (41%) were males and majority 40.6% (n=99) were in the age group of 18 – 28 years. 241 (98.8%) were Ugandans, 147 (60%) from Mbarara district, 198 (81%) from the Munyankole tribe and majority 96 (39.3%) had attained tertiary education.

Overall, the autorefractor (KR – 9000) had a sensitivity of 87.6%, specificity of 54.7% and NPV of 58.2% in detecting refractive errors compared to the gold standard. In determining overall, spherical power, the autorefractor (KR – 9000) had a sensitivity of 95.6%, specificity of 64.8% and NPV of 96.1%.

In detecting the spherical power all of all grades of myopia, it had a sensitivity and NPV of 100% respectively. However, it had a specificity of 98.2%, 98.0% and 54.2% in detecting spherical power of high, moderate and low myopia respectively.

In this study, there were no eyes with high hyperopia. The autorefractor (KR – 9000) had a sensitivity of 100%, specificity of 91.5% and NPV of 100% in detecting moderate hyperopia. However, in detecting spherical power of low hyperopia, it had a sensitivity of 94.6%, specificity of 24.6% and NPV of 80.8% compared to the gold standard.

Overall, in determining cylindrical power of astigmatism, autorefractor (KR – 9000) had a sensitivity, specificity and NPV of 72.5%, 88.2% and 59.5% respectively compared to the gold standard.

The autorefractor (KR – 9000) had a sensitivity, specificity and NPV of 100% respectively in determining high and moderate levels of astigmatism compared to the gold standard. It however had a low sensitivity (64.7%), low NPV (32.0%) and an excellent specificity (100%) in determining low astigmatism.

In determining axis of astigmatism, autorefractor (KR – 9000) had a sensitivity of 84.4%, specificity of 64.1% and NPV of 59.4% compared to conventional retinoscopy.

Conclusion: The proportion of the sensitivity, specificity and NPV in determining spherical power, cylindrical power and axis of astigmatism in this study showed that the autorefractor (KR – 9000) is a good tool in determining refractive errors among patients ≥ 5 years.

3.1.9.4 Prevalence and factors associated with Astigmatism among patients attending Mbarara University and Referral Hospital Eye Centre

Gisele Kirere, John Onyango, Amos Twinamasiko

Background: Astigmatism is the commonest refractive error across the different age groups and ethnicities, and its prevalence continues to increase due to different factors and yet not all patients who attend hospitals are routinely screened for it. This study determined the prevalence and factors associated with astigmatism among patients aged 5 years and above attending Mbarara University and Referral Hospital Eye Centre

Methods and materials: This hospital-based cross-sectional study was conducted among 413 patients aged ≥ 5 years attending Mbarara University and Referral Hospital Eye Centre. Consecutive sampling was used. A structured questionnaire was administered to the participants. We then examined the participants' eyes on a slitlamp. After objective refraction was done using a KR – 9000 autorefractor. Those who had errors ≥ -0.5 were then done subjective refraction. A patient was considered to have astigmatism if both eyes or either of the eyes had a cylindrical power of ≥ -0.5 . The proportion of patients with astigmatism was then determined by dividing the number of patients diagnosed with astigmatism by the total number of patients who were screened. Logistic regression was used to determine the factors associated with astigmatism. Factors with $p < 0.2$ were considered for multivariate model. A factor was considered significant at $p < 0.05$. All analyses were done using Stata 17.

Results: The study enrolled 413 participants. The mean age of the patients was $33.6 \text{ years} \pm 20.6$. The majority (56.7%) of the participants were female and Banyankole (81.1%). The prevalence of astigmatism among the participants was 74.82%. Males had the highest prevalence of astigmatism of 76.5% ($n=179$), The prevalence of astigmatism was highest (86.2%) in patients aged > 40 years. Compound astigmatism at 31.7% was the most common type of astigmatism the patients presented with. Male patients ($p < 0.009$), and Banyankole ($p < 0.039$) were significantly associated with a likelihood of having astigmatism.

Conclusions: The prevalence of astigmatism among patients attending Mbarara University Referral Hospital Eye Center was high. Males and Banyankole had a higher likelihood of having astigmatism. Thus, there is a need to screen all patients attending MURHEC for astigmatism, especially the males.

3.1.9.5 Incidence and factors associated with Significant Corneal Endothelial Cell loss following Small Incision Cataract Surgery at Mbarara University and Referral Hospital Eye Centre.

Rita Kageni, John Onyango, Simon Arunga

Introduction: The innermost layer of the cornea in humans is called the corneal endothelium. It serves primarily as a fluid barrier, maintaining corneal transparency. Endothelial cells are not known to be capable of proliferating. Following cataract surgery, there is acute and also chronic endothelial cell loss which seems to be larger than the loss of the normal aging process. Corneal endothelial cell loss resulting in cornea edema and eventual corneal decompensation is a potentially visually threatening complication of cataract surgery with expensive treatment options like corneal transplant.

Purpose: To determine the incidence and factors associated with significant corneal endothelial cell loss following manual small incision cataract at Mbarara University of Science and Technology.

Methods: This study was conducted as a hospital-based observational prospective cohort at Mbarara University and Referral Hospital Eye Centre. It included adult patients 40 years and above admitted for manual small incision cataract surgery. Those with corneal opacities/injuries and those with a previous history of intraocular surgeries were excluded. We included 91 participants that had their endothelial cell density measured before and one day after cataract surgery using a confocal microscope. A 20% loss was considered a significant loss. The associated factors with significant corneal endothelial cell loss were determined by Chi-square test and binomial regression, and repeated analysis comparing each independent variable with significant endothelial cell loss was done. Unadjusted odds ratios with their corresponding 95% CI were generated. A variable was considered significant if it has a $p < 0.05$. All statistically significant factors in bivariate analysis ($p < 0.05$), those with p -value < 0.1 , and those which are biologically plausible with significant endothelial cell loss were considered in the multivariate analysis which was performed to control for confounding among independent variables. Ethical clearance was obtained from the Institutional Ethical Review Committee of Mbarara University of Science and Technology.

Results: 91 participants were enrolled and all completed the one-day follow-up. The significant endothelial cell loss was found to be 49.5% ($n=45$). The factors found to be statistically significant with this loss included large cataracts ($p = 0.026$), duration of surgery of more than 30 minutes ($p > 0.001$), and history of uveitis which had a strong association (OR - 8.0) however was not found to be statistically significant ($p=0.08$).

Conclusion: The incidence of significant corneal endothelial cell loss after manual small incision cataract surgery at Mbarara University and Referral Hospital eye center was found to be relatively high at 49.5%. The strongly associated factors included surgical duration of more than 30 minutes and large cataracts (grade 3 of nuclear sclerosis). History of uveitis had a strong association however was not found to be statistically significant (p -value of 0.088).

Recommendations: Surgeons performing manual small incision cataract surgery should aim at completing the procedure in under 30 minutes. Incisions for large cataracts (grade 3 nuclear sclerosis), should be made larger than the normal incision of manual small incision cataract surgery to ease delivery of the large nucleus. Emphasis should be placed on proper patient selection for surgical expertise.

The baseline knowledge from this study can be used as a basis for another study that could determine the long-term effects on vision for patients with significant endothelial cell loss.

3.1.9.6 Validity of the ICARE IC100 Tonometer compared to Goldmann applanation Tonometer in determining Intraocular Pressure among adult patients attending Mbarara University and Referral Hospital Eye Centre

Ilonogbe Dende Dieudonné, John Onyango

Background: Measurement of intraocular pressure (IOP) is an essential examination in daily ophthalmic practice. It is fundamental in the management and follow up of glaucoma patients. The iCare IC100 is a new handheld tonometer, which is based on the impact-induction principle also known as rebound tonometry. It is quick and simple to use. Studies have reported varying sensitivities and specificities of the iCare tonometers. There is paucity of data on the sensitivity and specificity of the iCareIC100 in measuring IOP and detecting high IOP in Africans.

Aim: To establish the validity of the iCare IC100 tonometer in measuring IOP compared to Goldmann Applanation Tonometer among adult patients attending Mbarara University and Referral Hospital Eye Centre, Southwestern Uganda.

Methods: The study used an unmatched case control study design, and the study was conducted at the Mbarara University and Referral Hospital Eye Centre (MURHEC).

The study recruited patients aged 18 years and above attending the out-patient department of the MURHEC. We collected socio-demographic data from the patients. After clinical examinations, the principal investigator (PI) would measure the IOP of each patient (both eyes starting with the right eye) using the Goldmann Applanation Tonometer (GAT). The IOPs of each patient were measured again by the research assistant (RA) and the PI using the iCare IC100. The sensitivity and specificity of the iCare IC100 was determined by comparing the IOP measurements by the PI using the iCare IC100 to the IOP measurements using GAT with, GAT as the reference standard. The inter-user reliability was determined by comparing the IOP measurements by the PI and the RA using the iCare IC100.

Results: A total of 127 participants (254 eyes) were enrolled. The majority (60.6%) of the participants were females. The mean age of the participants was 50.8 ± 17.8 years. The sensitivity and specificity of iCare IC100 tonometer were 97.14% (95% CI 94.25 -100.00) and 90.91% (95%CI: 85.91-95.91) respectively; and with a positive predictive value of 98.08% (95.69-100) and negative predictive value of 86.96% (81.10-92.81) respectively. There was a high correlation ($r = 0.99$, $p < 0.001$) between the IOP measured by the Research assistant (RA) and the Principal Investigator (PI) using the iCare IC100.

Conclusion: The iCare IC100 has a high sensitivity and specificity, and high inter-user reliability, and is therefore a valid tool for measuring intraocular pressure and determining patients with high intraocular pressure.

Keywords: Intraocular pressure, validity

3.1.10 MASTER OF MEDICINE IN PAEDIATRICS & CHILD HEALTH

3.1.10.1 Adolescents' perceptions, attitudes and experiences regarding own Cancer Diagnosis at Mbarara Regional Referral Hospital in Southwestern Uganda

Akambasisa Mercy, Barnabas Atwiine, Kemigisha Elizabeth, Rukundo Godfrey Zari

Background: Pediatric and adolescent cancer is one of the leading causes of mortality and morbidity worldwide. Positive perceptions and attitudes among adolescents towards cancer disease, plus well managed experiences of adolescents with cancer are key factors for timely initiation of care for cancer, and retention in care, reduced stress, and improved quality of life among adolescents with cancer.

Objective: This study aimed at exploring the perceptions, attitudes, and experiences of adolescents receiving care at Mbarara Regional Referral Hospital regarding their own cancer disease.

Methods: In a qualitative study carried out between July and December 2022, in-depth semi-structured interviews with consented and assented adolescents with cancer and receiving care at Mbarara Regional Referral Hospital (MRRH), were conducted. 30 Adolescents participated in the study. The study was approved by the Research and Ethics Committee of Mbarara University of Science and Technology (MUST).

Results: The perceptions and attitudes were poor at the beginning of care, most participants thought of mystical and fetish causes of cancer and thought treatment was herbal and from witch doctors, these perceptions and attitudes were progressively refined as they received information from the health workers. Their experiences were generally negative and included body disfigurement, social challenges, emotional distress, pain, interrupted education among many others. Positive experiences included improvement in symptoms of the disease after starting care, and adequate support from the health workers, their families, and friends.

Conclusion: Findings from this study illustrated those adolescents' perceptions and experiences vary greatly, ranging from low to high knowledge and negative to positive attitudes during treatment because of social support, communication from health workers and response to treatment. However, participant who witness adverse effects of the cancer e.g., death of a child on treatment had poor perceptions and some were discouraged to adhere to their own medication

3.1.10.2 Clinical profiles, incidence and predictors of Early Neonatal Mortality at Mbarara Regional Referral Hospital

Lydia Kyasimire, Kyoyagala Stella, Nantongo Josephine

Background: The neonatal period, is a very vulnerable period. The causes of early neonatal deaths reflect the quality of paediatric and obstetric care available. The commonest causes of neonatal death are severe malformation, extreme prematurity, obstetric difficulties, trouble adjusting to extra uterine life, or infection. Neonatal mortality accounts for 40% of all under-5 mortality. Three-quarters of new born deaths happen within the first week of life. In Uganda, the NMR has been constant at 27 deaths per 1000 live births in the past decade. Neonates make the bulk of admissions to the paediatric ward of MRRH, and contribute significantly to

the overall mortality rate at MRRH. However, the clinical profiles, incidence and predictors of early neonatal mortality of admitted neonates are not known, in this setting.

Objective: To study the clinical profiles, and determine the incidence and predictors of early neonatal mortality of neonates at Mbarara Regional Referral Hospital.

Methods: We conducted a prospective cohort study of 384 neonates, <7days old, admitted to MRRH. We used a data collection tool to collect maternal social-demographic and obstetric information, and performed physical examination of the neonates for clinical profiles. We followed up neonates at 24 and 72 hours of life, and at 7 days of life for mortality, the primary outcome of interest. We used modified Poisson regression analysis to determine predictors of early neonatal mortality.

Results: The most common clinical profiles at admission were prematurity (46%), low birth weight (LBW) (44%), sepsis (36%), hypothermia (35%), and birth asphyxia (32%). The incidence of early neonatal mortality was at 12.5%. The predictors of mortality were hypothermia, [adjusted Risk Ratio (aRR): 4.10; 95% C.I (1.15-14.56), p= 0.029], birth asphyxia, [aRR: 3.6; 95% C.I (1.23-10.73), p= 0.020] and delayed initiation of breastfeeding, [aRR: 7.20; 95% C.I (1.01-51.30), p= 0.049].

Conclusion: The commonest admission diagnoses were prematurity, LBW, sepsis, birth asphyxia and hypothermia. The incidence of mortality was high, 12.5%. The paediatric and maternity clinical care team at MRRH should quickly identify neonates with or at risk of hypothermia and birth asphyxia, so as to optimise early interventions to manage or prevent these. Furthermore, all neonates should be supported to breastfeed within their first hour of birth, where possible.

3.1.10.3 Caregivers' perceptions of the benefits and harms of Hydroxyurea use by their children with sickle cell disease at Mbarara Regional Referral Hospital

Lutasingwa Dan, Atwine Barnabas

Background: The experiences of children and caregivers using hydroxyurea to treat sickle-cell disease are not well described especially in our setting. In order to understand this issue, we aimed to explore caregivers' perceived benefits and harms of hydroxyurea use by their caregivers of children with Sickle Cell Disease.

Methods: In a qualitative study carried out in November and December 2022, in-depth interviews with consented caregivers of children with sickle cell disease attending the Sickle Cell Clinic of Mbarara Regional Referral Hospital (MRRH) were conducted. We explored their perceptions about the benefits and harms of hydroxyurea use by their children. Recorded interviews were transcribed and analyzed using Nvivo 12 to identify themes. The study was approved by the Research and Ethics Committee of Mbarara University of Science and Technology (MUST)

Results: Interviews of 25 caregivers of 29 children attained saturation. Eighty-four (84%) caregivers were female. Their age groups were 20-30 years (44 %), 31-40 years (20%), 41-50 years (24%) and above 50 years (12%). Thirteen (44.8%) children were male, and 16 (55.2%) female. Four (13.8%) children were below 1 year, 10 (34.5%) were aged 1-5 years, 11 (37.9%) were aged and 4(13.8%) were above 10 years, with a median age of 7.2 years IQR

(4-11). Eleven (37.9%) children had used hydroxyurea for <1 year and 18(62.1%) for > 1 year. All caregivers reported that they and their children had had observed benefits of hydroxyurea use which included: family stability, reduction of symptoms, hospitalization frequency, and improved level of child activity, school attendance and performance. A few caregivers reported perceived harms like side effects and, fear of long-term complications although many worried about the length of treatment.

Conclusion and Recommendation: All caregivers reported benefits of hydroxyurea use and some reported harms. Hydroxyurea use should be made widespread and health care workers ought to be encouraged to know that the caregivers of the children with sickle cell disease find the therapy useful.

3.1.10.4 Patterns and Predictors of Mortality in the First 24 Hours of Admission among Children Aged 1-59 Months Admitted At Mbarara Regional Referral Hospital, Southwestern Uganda

Ochora Moses, Kyoyagala Stella, Namoiija Dorah, Kumbakumba Elias

Background: Most deaths among children under 5 years occur within the first 24 hours of hospital admission from preventable causes such as diarrhea, pneumonia, measles, malaria, and HIV/AIDS. This is worsened by socioeconomic factors such as delays seeking health care, delayed interventions, financial limitations, unavailability of life-saving equipment, and inadequate support services. The demographic and clinical predictors of death within 24 hours of hospital admission are not yet well documented in our setting.

Aim: This study aimed to describe the patterns and predictors of mortality within the first 24 hours of admission among children aged 1-59 months admitted at Mbarara Regional Referral Hospital.

Methods: We conducted a prospective cohort study among 208 children aged 1-59 months admitted at the MRRH. Participants were consecutively enrolled and pre-hospital, clinical, and laboratory factors that predicted their mortality within 24 hours of in-hospital admission were studied. Patterns of mortality were described and statistical analysis of predictors of mortality was done.

Results: We enrolled 208 children aged 1-59 months in the study. The mortality rate within the first 24 hours of admission among children aged 1-59 months in MRRH was 7.7% (16), the median time to death was 7 hours and death was higher among infants. Pneumonia, Severe Acute Malnutrition, and Malaria accounted for 26.4%, 23.5%, and 11.5%, respectively of deaths. Admission during the night (p-value 0.047, AHR 3.7 (95% CI 1.02-13.53)) and having an abnormal neutrophil count (p-value 0.034, AHR 3.5 (95% CI 1.10-11-31)) were predictive of mortality.

Conclusion: The most common causes of death within 24 hours of admission are pneumonia and severe acute malnutrition. The mortality rate was higher among infants. Being admitted at night and having an abnormal neutrophil count is predictive of mortality within 24 hours of admission.

3.1.10.5 Prevalence of Anemia among preterm infants and its effect on growth velocity in the first 8 weeks of life at Mbarara Regional Referral Hospital

Twine Margaret, Nampijja Dorah, Keneema Olive

Background: Anemia in preterm infants is a recipe for poor growth and development, malnutrition and economic stress. The magnitude of preterm infants with anemia is not documented and majority of the preterm infants have suboptimal growth velocity.

Aim: This study aimed to determine the prevalence of anemia among preterm infants and its effect on their growth velocity in the first 8 weeks of life at Mbarara Regional Referral Hospital.

Methods: A prospective cohort study was conducted among 98 preterm infants admitted at MRRH. Participants were consecutively enrolled and their hemoglobin levels ascertained during the early neonatal period and at 4 weeks of life. Weight, length and head circumference were measured at 4 and 8 weeks of life. Growth velocity was calculated for each preterm infant at 4 and 8 weeks. Effect of anemia on growth velocity at 4 and 8 weeks of life was analyzed statistically.

Results: The prevalence of anemia among preterm infants during the early neonatal period was 44.9%. The mean hemoglobin was 15.4 g/dl (\pm 2.6). The incidence rate of anemia at 4 weeks of life was 113.4 per 1000, 95% CI (82.8, 155.2). The median growth velocity was 5.3 g/kg/day (IQR: 2.4 – 7.3) at 4 weeks of life. The mean growth velocity was 12.7 g/kg/day (\pm 3.3) at 8 weeks of life. At 8 weeks of life, anemia in the early neonatal period increased the risk of low growth velocity by 1.4 times, adjusted RR 1.42, 95% CI (1.08, 1.88), $p=0.013$.

Conclusion: Prevalence of anemia during the early neonatal period is high and so is the incidence of anemia at 4 weeks of life. Growth velocity of preterm infants is negatively affected by anemia during the early neonatal period. Therefore, routine screening of all preterm infants for anemia and growth monitoring is essential.

Keywords: anemia, prematurity, growth velocity

Nampijja Dorah, Keneema Olive

3.1.10.6 Clinical Profiles and Survival of Children with Hodgkin Lymphoma at the Mbarara Regional Referral Hospital Cancer Unit

Muna Ahmed Adan, Barnabas Atwiine, Kalubi Peters

Background: Survival among children with Hodgkin lymphoma at in our setting is unknown yet variation in culture and environmental factors may influence the clinical profiles and survival of these children This study described the clinical characteristics and survival of children diagnosed with Hodgkin lymphoma at the Mbarara Regional Referral Hospital Cancer Unit

Methods: In a retrospective cohort study conducted at the MRRH Cancer Unit in July and August 2022, a data regarding demographics, disease and treatment characteristics was extracted from medical records of all children below 18 years diagnosed with Hodgkin lymphoma from 1st May 2018 to 31st July 2022. Frequencies and proportions were used to

describe the clinical profiles. Overall survival and its associated factors were estimated using Kaplan Meier curves and Cox proportional hazard model regression analysis respectively. The study was approved by the Review and Ethics Committee (REC) of Mbarara University of Science and Technology (MUST).

Results: Thirty-eight children had been diagnosed with Hodgkin lymphoma during the study period, with a mean age of 10.6 years and 27 (71.1%), males. All children presented with lymphadenopathy, for cervical lymphadenopathy, 34 (89.5%). 28 (73.7%) had B symptoms, and 18 (47.4%) bulky disease. 20 (50.1%) had mixed cellularity histological subtype and their clinical stages were as follows: stage III 15(39.5%), and 35 (92.1%) were rapid early responders after 2 cycles of chemotherapy. 34 (89. %) were alive and 31(88.6%) were in remission. The overall 3-year survival of children with Hodgkin Lymphoma at MRRH cancer unit was 82.9% and the factors associated with survival were remission p value <.001***, stage of disease p value 0,034 and female sex p value 0,032.

Conclusions: Painless lymphadenopathy is the universal clinical presentation of children with Hodgkin lymphoma and the overall 3-year survival of children with Hodgkin Lymphoma at MRRH cancer unit is good and comparable to what is achieved in the developed world.

3.1.11 MASTER OF MEDICINE IN PSYCHIATRY

3.1.11.1 Substance use disorders among patients with primary mental illness in Mbarara regional referral hospital

Rubega Abel, Scholastic Ashaba, Samuel Maling

Background: The numbers of people using substances of addiction globally is rising at approximately 296 million in 2019 with increase Substance use disorders (SUDs). Patients with primary mental illnesses comorbid with substance use disorders face a number of challenges that impact their wellbeing and which go unattended to during their routine care. Alcohol is the most widely available and most heavily taken drug in sub-Saharan Africa. In Uganda in 2022, marijuana, khat, and alcohol are frequently used by persons who have mental illnesses.

Objective: The purpose of this study was to determine the prevalence of SUDs and associated factors among patients with primary mental illness attending the mental health clinic at Mbarara Regional Referral Hospital (MRRH).

Methods: It was a cross-sectional study conducted among 385 Patients with primary mental illnesses attending the outpatient clinic at MRRH, using a questionnaire that captured information on socio-demographic characteristics, substance use disorders based on Cannabis Use Disorder Identification Test and Alcohol Use Disorder Identification Test, and adherence to medication using The Adherence in Chronic Disease Scale. Multivariable logistic regression model was run to determine the factors associated with SUDs.

Results: The participant's mean age was 38.93 (SD ± 13.76) years. Women made up the majority of participants 197 (51.17%). Among the participants, 13.25 % had SUDs. The mean age of the participants was 57.7 (SD=12.69). male gender (AOR=13.61, 95% CI=3.66-50.63: p = 0.001), secondary education (AOR=3.45, 95% CI=1.20 – 9.97: P=0.022), being a

Christian (AOR=6.58,95% CI=1.54–28.17: p=0.011) and prior history of substance (cannabis/alcohol) use (AOR=34.95, 95% CI=8.80 – 138.72: p = <0.001)were significantly associated with the likelihood of developing SUDs whereas Medium adherence to medications (AOR=0.29, 95% CI=0.09-0.097: p=0.045) and high adherence to medications (AOR=0.027, 95% CI=0.09-0.83: p=0.027) were protective factors against SUDs.

Conclusion: There an increase in the prevalence of SUDs among patients with primary mental illness attending the mental health clinic at Mbarara Regional Referral Hospital. Therefore, people with primary mental illnesses should be screened and treated for SUD.

Keywords: substance use disorder, primary mental illness

3.1.11.2 Depression, suicidality and associated factors among people with Diabetes and/or Hypertension at a tertiary Hospital in southwestern Uganda

Rahel Nkola, Godfrey Zari Rukundo, Scholastic Ashaba

Background: Depression and suicidality are more common among patients with chronic physical illnesses, including diabetes mellitus (DM) and hypertension (HTN). Both suicidality and depression are preventable and curable if diagnosed early and treated. However, these conditions go undetected, and underdiagnosed, and hence untreated during routine care of patients with chronic physical illnesses such as DM and HTN. Therefore, the purpose of this study was to identify the prevalence and factors associated with depression and suicidality among people living with DM and /or HTN in Uganda.

Methods: This was a cross-sectional study conducted among 512 people with DM and /or HTN at a tertiary hospital using a questionnaire that captured information on socio-demographic characteristics, depression based on PHQ-9 (cutoff: 10/27), and suicidality in the past 12-months. Multivariable logistic regression models were run to determine the factors associated with depression and suicidality among people with DM and/or HTN.

Results: Seventy-three percent of the participants were women. The mean age of the participants was 57.7 (SD=12.69). The prevalence of depression and suicidality was 22.07% and 8.59%, respectively. Fear of complications (AOR = 6.13; 95% CI = 2.58-14.56; p = 0.01) and being a widow/ widower (AOR = 6.94; 95% CI = 0.97-49.25; p = 0.05) increased the likelihood of depression among people with DM and/or HTN. A high level of antidiabetic medication adherence (AOR = 0.10; 95% CI = 0.02-0.72; p = 0.02) reduced the likelihood of having depression among people with DM. However, none of the studied variables were associated with suicidality in this study.

Conclusion: Depression and suicidality are common among people with DM and/or HTN. Therefore, people with DM and/or HTN should be screened for depression and suicidality for earlier recognition and treatment.

Keywords: Depression; suicidality; diabetes mellitus; hypertension; Uganda, sub-Saharan Africa.

3.1.12 MASTER OF SCIENCE IN BIOCHEMISTRY

3.1.12.1 Prevalence of Zinc Deficiency and its association with the Immunity of Children aged 12-59 months admitted on Pediatric Ward of Masaka Regional Referral Hospital

Male Keneth, Atwiine Barnabas, Kiwanuka N. Gertrude

Background: Zinc is an essential micronutrient with a variety of physiological functions. Zinc deficiency (ZnD) affects development of acquired immunity and contributes to failure to grow in children under 5. Still, there is paucity of data on the zinc status of children under 5 years of age in Uganda, particularly in hospital settings. Serum zinc status, and the association between serum zinc levels and the immune system in children aged 12 to 59 months were assessed.

Methods: This cross-sectional, laboratory-based study enrolled 40 children as they were admitted to the paediatric ward of Masaka RRH. Anthropometric measurements were taken and interpreted according to WHO growth standards charts appropriate for age and sex. Serum zinc, albumin and C-reactive protein were determined by flame absorption spectrophotometry and photometric methods respectively. Whole blood cell count was measured using an automated haemalyser, and interleukin-2 and -4 levels enzyme-linked immunosorbent assays. Student's t, Mann Whitney tests and correlation coefficients were used to determine relationships between variables.

Results: The mean age of the children was 27.8 (SD10.6) months and females were older than males ($P < 0.003$). Nearly, a third (13/40) were undernourished, 22.5% stunted and 20% wasted, and 82.5 % were anemic (Hb < 11.0 g/dL). The prevalence of ZnD was 40.6%. Serum zinc levels were positively correlated with total white blood cell ($r_s = 0.41$, $P = 0.02$) and lymphocyte ($r_s = 0.43$, $P = 0.01$) counts. Overall, children had high levels of IL-2 and IL-4, but both were not associated with ZnD. High cRP levels were negatively correlated with Hb levels.

Conclusion: The high prevalence of ZnD, among the under 5 children admitted to the paediatric ward of Masaka RRH is suggestive of a bigger problem in the community. Regular assessment especially of children aged below 24 months for possible zinc deficiency should be done, and zinc supplemented as an intervention, where there is high suspicion of the ZnD not only for those suffering from diarrhea.

3.1.12.2 Viral Genomic analysis of African Swine Fever Viruses from the 2019-2021 disease outbreaks in Uganda.

Ezinga Richard; TonnyKabuuka; TusubiraDeusdeddit.

Background: African Swine Fever (ASF) is a highly lethal disease affecting pig farmers globally leading to enormous economic losses. It is endemic with sporadic outbreaks continually reported in Ugandasince 2010. Currently, no known approved treatment or vaccine is available for its control and this could be attributed to the highly evolving nature of the virus. We therefore aimed at identifying the pig deaths attributable to ASF and genotype the virus strains involved in the 2019/2021 ASFV disease outbreaks in Uganda.

Methods: In our study, 196 field samples were randomly selected from the 400 archived field samples at NaLIRRI. We modified Viral DNA extraction methods to reduce results turnaround time and amplified *P72* genes based on new PCR 2X PCR BIO Taq mix kit. This

was followed by gel electrophoresis for ASFV disease diagnosis. Two ASF viral DNA amplicons (P9C and SOR 35) were partially sequenced (*P72* gene) for strain/genotype elucidation.

Results: Our study revealed that ASFV was responsible for outbreaks in 5 districts (Kasese, Soroti, Mukono, Bunyangabu and Namayingo) with a proportion of 9.18% (CI 95%; 5.5% – 14.1%). Of the 18 positive samples, two virus isolates were purposively selected for partial sequencing. Short nucleotide sequences of 5-7 bp were returned and these were not sufficient for downstream genomic analysis.

Discussion: Our study confirms that ASFV was responsible for the 2019/2021 outbreaks thus endemic in Uganda and can be diagnosed faster within the country using conventional PCR. We further observed that field samples are not suitable for genome sequencing especially if samples must be shipped or transported for quite long periods of time.

Conclusions: ASF Virus was responsible for the recently reported outbreaks and is still endemic in Uganda thus threatening the growth of the pig production industry. Virus enrichment is required for successful genome sequencing. Adoption of procedures that enrich virus DNA yield to improve genome sequencing objectives. Furthermore, newer techniques like RT-PCR could replace conventional PCR methods since they easily quantify the virus basing on the Ct-values.

Keywords: African Swine Fever virus, Partial genome sequencing, Outbreaks

3.1.13 MASTER OF SCIENCE IN MEDICAL MICROBIOLOGY

3.1.13.1 Phenotypic and genotypic prevalence of *Candida* species associated with vulvovaginal candidiasis in pregnant women attending the antenatal clinic of Mbarara regional referral hospital

Jude C. Busingye, Herbert Itabangi, Kennedy Kassaza

Background: Vulvovaginal candidiasis (VVC) represents a universal health hazard that contributes to significant morbidity in pregnant women. Antifungal resistance is a worldwide increasing health problem that reduces treatment options, increased treatment costs and its time consuming. However minimal information is known about the phenotypic and genotypic prevalence of candida species in Mbarara city.

The purpose of this study was to define the patterns of FKS1 and ERG11 resistant genes isolated in *Candida* species associated with vulvovaginal candidiasis.

Methods: A laboratory-based, cross section study was conducted involving 90 candida species isolates previously collected from a larger study. The isolates were sub cultured on Sabouraud dextrose agar with 0.1% gentamycin for purity of yeast colonies. Identification to species level was performed using germ tube method and Chromogenic agar media. Phenotypic susceptibility methods (Kirby-Bauer and minimum inhibitory concentration) were used and the clinical breakpoint susceptibility was determined according to the CLSI clinical breakpoint reference methods. Polymerase chain reaction method and electrophoresis were used for identification of the ERG11 and FKS1 mutated gene in the phenotypically resistant isolates. Mean, regression and the chi square test were used to evaluate the associations of resistance patterns between resistant and susceptible isolates.

Results: Out of the 90 candida isolates recovered, 56% were candida albicans and 44% were non candida albicans. Caspofungin showed the best antifungal activity. All the candida isolates were susceptible to Caspofungin. The overall drug resistance rate of Candida species was observed against flucytocine (82.2%), followed by amphotericin B (35.6%) and lastly fluconazole (34.4%). The FKS1 mutated gene was not detected in randomly selected caspofugun susceptible isolates. The ERG11 mutated was detected in 80.6% of the fluconazole resistant isolates and 87.5% of the isolates with intermediate activity towards fluconazole

Conclusion: This study demonstrates that there is significant evidence that the erg11 gene mutation causes reduction in fluconazole drug susceptibility (p value <0.001). Susceptible dose dependence should not be ignored as it may be associated with ERG11 gene mutation leading to resistance to fluconazole. Caspofugin was the most effective drug with 100% susceptibility. Amphotericin B and flucytosine have limited antifungal activity. We recommend the use of Caspofunginas treatment of vulvovaginal candidiasis in pregnant women.

3.1.13.2 Phenotypic and genotypic prevalence of Candida species associated with vulvovaginal candidiasis in pregnant women attending the antenatal clinic of Mbarara regional referral hospital.

Nalumaga Pauline Petra, Herbert Itabangi, Kennedy Kassaza

Background: Vulvovaginal candidiasis (VVC) represents a universal health hazard that contributes to significant morbidity in pregnant women. Antifungal resistance is a worldwide increasing health problem that reduces treatment options, increased treatment costs and its time consuming. However minimal information is known about the phenotypic and genotypic prevalence of candida species in Mbarara city. The study was set to define the patterns of FKS1 and ERG11 resistant genes isolated in Candida species associated with vulvovaginal candidiasis.

Methods: A laboratory-based, cross section study was conducted involving 90 candida species isolates previously collected from a larger study. The isolates were sub cultured on Sabouraud dextrose agar with 0.1% gentamycin for purity of yeast colonies. Identification to species level was performed using germ tube method and Chromogenic agar media. Phenotypic susceptibility methods (Kirby-Bauer and minimum inhibitory concentration) were used and the clinical breakpoint susceptibility was determined according to the CLSI clinical breakpoint reference methods. Polymerase chain reaction method and electrophoresis were used for identification of the ERG11 and FKS1 mutated gene in the phenotypically resistant isolates. Mean, regression and the chi square test were used to evaluate the associations of resistance patterns between resistant and susceptible isolates.

Results: Out of the 90 candida isolates recovered, 56% were candida albicans and 44% were non candida albicans. Caspofungin showed the best antifungal activity. All the candida isolates were susceptible to Caspofungin. The overall drug resistance rate of Candida species was observed against flucytocine (82.2%), followed by amphotericin B (35.6%) and lastly fluconazole (34.4%). The FKS1 mutated gene was not detected in randomly selected caspofugun susceptible isolates. The ERG11 mutated was detected in 80.6% of the

fluconazole resistant isolates and 87.5% of the isolates with intermediate activity towards fluconazole

Conclusion: This study demonstrates that there is significant evidence that the *erg11* gene mutation causes reduction in fluconazole drug susceptibility (p value <0.001). Susceptible dose dependence should not be ignored as it may be associated with ERG11 gene mutation leading to resistance to fluconazole. Caspofugin was the most effective drug with 100% susceptibility. Amphotericin B and flucytosine have limited antifungal activity. We recommend the use of Caspofungin treatment of vulvovaginal candidiasis in pregnant women.

3.1.13.3 Prevalence and Molecular Determinants of Colistin Resistance among Multidrug-Resistant *E.Coli* isolates recovered from Humans and animals in Uganda

Phiona Twinomugisha, Joel Bazira

Background: Antimicrobial resistance in Gram negative bacteria (GNB) is one of the major causes of diseases and death globally, particularly the Enterobacteriaceae family. Colistin has gained clinical value as a last-resort medication for managing certain Gram-negative bacterial infections that are multidrug resistant. Recently, in China, it was discovered that members of the Enterobacteriaceae family were resistant to this last-ditch class of antibiotics. Subsequently, many other parts of the world reported having experienced the same problem. Our extended search for published articles about this kind of resistance in Uganda was futile as we were not able to find any approved studies.

Aim: In this research study, we aimed at understanding the prevalence of Colistin drug resistance among multidrug-resistant *E.coli* and the genes that confer the resistance in Uganda.

Methods: A cross-sectional laboratory study was conducted, involving multidrug resistant *E.coli* isolates. The exposure was to detect the Phenotypic Colistin resistance and the type of gene responsible for it. *Escherichia coli* isolates kept in the medical microbiology department (MUST) were re-identified, performed Broth diffusion test to determine MIC for Colistin Sulphate and PCR using *mcr 1* and *mcr 2* primers to determine Colistin Resistant Determining Genes.

Results: 72 (53.3%) of the 135 isolates came from people, while 63 (46.7%) came from animals. Among the animals, *E. coli* clinical isolates were recovered from cows, goats, pigs, and sheep in the proportions of 11.2% (24/135), 11.7% (25/135), 3.7% (8/135) and 2.8% (6/135), respectively. Out of 135 *E.coli* isolates, 51 (including 30 from human and 21 from animal sources) exhibited phenotypic Colistin resistance. 9 of the 21 isolates from animal sources came from cows, 7 from goats, 1 from pigs, and 4 from sheep. Out of 135 examined *E.coli* isolates, a total of 10 (7.4%) CRDGs were found. These ten positive isolates contained 7 (5.18%) *mcr2* genes and 3 (2.22%) *mcr1* genes, respectively. All *E.coli* isolate that possessed the Colistin Resistance Determining Genes tested were phenotypically resistant to Colistin.

Conclusion: The study showed a significant rate of Colistin drug resistance among the *E. coli* clinical isolates tested and so the occurrence of Colistin drug resistance determinants in our region should not be ignored or overlooked.

Recommendation: Continuous surveillance and further research of other Colistin Resistance Determining Genes responsible for causing resistance to Colistin preferably with a bigger sample size. Further testing of other Gram-negative Bacteria besides *E.coli* to determine the presence of these Colistin Resistance Determining Genes so as to learn more about the impact of Colistin resistance in Uganda both in animals and humans.

3.1.13.4 Drug susceptibility testing and characterization of *Neisseria gonorrhoeae* isolated from clinical samples at regional and national referral hospitals in Uganda

Jackson Were, Joel Bazira

Gonococcal infections (gonorrhoea) are increasingly becoming important sexually spread infections in humans in sub-Saharan countries including Uganda. Antimicrobial resistance associated with *Neisseria gonorrhoeae* is rising, and spreading very fast, threatening health crisis. However, the circulating *Neisseria gonorrhoeae* strain in Uganda have not been fully characterized. This study was carried out to investigate genetic characterization of *Neisseria gonorrhoeae* isolates and antibiotic resistance as well as assess determinants of resistance in Western and Central in Uganda. Molecular techniques (PCR and DNA probes) were used to characterize *Neisseria gonorrhoeae* strains in the positively screened isolates at three important gene loci; *penA*, *gyrA* and *parC*. Kirby-Bauer was used to assess the genotypic and phenotypic resistance to drugs, namely; penicillin, tetracycline and cefuroxime, among others, and Illumina shotgun sequencing data to identify determinants of resistance. Fifty-four positive isolates of *Neisseria gonorrhoeae* were characterised and the genotypes subjected to antibiotic sensitivity analysis. The results revealed that largely (56.8%) of participants were male with mean age of 30 years. The adults aged 45 and above were the most sexually active with high odds ratio (OR=2.88) followed by the middle aged (OR=1.43). PCR analysis revealed 66.7% (n=34) and 33.3% (n=17); 35.3% (n=18) and 64.7% (n=33); 25.5% (n=13) and 74.5% (n=38) positive and negative samples for *penA*, *gyrA* and *parC* encoding genes of *Neisseria gonorrhoeae* respectively. Antimicrobial sensitivity test revealed high sensitivity with spectinomycin (83.33%) Cefixime (66.67%) and Ceftriaxone (94%) and high resistance; Penicillin (100%), Tetracycline (98.15%), and Ciprofloxacin (87.04%) and least resistance was with Cefixime (33.33%) and cefoxitin (28.26%). *PenA* was predominant genetic determinant of resistance; Penicillin (100%) and Cefixime (71.4%), and *GyrA* and *PerC* expressed the least antibiotic resistance especially for Cefixime (14.3%). In conclusion, there is high genetic variation among the *Neisseria gonorrhoeae* strains with high sensitivity to Cefixime and Ceftriaxone. The highest antimicrobial resistance was demonstrated by penicillin and cefixime which is largely determined by *PenA* encoding genes. There is need to strengthen clinical laboratory diagnosis and sensitise population on rationale use of drugs in treatment of sexual infections.

3.1.14 MASTER OF SCIENCE IN PHARMACOGNOSY & NATURAL MEDICINE SCIENCES

3.1.14.1 Evaluation and Comparison of Physical and Chemical Characters of *Artemisia annua* Linn. & *Artemisia vulgaris* Linn. Grown in Western Uganda

Ivan Kahwa, Ajayi Clement Olusoji, Patrick Ogwang Engeu

Background: *Artemisia annua* Linn. & *Artemisia vulgaris* Linn. are shrubs that originate from Asia but currently exist in Uganda. They are used interchangeably for the treatment of malaria, fevers, and inflammation among others by the communities. *A. vulgaris* L. is more resistant to harsh climatic conditions than *A. annua* L. making it cultivable in most parts of Uganda. However little remained known about the physical and chemical of the two species grown in Uganda.

Methodology: Fresh leaves of *A. annua* L. and *A. vulgaris* L. species were collected from Kabale, Kamwenge, Bushenyi, Kabarole (Fortportal) districts during their flowering stages. Macroscopic, microscopic, chemo-microscopic, quantitative physicochemical studies, phytochemical screening, and TLC by using standard pharmacognostic methods of evaluations were carried out on leaves of both plant species. Quantification of artemisinin in both plants was carried out using HPLC. TFC was quantified by the use of a UV-vis spectrophotometer.

Results: The leaves of *A. annua* were yellowish green with a sweet bitter taste whereas *A. vulgaris* leaves were dark green with a pleasant bitter taste. Similar and differing diagnostic features such as size, lamina, and venation, among others were identified in the two species. Leaves from both species had epidermal cells with wavy anticlinal walls with a difference in their texture in *A. annua* (smooth) and *A. vulgaris* (thick). Amphistomatic anomocytic stomata, unicellular and uniseriate multicellular glandular trichomes and non-glandular T-shaped trichomes were identified in both plants. *A. annua* had a higher stomatal index and vein-islet number; 38.7 (upper epidermis), 42.9 (lower epidermis) and 22.0 vein-islet number than *A. vulgaris* which had 33.3 (upper epidermis), 32.6 (lower epidermis) and 15.0 as vein-islet number respectively whereas the stomatal number and veinlet termination number of *A. vulgaris* (17.0) (upper epidermis) and 17.0 were higher than in *A. annua* (12.0 and 15.0) respectively. Both species had all cell contents and inclusions features. AaF and AvK had lower moisture content, and alcohol-soluble and water-soluble extractive values in AaF and AaK were found to be higher than those of AvK and AvB. Phytochemical screening showed similar plant metabolites except saponins and anthraquinones. The crude extracts of the two plants showed several numbers of spots with different R_f values. Artemisinin was highest in AvK (1.72 %) and AvB (1.70 %) than in AaF (1.43%) and AaK (0.32%). TFC was higher in both extracts of *A. annua* than in extracts of *A. vulgaris*.

Conclusion: The morphological, anatomical, histochemical, and phytochemical characters of the two plants are diagnostic and could be used for their identification.

3.1.14.2 Larvicidal efficacy of *Aframomum angustifolium* and *Tagetes patula* essential oils against *Anopheles gambiae* larvae in laboratory and simulated field

Thomas Adelina, Patrick Ogwang Engeu, Eliningaya John Kweka

Introduction: Malaria is a parasitic disease spread by mosquitoes in the tropical and subtropical parts of the world. The use of synthetic chemical insecticides for mosquito control has been linked with resistance and negative human and environmental consequences. The larvicidal activity of essential oils (EOs) and blends of *Aframomum angustifolium* and *Tagetes patula* against *Anopheles gambiae* s.s. was determined using treatment solutions with concentrations ranging from 10 to 100 parts per million (ppm).

Methods: To determine the chemical composition of the EOs, gas chromatography-mass spectrometry (GC-MS) was used. The WHO protocol was followed for the laboratory bioassay and the simulated bioassay. Laboratory-reared and field-collected larvae, as well as non-targeted organisms (*Gambusia affinis*), were tested in simulated field conditions at concentrations that resulted in 90% to 100% mortality in the laboratory. The collected data were analyzed using probit analysis, and the means were compared using one-way analysis of variance (ANOVA) using IBM SPSS Statistic version 26.

Results: The main constituents in *A. angustifolium* were cis-pinen-3-ol (58.48%), β -pinene (31.03%), and for *T. patula*, terpinolene (20.75%), and (Z)-Ocimene (17.10%). Among the EOs, *T. patula* was the most efficacious. The larvicidal bioassay findings demonstrated that the mortality rate was highly dose and exposure time dependent. In the laboratory, the EOs of *A. angustifolium* and *T. patula* have larvicidal activity against *An. gambiae* larvae, with LC50 values of 1.71 and 0.71 ppm after 48 hours, respectively. Both binary combinations of the EOs showed synergistic interactions at 24 h and antagonistic interactions at 48 h. In the simulated-field trial, using laboratory-reared larvae, the mortality rate was higher in the simulated setting compared with the laboratory setting for all the tested concentrations for both EOs, whereas laboratory-reared larvae were more susceptible to the essential oils of both plants than those of field-collected. Only *A. angustifolium* EO was toxic against *Gambusia affinis* at 100ppm.

Conclusion: Therefore, *T. patula* and *A. angustifolium* oils have good larvicidal properties for *An. gambiae*. The two plants are obviously potential sources of insecticidal compounds that could be used to control the malaria vector. As a result, the formulation and commercialization of products derived from these plants should be investigated

3.1.15 MASTER OF PHARMACY (CLINICAL PHARMACY)

3.1.15.1 Prevalence, Severity and Factors associated with Clinically Significant Drug-Drug Interactions among Patients with cancer attending Mbarara Regional Referral Hospital Cancer Unit

Luzze Bonny, Tadele Mekuriya Yadesa, Atwiine Barnabas, Lugobe Henry Mark

Background: Cancer patients receive many medications whose interaction data is fragmented and poor, resulting in Drug-Drug Interactions (DDIs) exposure. DDIs can lead to toxicities due to antineoplastic drugs' narrow therapeutic index. DDIs are avoidable, but if undetected, can cause harm leading to increased treatment costs and at worst death. This study identifies prevalence, severity, and factors associated with cs-DDIs at Mbarara Regional Referral Hospital Cancer Unit (MRRHCU).

Method: Cross-sectional study conducted among 300MRRHCU confirmed cancer patients from January-February 2022, including both adults and pediatrics of either sex receiving at least two drugs, of which, at least one being an anticancer drug. Patients' demographic, medical and drug information/data was obtained through patient interviews using a validated questionnaire and data collection form. All drugs taken by the patient were entered into Lexicomp® Drug interaction software to screen for DDIs, categorize DDIs risk rating (A, B, C, D and X) and finally assess them for severity (major/moderate/minor). SPSS version 21 was used for data analysis. Logistic regression was used to identify the predictors of DDIs.

Result: Mean age 48 years. 181 patients experienced 495 cs-DDIs. cs-DDI prevalence was 60.3%. Digestive organs neoplasm (80, 26.7%) were the most prevalent. Plant alkaloids and other natural products mostly used antineoplastic (143, 47.7%). About three quarters were category C and moderate (355, 71.7%) in severity. Being female ($P < 0.011$) and concurrent use of ≥ 6 drugs ($P < 0.001$), were significantly associated with cs-DDIs. Potential adverse events due to these interactions include, cardiotoxicity, tendon rupture, myelosuppression, QT-interval elongation depression, mucositis, and reduced therapeutic effectiveness.

Conclusion: More than half of the patients experienced at least one csDDI during their attendance at the MRRHCU. About three thirds of csDDIs were category C and moderate in severity. Being female and concurrent use of ≥ 6 drugs were found significantly associated with csDDIs. We recommend the MRRHCU health care team to constantly screen for DDIs using DDI checkers and enhance patient drug therapy monitoring.

Keywords: Prevalence, factors associated, clinically significant Drug-Drug Interactions, cancer.

3.1.15.2 Assessment of Rational Prescribing of Drugs in Children (0-12 Years) at the Paediatric Out Patient Department of Mbarara Regional Referral Hospital-Uganda

Namutebi Carolyn, Robert Tamukong, Peter Ndirangu Karimi

Background: Rational prescribing is the basis of rational drug use since it is based on medicines; safety, effectiveness and affordability. Incidentally, it's not always the case leading fatal consequences especially in vulnerable groups like pediatric patients.

Objective: To assess rational prescribing in children (0-12years) at the outpatient department of MRRH.

Methods: This was a retrospective descriptive, cross-sectional study targeting children aged 0–12 years at the outpatient department of Mbarara Regional Referral Hospital. The sample size was 384 and simple random sampling technique was used. Data was collected from prescription using an abstraction form adopted from WHO core drug prescribing indicators. Analysis was carried out using descriptive statistics.

Results: The average number of drugs per prescription was 2.27 and 41.61% of them had brand names of the drugs. Most (68.23%) had an antibiotic but only 1.56% contained an

injection. Approximately half of the drugs prescribed (50.11.5%) were from the essential medicines List of Uganda.

Conclusion: The results showed that injection use was optimal; whereas the rest of the parameters were not in line with WHO/INRUD core prescribing patterns, hence there is irrational prescribing at the outpatient pediatric department of MRRH.

Keywords: Rational prescribing, WHO/INRUD

3.1.16 MASTER OF PUBLIC HEALTH

3.1.16.1 Correlates of Late Stage Esophageal Cancer at Diagnosis Among Patients Attending Mbarara Regional Referral Hospital-Oncology Unit and Mobile Hospice Mbarara

Nagujja Francisca, Imelda Tamwesigire

Background: Esophageal cancer is on a rise with a burden of late stage presentation among these patients creating a burden in survival of these patients globally. In sub-Saharan Africa, over 59.9% patients are reporting with inoperable tumors and over 100% at Uganda Cancer institute presenting in late stage despite of the evolving early screening, diagnosis and treatment of esophageal cancer.

Objective: To determine the stage at diagnosis and factors associated with late stage esophageal cancer at diagnosis among patients attending Mbarara Regional Referral Hospital-Oncology unit and Mobile Hospice Mbarara

Methods: We used a cross sectional review of esophageal cancer patients records for period of 2016-2020 and key informants' interviews. A sample size of 150 reviewed records, 13 interviews and 4 case studies. We calculated percentages for stage at diagnosis and to determine associations, Poisson regression was conducted to multivariate analysis. Chi square was used to contrast characteristics of cancer esophageal patients. Thematic analysis was done on transcribed data.

Results: 150 records fitted into the inclusion criteria and were reviewed, 79% of patients presented in late stage. With proportions in tribe and patients who smoke significantly being more with late stage [X^2 (3, N=150) =11.1309, pvalue=0.011], [X^2 (1, N=150) pvalue=5.6502, pvalue=0.017] respectively. Major correlates at multivariate included age ranges 40-49 (IRR 0.511 95%CI 0.28-0.95 pvalue=0.032) 50-59 (IRR 0.597 95%CI 0.39-0.91) pvalue 0.016) and 70-79 (IRR 0.602 95%CI 0.39-0.92 pvalue=0.02), ethnicity (IRR 4.91 95%CI 5.4-4.44 pvalue 0.000), time spent with between onset chest pain and diagnosis for 7-12 months and 13-18 months were associated with late stage (IRR 1.482 95%CI 1.030-2.13 pvalue=0.034 & IRR 1.42 95%CI 1.05-1.92 pvalue 0.02) and time spent between onset dysphagia and diagnosis for 13 months and above (IRR 2.71 95%CI 2.08-3.5 pvalue=0.000). The themes that merged included knowledge about esophageal cancer, health seeking behaviors of patients, impact of preceding symptom, attitude of stake holders, referring network challenges, availability of esophageal cancer service provider and patient related factors.

Conclusion: The age, ethnicity and time spent with presenting symptoms chest pain and dysphagia had an association with late stage presentation at diagnosis. Therefore a need of

improved service from screening throughout the course of care of esophageal cancer should be provided to curb late stage presentation.

Keywords: Correlates, Esophageal cancer, Factors, late stage

3.1.16.2 Evaluation of parent-adolescent Communication on sexual and reproductive health issues among 10-14 years in Mbarara City

Tumuhairwe Jackline, Eleanor Turyakira, Viola NilahNyakato

Background: It is estimated that 21% and 14% of the world's and Uganda's populations respectively are very young adolescents (VYAs). Although very young adolescence is considered to be a healthy stage, studies have revealed that a significant number of VYAs start engaging in sexual relationships at an early age which exposes them to risky behaviors like coitus and its consequences including early pregnancies, HIV/AIDs and sexually transmitted infections(STIs). Researchers have shown that parent-adolescent communication on sexual and reproductive issues reduces the risk of sexual engagements when communication starts early.

ObjectivesTo determine the proportion of PAC on sexual and reproductive health (SRH) topics, identify factors that are associated with PAC, and determine if there is any association between PAC and sexual encounters among VYAs. PAC (Parent-adolescent communication was defined as any verbal communication between SRH topics between parent and adolescent in agreement.

Methods: This was a cross-sectional study of 310 dyads of parents and adolescents recruited in Mbarara City in December 2021. Multistage sampling was employed to select study participants. Data was collected using a computer-assisted personal interviewing (CAPI) approach with a structured questionnaire uploaded in the Kobo Collect App. The main outcome was parent-adolescent communication (PAC). Bivariate and multivariate analyses were done in Stata Version 15 were conducted to get the factors responsible for PAC.

Results: Only 28.1% of parents and adolescents' dyads communicated on SRH issues. The most discussed topics were HIV/AIDs and the least discussed was condoms. There was a high discrepancy in reporting PAC with parents reporting the presence of PAC more than adolescents 59.7% versus 2.5%. Knowledge of sexual and reproductive health played an important role for VYAs to communicate with their parents; Adolescents who communicate on SRH (PAC) were 11.5 times more likely to have high knowledge of SRH than those who had no communication on SRH (No PAC). (AOR=11.5; 3.19-41.76; p-value <0.001). Being a male increases the chances of engaging in a sexual relationship while being in a higher class lowers the chances of an adolescent engaging in sexual relationships.

Conclusions: Communication on SRH between parents and adolescents in Mbarara city is still low. Although a high level of knowledge on SRH increases PAC, most adolescents have low knowledge. It is therefore important to identify and implement interventions that can increase adolescents' knowledge of SRH.

Keywords: Parent-adolescent communication, Very Young Adolescents, Sexual Reproductive Health

3.1.16.3 Relationship between caretaker perceptions, care seeking practices and under-five Acute Malnutrition among refugees and hosts in Oruchinga Refugee Settlement, Isingiro District

Kembabazi Scovia, Eleanor Turyakira

Background: Most studies on acute malnutrition among under five children in the host compared to refugee population, have focused more on socio-demographic characteristics, this study went beyond, to focus more elaborately on the perceptions and care seeking practices of caretakers of under five children to assess the pattern of acute malnutrition amongst refugees and host children below five years in Oruchinga refugee settlement, Isingiro District.

Methods: A mixed quantitative and qualitative study of children under-five with and without acute malnutrition, along with their caretakers were conducted. A case-control study method was used to determine the association of caretaker perceptions and care seeking practices with acute malnutrition. Furthermore, analyses from the Case-control study were also used to describe the place pattern and socio demographic characteristics of the study population.

Results: A total of 533 under five Children; Refugees (n=208, 39.1%) and Host (n=325, 60.9%) were enrolled into the study and of these, 307 participants; Refugees (n=70, 22.8%) and Host (n=237, 77.2%) were malnourished (*cases*), while a total of 226 children; refugees (n=138, 61.1%) and host (n=88, 38.9%) were healthy participants (Controls). Among both the host and refugee communities, socio-demographic characteristics were a key determinant factor for the distribution of acute malnutrition. Furthermore, caretaker's perception of fever and diarrhoea significantly varied among caretakers of malnourished children compared to those of healthy children among the refugee community and the knowledge of management and prevention (among host) and cause and management (among refugees) was found to be significantly associated with the occurrence of acute malnutrition. Caretakers from both the refugees and host communities were more likely to perceive childhood illnesses of Malaria, fever, diarrhoea and wasting as serious or not serious based on; affirmation of serious of illness from the neighbour, the clearly identifiable danger sign and symptoms, misconception from herbalist, religious leaders and traditional healers. Additionally, care-seeking practices of frequency of visit to the welfare clinic, seeking nutritional advice from health workers (among both host and refugee caretakers) and deworming (among host) were found to be significantly associated with the occurrence of acute malnutrition. This was so because according to the various key informants and focus group discussions among refugees and host communities, care seeking practices among caretakers were related to several factors including access to health services, and degree of community engagement for health promotion.

Conclusion and recommendations: This study has identified several risk factors related not only to socio- demographic characteristics of study population but also to caretakers' perception of childhood illnesses and care seeking practices gaps that needs to be addressed through a multi-sectoral approach during District development planning and policy making that should mainstream nutrition concerns in all sectors and at all levels of local governance.

3.1.16.4 Prevalence and Determinants of Full Hepatitis B Vaccination Among Health Workers at Mbarara Regional Referral Hospital

Iris Atuhirwe, Fred Norman Bagenda

Background: Hepatitis B is a viral infection of the liver. Healthcare workers are at increased risk of acquiring Hepatitis B due to their frequent exposure to the virus at the work place. Vaccination is the most effective preventive measure against Hepatitis B. The current prevalence of HBV vaccination among healthcare Workers in Uganda is unknown. This study was therefore conducted to assess the HBV vaccination coverage and associated factors among the healthcare workers in Mbarara Regional Referral Hospital, Southwestern Uganda.

Objective: To assess the hepatitis B vaccination coverage of healthcare workers and associated factors in Mbarara Regional Referral Hospital

Methods: An analytical cross sectional study with a mixed methods approach was conducted at Mbarara Regional Referral Hospital, southwestern Uganda. 139 participants filled in a self-administered questionnaire, six in depth interviews and three focused group discussions were carried out. Quantitative data was analyzed using STATA version 12.0. Descriptive statistics were computed and logistic regression analysis used to identify factors that influenced the Hepatitis B vaccination status. The responses to the semi-structured questions were analyzed using Microsoft excel 2013. Data from interviews and focused group discussions was transcribed and analyzed using thematic analysis techniques.

Results: Of the 139 participants only 68(48.9%) were fully vaccinated. Vaccination status was found to be significantly associated with the male gender [aOR 0.36; CI 0.16-0.80; P-value 0.012], knowledge score [aOR 1.78; CI 1.37-2.32; p-value <0.0001] and (5-10) years of experience [aOR 2.92; CI 1.28-6.61; P-value 0.010] compared to less than 5 years. The most frequently mentioned reasons for not being vaccinated were low availability and high cost of the vaccine. Majority of the participants (63.3%) had good knowledge about HBV infection. However, the knowledge scores ranged from very good for some aspects such as routes of transmission and prevention to poor for other aspects such as vaccine schedule and HBV post exposure prophylaxis.

Conclusion: The full HBV vaccination coverage among HCWs at Mbarara RRH is still low hence the majority of the HCWs are still at risk of acquiring HBV. The knowledge about HBV is variable among the different cadres of HCWs. This calls for sustained provision of free vaccination services and targeted sensitization of the HCWs to increase their knowledge on HBV infection.

Keywords: Hepatitis B virus, Health Care Workers, vaccination

3.1.16.5 Health facility delivery and associated factors among multiparous women in Kisoro district, South Western Uganda: a Cross-sectional study.

Emmanuel Mfitundinda, Fred Bagenda, Imelda K Tamwesigire

Background: Inadequate access to health facility delivery and emergency obstetric care greatly contributes to maternal mortality. The proportion of mothers who deliver outside

health facilities is still significantly high worldwide and is even higher in Sub Saharan Africa at large and Uganda in particular. 27 % and 24.5 % of all deliveries in Uganda and Kisoro respectively happen outside health facilities. The documentation of the associated factors is also limited in Kisoro District for multiparous mothers. This study was to determine the proportion of multiparous mothers who deliver from the health facility and the associated factors.

Methods: We conducted a cross sectional study in 20 randomly-selected villages in Kisoro District, South Western Uganda. Three hundred and ninety four women, who had had at least four deliveries with the last one in the two years preceding the study, were interviewed. The study was conducted in April and May 2021. Chi squared testing was performed at bivariate analysis. Logistic regression was used at multivariate level for the association between health facility delivery and independent variables with a p value <0.05 at bivariate analysis.

Results: Out of the 394 participants; 70 % of them had their recent delivery from the health facilities and 30 % delivered outside the health facility. Health facility delivery was significantly influenced by the age group of the mother. Women aged ≥ 36 years were less likely to deliver from health facilities compared to the ones who were 18-25 years (OR=0.52 C.I=0.12 - 0.94).

Conclusions: Our study found that the proportion of women in the study population that used health facility for delivery was 70%, which was lower compared to the national average of 73%. Likelihood decreased with an increase in age of the mother. We recommend intensification of health education on the importance of health facility delivery.

Keywords: *multiparity, healthy facility delivery, traditional birth attendants (TBAs), Birth Before Arrival (BBA)*

3.1.16.6 Prevalence and factors influencing malnutrition among children under five in host and refugee communities, Arua district, Uganda

Amaguru Hellen, Eleanor Turyakira

Background: Malnutrition is one of the major contributors of morbidity and mortality among children under five and remains a major problem in most parts of the world, especially in emergency situations such as conflicts; post conflict recovery and refugee influxes where there is sudden change in food availability. Globally, one in two children under five are malnourished. Despite overall declines in malnutrition levels across Uganda, Arua district is in a region that has the second highest prevalence of malnutrition after Karamoja. The study determined factors influencing malnutrition status among refugee and host community children under five in Arua district.

Methods: A cross sectional study was carried out in Imvepi, Rhino refugee settlement camps and within neighbouring host communities in July 2019. Subcounties and parishes were selected purposively. A total of 643 households were enrolled using simple random sampling method for the study, 327 from host community and 316 from refugee community. Anthropometric measurements were taken from children 6-59 months in sampled households. A researcher administered questionnaire was used to collect the data. ENA-SMART nutrition software was used to determine nutrition indices of stunting, wasting and underweight. Logistic regression models were fitted to determine factors associated with stunting, wasting, underweight and malnutrition in general using STATA version 12.

Results: The findings of this study showed prevalence of malnutrition among children under five in general was higher in the host community (27.8%) compared to the refugee community (17.7%). Stunting, wasting and underweight were 26.3%, 1.2%, 3.3% and 13.9%, 3.5%, 3.2% respectively in the host and refugee communities. This study also revealed that higher percentage of children in the host community had high dietary score (56%) compared to those in the refugee community (48.7%). The study further found that child's age and family size, water storage, child's age, child's stool disposal were statistically associated with malnutrition among children under five in refugee and host communities respectively.

Conclusion: Prevalence of malnutrition was higher among the host community than refugee community. It also revealed that prevalence of underweight was higher among boys than girls. Age group, child sex, family size, water storage, child's stool disposal and knowledge level of caregiver were associated with one of the indices of malnutrition. These findings also highlight the potential areas for nutrition interventions for example awareness and sensitisation to improve knowledge gap of caregivers, need for small family size among others as depicted in the study for policy makers and implementing partners in such settings.

Keywords: Malnutrition, Stunting, Wasting, Underweight, Refugee and host communities.

3.1.17 MASTER OF MEDICAL LABORATORY SCIENCE

3.1.17.1 Coagulation profile among Patients with type II diabetes attending the diabetes Clinic at Mbarara Regional Referral Hospital, South Western Uganda

Uwamahoro Consolee, Muwanguzi Enoch, Muhindo Rose, Benson Okongo

Background: Type 2 diabetes mellitus is a metabolic disorder characterised by hyperglycaemia and insulin resistance. It disturbs the physiological balance of coagulation and fibrinolysis, leading to a prothrombotic state and/or bleeding tendency. Hyperglycaemia and insulin resistance cause qualitative and quantitative changes in coagulation and fibrinolytic processes thereby producing atherothrombotic events.

Objective: The objective of this study was to determine the coagulation profile, glycaemic control and the association between glycaemic control and coagulation status among patients with Type 2 Diabetes Mellitus attending the diabetes clinic of Mbarara Regional Referral Hospital.

Methods: A cross-sectional study was conducted among 147 participants at the diabetes clinic between November to December 2022. Four millilitres of whole blood samples were collected from T2DM participants meeting the inclusion criteria after consenting and filling questionnaires. EDTA blood samples were analysed for platelets count and HBA1C using Mindrayhematology analyser and FineCare machines respectively. Blood samples collected in citrate tubes were used for determining PT, aPTT, Fibrinogen and D-dimer levels as coagulation parameters using HumaClot Junior. Data collected were entered and analysed using Stata version 19. A *p*-value of ≤ 0.05 was considered significant and the odds ratio with its 95% interval were used to determine the strength of association between the outcome and independent variable.

Results: The prevalence of coagulopathy was 46%. 75 (51%) of the study participants had abnormal PT, 72 (49%) had abnormal aPTT, 88 (59.9%) had abnormal fibrinogen concentration, 30 (20.4%) had abnormal D-dimer concentration and 27 (18.4%) had abnormal platelets count. 81.6% participants had a poor glycaemic control. Factors that were statistically significant were poor glycemic control (cOR = 0.23; 95% CI: 0.09-0.59, P=0.004), being female (cOR = 0.31; 95% CI: 0.14–0.65, P=0.006), BMI/overweight (cOR = 0.48; 95% CI: 0.25–0.95, P=0.02) and age above 60 years (cOR = 4.06; 95% CI: 1.2-9.21, P=0.034) which has also showed an association with coagulopathy.

Conclusion: Patients with T2DM had abnormalities in coagulation causing hypercoagulation and/or bleeding tendency as evidenced by findings from this study. Patients with poor glycaemic control are at high risk of developing coagulopathies leading to atherothrombotic and haemorrhagic events.

Keywords: type 2 diabetes mellitus, coagulopathy and glycaemic control.

3.1.17.2 Bacteria isolates and antimicrobial susceptibility patterns in wound infections among post-surgery patients attending Arua Regional Referral Hospital, Uganda

Opeli Wilfred, Abaasa N. Catherine

Background: Post-surgery wound infections are associated with long hospital stays, higher treatment expenditure, morbidity and mortality. The emergence of antimicrobial resistance has further made the management of wound infections in some of these patients difficult. There is also limited information on the bacterial pathogens and their antimicrobial susceptibility patterns in post-surgery wound infections in the West Nile region of Uganda. The general objective of this study was to identify the bacterial isolates from post-surgery wound infections and their antimicrobial susceptibility patterns among patients attending ARRH.

Methods: This was a descriptive cross-sectional study. Inpatients presenting with clinical signs of infected post-surgery wounds constituted the study population. A consecutive sampling technique was used to select 183 participants. Pretested and semi-structured questionnaires were used to interview and collect information on study participants and wound fluid and swab sampling techniques used to collect samples for gram staining, culture and antimicrobial susceptibility testing.

Results:Prevalence of post-surgery bacterial wound infection in this study was 87.98% with a predominance of gram-negative isolates 54.5% than gram positives 45.5%. All 183 (100%) of the study participants received antibiotic prophylaxis before surgery. *S aureus* was the most prevalent isolate at 31.74% (53/167) followed by *klebsiella species* 25.15%, *E. coli* 12.57%, Coagulase negative *Staphylococcus* 10.78%, *Acinobacterbaumanni* 8.98%, *Proteus sp.*, 4.19%, *Citrobacter sp.*, 3.59% and *E. faecalis* 2.99%. High resistance levels of ampicillin to gram-positive and gram-negative bacteria were seen in this study. The gram negatives showed moderate sensitivity to ciprofloxacin and cotrimoxazole. The highest antibiotic sensitivity to gram-positives was shown with vancomycin, amikacin, ceftriaxone (80.3%), amoxclav and, ciprofloxacin.

Conclusion: There is need to change choice of drugs for prophylaxis and improve infection control measures given the high prevalence levels. Based on this study, ciprofloxacin and amikacin are the recommended drugs for management of post-surgery wound infections.

Keywords: Bacteria isolates, Antimicrobial susceptibility, Wound infections

3.1.17. 3 Association between Fetal Hemoglobin, Lactate Dehydrogenase, and Disease Severity in patients with Sickle Cell Disease at Bugando Medical Centre, Mwanza, Tanzania

Samwel E. Kahema, Cosmas H. Mbulwa, Muwanguzi Enoch

Introduction: Sickle cell disease (SCD) is known to exhibit great clinical diversity. Though the same disease, the effect of disease complications varies significantly from one individual to another. Classification of individuals into disease severity groups can help detect which severity group they belong to and respective care given accordingly based on their needs. Sickle cell disease (SCD) has higher level morbidity and early mortality for patients that are not followed and managed properly. Regardless the usefulness of fetal hemoglobin (HbF) and lactate dehydrogenase (LDH) in management of SCD, there is limited information about the association between HbF, LDH, and disease severity in Tanzania. This study aimed at determining the association between HbF, LDH, and disease severity in patients with SCD at Bugando Medical Centre.

Method: This was a cross sectional study which was conducted at Bugando Medical Centre in Mwanza, Tanzania among SCD patients aged 6 months and above. A simple random sampling method was employed to get a total of 130 SCD patients. A designed patient report form was used to capture the clinical history and laboratory test results for SCD patients.

Results: Majority (56.9%) of the participants were males. More than half (60.8%) of the participants had moderate clinical phenotype (MCP), followed by 31.5% with asymptomatic clinical phenotype, and 7.7% participants had severe clinical phenotypes (SCP), for the studied population. LDH was significantly higher in participants with SCP with a mean LDH value of 810.97IU/L (95% CI: 559.31-1062.64) with a p -value =0.005. In comparison to the asymptomatic and moderate clinical phenotypes, the severe clinical phenotype had a significantly high mean HbF score value of 10.09% (95% CI: 7.44-13.74%) with a p -value of 0.024.

Conclusion and recommendation: There were higher levels of serum LDH and HbF in SCD patients with SCP than was to MCP and MCP. We recommend that a study with large number of SCD patients to be conducted that would come out with the generalizable results about the association between LDH, HbF, and disease severity among patients with patients with SCD.

Keywords: Fetal haemoglobin, Lactate Dehydrogenase, Disease severity, Sickle Cell Disease.

3.1.17.4 Prevalence of iron deficiency and associated factors among blood donors at national centre for blood transfusion in Kigali Rwanda

Peter K. Kayonde, Benard Natukunda

Background: Blood donors have a risk of becoming iron deficient especially those who donate regularly, are females and adolescent donors. It is necessary for blood transfusion centres to monitor the level of iron reserves of their donors. This is why it was prudent for us to determine the prevalence of iron deficiency and its associated factors among the blood donors.

Objective: To determine the prevalence of iron deficiency and associated factors among blood donors at National Centre for Blood Transfusion in Kigali, Rwanda.

Method: We recruited 293 voluntary non remunerated blood donors in May 2021. Iron deficiency was determined by assessing the plasma ferritin levels using a system compatible reagent kit on a Cobas e 411 analyzer. The proportion of blood donors with iron deficiency was calculated as a fraction of all blood donors with iron deficiency out of all blood donors enrolled in the study and expressed as a percentage with its corresponding 95% confidence interval (CI). Multiple logistic regression analysis was done to identify the factors associated with Iron deficiency.

Results: Of the 293 study participants, 193 (65.9%) were men. The median age of the study population was 35years with an interquartile range (IQR) of 22 to 42 years. Female sex and a donation frequency, Mean Corpuscular Volume (MCV) and Mean Cell Hemoglobin Concentration (MCHC) were found to be significantly associated with iron deficiency OR=3.91(95% CI 1.01 -13.83), OR=2.23(95% CI 1.13 - 4.39), OR=0.98(95% CI 0.097 -0.99) and OR=0.86(95% CI 0.75 -0.98) respectively. We did not observe any significant association between other independent variable and iron deficiency.

Conclusion: Donation frequency, sex, Mean Corpuscular Volume and Mean Cell Hemoglobin Concentration have a significant association with iron deficiency. Therefore, there is need to regularly check for ferritin levels among blood donors to prevent adverse outcomes encountered as a result of iron deficiency.

Keywords: Blood Donors, Iron Deficiency, Prevalence, Ferritin, National Centre for Blood Transfusion, Rwanda.

3.1.17.5 Bacterial Symbiosis and its Effects on the Virulence of Clinical and Environmental Fungal isolates at Mbarara Regional Referral Hospital

Lauben Kumureeba, Herbert Itabangi, Lucas Ampaire

Fungi when in a symbiotic relationship with bacteria can cause infections that are complicated and difficult to manage. They are ecologically regarded environmental saprophytes that feed on decaying organic matter but in the past thirty years, they have transitioned into key aetiological agents for difficult to manage diseases of both plants and animals including human beings. However, how they transition from a saprophytic life style to pathogenicity remains a pending question. Although some studies highlight the possibility

of bacterial symbiosis influencing fungal virulence, how endobacteria shapes fungal virulence and extent to how this occurs is yet to be fully understood. This study therefore seeks to elucidate the effects of bacterial – fungal interactions on the virulence of isolated filamentous fungi at Mbarara Regional Referral Hospital (MRRH).

Bacterial symbiosis was determined in 152 clinical and environmental filamentous fungi isolated from eye swabs and culture media exposed to the environment respectively at MRRH. PCR analysis for the detection of bacterial endosymbionts was done using universal primers that amplify a 1.5 kb 16S rDNA segment. Fungal isolates that were found positive and negative for bacterial 16S rDNA were recorded as endobacteria positive and endobacteria naïve fungi respectively whereas those whose bacteria was eliminated were recorded as cured fungi. These isolates were further studied for their growth and response to environmental stress factors such as elevated carbon dioxide concentration, heat stress, pH stress and antimicrobial drugs.

Of the 152 filamentous fungal isolates screened, 67.8% (103/152) were clinical while 32.2% (49/152) were environmental. Bacterial symbiosis was found in 4.9% (5/103) of the clinical isolates and in 6.0% (3/49) of the environmental isolates. Out of all isolates screened (N=152), bacterial symbiosis was found in 5.3% (8/152). The endobacteria positive isolates included; *Fusarium*spp (n=4), *Penicillium*spp (n=2) and *Trychophytonmentagrophytes* (n=2). There was enhanced fungal growth among endobacteria positive fungi than endobacteria free (naïve) fungi at 30°C (48.8 versus 34.3 mm), 37°C (30 versus 18 mm) and 40°C (20.5 versus 8.5 mm). Enhanced growth and increased antimicrobial resistance was also noted among endobacteria positive than endobacteria free fungi across all challenging environments tested which included; 5% CO₂ concentration (23.3 versus 15.7 mm), antimicrobial drugs (170.7 versus 37.3 mg/L) and pH stress with a difference in growth between endobacteria positive and endobacteria free fungi of 10.8, 11.7, 13, 12.2 and 9.8 mm at pH 3.0, 5.0, 6.0, 7.0 and 8.0 respectively. The bacteria positive isolates included; *Fusarium*spp (n=4/8), *Penicillium*spp (n=2/8) and *Trychophytonmentagrophytes* (n=2/8); Bacterial symbiosis was more noted in *Fusarium*spp which contributed 50% (4/8) of the bacteria positive isolates.

The prevalence of bacterial endosymbiosis in clinical and environmental filamentous fungi is low. However, the impact of these endobacteria on fungal phenotypes is significant. We noted that having an endobacterium can influence fungal pathogenesis by enhancing fungal growth and adaptation to harsh and contrasting environmental conditions including but not limited to; elevated levels of CO₂ concentration, high temperatures, varying pH levels and antimicrobial drugs.

Keywords: Bacterial symbiosis, Endobacteria, Cured fungi, Endobacteria free fungi, Endobacteria naïve fungi, Endobacteria positive fungi, Fungal virulence, Stress factors.

3.1.17.6 Prevalence and association between Dyslipidemia and Cervical precancerous and cancerous lesions among women attending Cervical cancer clinic at Uganda Cancer Institute

Mwangi Fridah Gakii, Frank Ssedyabane, Nixon Niyonzima, Raymond Atwine.

Background: In Sub-Saharan Africa, the prevalence of dyslipidemia is on the rise. Studies have shown dyslipidemia as a host factor that can contribute to the progression of cervical

cancer. In Uganda, cervical cancer is a common malignancy just as dyslipidemia is. However, the association between dyslipidemia and cervical lesions in Uganda requires further investigation.

Objective: To determine the prevalence of dyslipidemia and its association with precancerous and cancerous lesions of the cervix among women attending a cervical cancer clinic at Uganda Cancer Institute.

Methods: This was a cross-sectional study done from February 2022 to April 2022. Data on participants' social demographics were collected using a pretested structured questionnaire after written informed consent. Visual inspection with acetic acid was performed, Pap smears and cervical biopsies were collected appropriately from study participants, and Cervical lesions were classified following the Bethesda system. Blood was drawn aseptically into plain tubes, centrifuged and then separated. The separated serum was used for the analysis of lipid and the associations between serum concentrations of different lipids were assessed using the Chi-square test and a p-value ≤ 0.05 was considered statistically significant.

Results: The overall prevalence of dyslipidemia was 103/159(65%). Low high-density lipoprotein was the most prevalent at 46.5%(95%CI 39.0-54.3). There was no association between dyslipidemia and precancerous lesions. However high low-density lipoprotein showed a significant association with well-differentiated squamous cell carcinoma (SCC) (p=0.0309). Also, high triglycerides (TGs) and high low-density lipoprotein were significantly associated with moderate-poorly differentiated SCC (p values =0.0007 and 0.0042 respectively).

Conclusion: The prevalence of dyslipidemia was high. High TGs and high LDLc were significantly associated with cancerous lesions. We recommend that women with cancerous lesions be regularly screened for dyslipidemia.

Keywords: Dyslipidemia; cancerous lesions; precancerous lesions; prevalence; association; cervix.

3.1.17.7 Suitability of Umbilical Cord Blood for Neonatal Transfusion Purpose at Mbarara Regional Referral Hospital

Benjamin Nuwareeba, Natukunda Bernard, Kanyesigye Hamson

Background: Blood transfusion services in sub-Saharan Africa continue to struggle to provide adequate quantities of safe blood. Umbilical cord blood (UCB), which is usually discarded, is a potential but untested source of blood for transfusion in young children with severe anaemia at MRRH.

Methods: A descriptive cross-sectional study was conducted between November to December 2021 at Mbarara Regional Referral Hospital. The mothers' blood samples were screened for Transfusion Transmissible infections (HIV, HBSAg and Syphilis). The collected UCB was analyzed for Total collection volumes, red blood cell parameters and bacteriological safety. The recorded clinical history of the mother and UCB laboratory tests were reviewed by data collectors and analysed with statistical Package for social sciences version 20 software. The p-value of less than 0.005 was considered statistically significant.

Results: A total of 62 mothers were screened during the study. The sero-prevalence of HIV and Syphilis was 2.7% and 6.8% respectively. The mean age of the mothers who took part

was 25.97 ± 0.770 years. A total of 49 (79.0%) mothers delivered by safe virginal delivery (SVD) and 13(21.0) delivered through cesarean section (CS). The mean gestation age was 38.63 ± 0.197 weeks. Of the delivered infants 58 (93.5%) 2.5 kg and above with a mean weight of 3.1439 ± 0.05647 kg. The average volume of UCB collected was 53.82 ± 2.051 mls. Bacterial pathogens were found in 8.1% of units. The isolated organisms were 3 isolates of Klebsiella (60%) and 2 isolates of E. Coli (40%). The mean red cell total count was 4.051 ± 0.05585 , haemoglobin concentration was 14.8 ± 0.22322 g/dl, hematocrit was 39.25 ± 0.55981 and Mean cell Volume was 96.93 ± 0.7457 .

Conclusion: The current study shows that variable volumes of UCB-WB (average 53.8mls) were collected. This volume when screened and stored properly can be used for transfusion purposes at Mbarara Regional Referral Hospital. This blood can be used as whole blood or packed red cells for management of severe anaemia among neonates.

Keywords: Umbilical cord blood, Blood transfusion, Suitability neonates, Anaemia

3.1.18 MASTER OF NURSING SCIENCE IN CRITICAL CARE

3.1.18.1 Predictors of knowledge on the signs and symptoms of stroke among clients with hypertension attending care at Mbarara Regional Referral Hospital.

Stella Anyango, Fortunate Atwine, Grace Nambozi, Vallence Niyonzima

Background: Stroke is the second leading cause of morbidity and mortality among cardiovascular diseases after ischemic heart disease with hypertension contributing to 64% of all cases of stroke. In Sub-Saharan countries, mortality from stroke is more common at 85% among patients with hypertension. There is an increase in hypertension with stroke as a complication in Uganda and Africa. However, it's not clear, whether such individuals are knowledgeable on signs and symptom of stroke. This study sought to assess knowledge, and its predictors on signs and symptoms of stroke among clients with hypertension in Mbarara Regional Referral Hospital in southwestern Uganda.

Method: A cross-sectional study design was used for the study objectives 1 and 2. The study was conducted among clients with hypertension at the Out Patient Department (OPD) of MRRH. Data were collected from 80 participants using a researcher-administered questionnaire. Data analysis for objective one was done using descriptive statistics, while ordered logistic regression was applied for objective two. All data analysis was done using Stata 17.0.

Results: In total, 70 (87.5%) had low knowledge on signs and symptoms of stroke, 10(12.5%) had fairly good knowledge and none of the participants had very good knowledge. Sixty-eight respondents totaling to eighty-five percent knew about signs and symptoms of stroke. Of these, 62(91%) identified one sided paralysis as a sign of stroke while sudden numbness was the least known to the respondents 3(4%). At a bivariate level there was an observation that, source of information like; internet, radio, consultations with doctors and age had significant importance on knowledge. Respondents who used internet, had high odds of having fair knowledge on signs and symptoms of stroke versus those who used other sources of information (OR=19.83, p-value=0.024). At a multivariable level, only using

internet as sources of knowledge were associated with fair knowledge on signs and symptoms of stroke versus low knowledge.

Conclusion: The overall respondents' knowledge was very low 70(87.5%). The study found that the internet source and respondent age were the main predictors of signs and symptoms of stroke.

3.1.18.2 Exploring Experiences of Nurses Working in Intensive Care Unit and Family Caregivers on the use of a Bio-Psychosocial Model at Mbarara Regional Referral Hospital

Naisu Lovisa, Grace Nambozi, Vallenge Niyozima

Introduction: Critical illness is a potentially fatal multisystem process that can result in significant morbidity or mortality. Critically ill patients should receive holistic care that employs the bio-psychosocial and spiritual dimensions for optimal care.

Objective: The purpose of the study was to explore the experiences of nurses working in the intensive care unit and family caregivers on the use of the bio-psychosocial model at Mbarara Regional Referral Hospital.

Methods: The study employed a qualitative descriptive study design. The study participants were nurses and caregivers. Data were collected using in-depth interviews. Purposive sampling was employed for both nurses and family caregivers of critically ill patients in the ICU. An in-depth interview guide was used because it's a qualitative research technique that helps to capture details about participants' experiences, thoughts, and behaviours. Thematic data analysis was employed to understand participants' experiences.

Results: The study revealed intertwined themes: rewarding satisfaction, daunting experiences, as well as culture and illness. While self-blame was only experienced by nurses, the family caregivers experienced fear of uncertainty and isolation while using the bio-psychosocial model in the ICU. Self-blame was evident among nurses who had less experience and training to work in the ICU as a result of mistakes or errors they made on patients.

Conclusion: The study recognized positive and negative experiences associated with the use of the Bio-psychosocial model of care; satisfaction was as the provision of holistic care, teamwork, gaining of skills in the ICU environment, witnessing patient recovery till discharge, plus the general happiness portrayed by the family caregivers. Negative experiences such as the daunting experience associated with the skills gap in the ICU, limited resources, and the work environment shock, plus self-blame associated with aspects beyond their control were evident.

Recommendation: The study recommends that the knowledge and skills gap in the ICU among the study participants be bridged by emphasizing the training of ICU nurses before deploying them to the wards and fully integrating bio psychosocial care in the ICU. This will allow them to fully appreciate the uniqueness of utilizing the bio-psychosocial model in the ICU, build confidence, and gain competency. Continuous health education should be given to

the family caregivers on the use of the bio-psychosocial model in the ICU to reduce their fear and isolation.

Keywords: Family caregiver, Nurses, Intensive care, critically ill, Bio-psychosocial mode of care.

3.1.19 MASTER OF SCIENCE IN ANATOMY

3.1.19.1 Morphological changes in the Fallopian Tubes of Women attending two selected Fertility Clinics in Southwestern Uganda

Mercy Aturinde, Ayesiga Savino, Ahesibwe Hillary, Nalugo Halima

Background: Morphological changes that occur in fallopian tubes have been implicated in up to 20–35% of reported female infertility cases. Congenital absence or malformation, infections including Chlamydia trachomatis and Neisseria gonorrhoea, genital TB, and endometriosis adhesions that cause tubal distortion are some of the factors that may have an adverse effect on fallopian tube shape or function. Infertility may be brought on by tubal defects resulting in occlusion. A greater incidence of tubal occlusion is mainly associated with a history of recurrent pelvic inflammatory disease and a history of intra-abdominal surgery that resulted in adhesions. The degree of the damage to the fallopian tubes increases with the frequency of prior infections. Despite the fact that these unusual organs were initially explored over a century ago, the success of reproductive medicine has mostly resulted in their marginalization.

Methods: A cross section of 77 women with infertility were enrolled consecutively over a period of 3 months (from December 2022 to February 2023) at Gynecology clinic of Mbarara Regional Referral Hospital and NeoCare Fertility Centre and Clinic. Participants' HSG reports and images as well as participant characteristics were assessed and captured.

Results: We included 77 participants in this analysis and 31 (40.3%) of these instances had primary infertility whereas 46 (59.7%) had secondary infertility. Majority of patients had bilateral hydrosalpinx, while 5.4% of those with primary infertility had unilateral loculated spill indicative of peritubal adhesions. 60% of patients had bilateral free peritoneal spillage. Tubal occlusion was unilateral in 32.5% of patients, while 24.7% had bilateral tubal occlusion. History of PIDs (OR 4.88; 95% CI: 2.4328, 7.3349, p-value 0.001), age >35yrs (OR 3.83; 95% CI: 1.9781, 6.6923, p-value 0.009), prior use of contraceptives [OR 1.83; 95% CI: 1.050, 3.159, p-value 0.007] and type of infertility [OR 1.6; 95% CI: 1.082, 3.9769, p-value-0.050] were identified as factors associated with tubal occlusion.

Conclusions: Bilateral tubal occlusion with or without hydrosalpinx was the most frequent fallopian tube abnormality on HSG and occurred in 40% of all study participants. Age over 35 years, prior use of contraceptives, secondary infertility, and prior abdominal surgeries are all significant risk factors that have a substantial correlation with tubal occlusion.

Keywords: Hysterosalpingography, morphological, infertility.

4.0 FACULTY OF SCIENCE

4.1 MASTER OF SCIENCE IN BIOLOGY

4.1.1 Influence of Epigeous termite mounds on selected attributes of rangeland health in the Rwizi catchment: Interrogating human perceptions

Yasin Igga, Grace Rugunda Kagoro, John Bosco Nkurunungi, Ronald Twongyirwe

Rangelands are non-arable areas used predominantly, but not exclusively, for grazing livestock such as goats and cattle. Rangelands are fragile ecosystems that have been increasingly mismanaged due to resource scarcity and increasing population. The major aim of this research was to determine the influence of epigeous termite mounds on selected attributes of rangeland health and investigate human perceptions on termite mounds. Specific objectives were to: determine the spatio-temporal distribution of termite mounds; determine morphological characteristics of termite mounds; establish soil physicochemical parameters & vegetation species diversity surrounding termite mounds; determine farmers' perceptions, knowledge and attitude towards termite mounds. This study entirely employed both quantitative and qualitative design. This study was carried out using Google earth historical imagery and nine (9) purposively selected plots measuring 500m x 500m to determine spatio distribution and morphological characteristics of mounds respectively. Furthermore, a questionnaire was administered to 104 respondents to determine farmers' perceptions, knowledge and attitude towards termite mounds. Results indicated that Kiruhura had the highest mean area coverage of mounds ($8043 \pm 1873 \text{ m}^2$), followed by Isingiro ($3907 \pm 2648 \text{ m}^2$) & Mbarara ($3687 \pm 1081 \text{ m}^2$) respectively. *Macrotermes bellicosus* was recorded as the most dominant species. Mound soil across all the sites had significantly ($p < 0.05$) higher nutrient content in relation to control soil. Mounds had significantly ($p < 0.05$) more shrubs than off-mound distances. Majority of respondents who were educated (89.4%) destroy termite mounds compared to 39.5% of the respondents who were uneducated. A significant relationship was found between level of education and termite mound destruction ($\chi^2 = 29.279$, $p = 0.000$). Majority of respondents (71.2%) destroy termite mounds on their farms. Half of the farmers destroy termite mounds by removing the queen. This study concludes that although termite mounds may have some benefits known and acknowledged by few, the trend is to destroy them due to their destructive nature especially to agricultural pasture and settlement construction. Furthermore, mounds are vital sinks of crucial nutrients, hence play a significant role in the maintenance of the integrity and proper functioning of rangelands through accumulation of nutrients in their mounds and modifying soil physicochemical properties.

Keywords: Benefits, Google Earth, Mound destruction, Perception.

4.1.2 An Assessment of Soil Erosion and Soil Nutrient Loss Under Different Land Uses in Rwamucucu Sub County, Rukiga District in Uganda

Nuwagira Upton, Grace Kagoro-Rugunda, RaphealWangalwa

Soil erosion is a huge challenge to soil nutrient management in mountainous areas of Sub-Saharan Africa. In Uganda, in Rukiga district, soil erosion is influenced by land use activities. For Instance, the use of rudimentary methods of farming commonly used by farmers triggers soil erosion and nutrient loss on the steep hills, thus reducing crop yields. The objectives of this study were; i) to determine the land use/land cover changes (2005, 2010, 2015, and 2022), ii) to determine the extent to which areas under different land uses/land cover types are prone to soil erosion, iii) and determine the soil and nutrient losses under different land uses and soil conservation practices within the soil erosion prone areas and iv) document the farmers' knowledge, perception, and conservation practices towards soil erosion and soil fertility, in Rwamucucu the sub-county in the Rukiga district. This study employed GIS and Remote Sensing techniques in determining the land use /land cover types. The RUSLE model was used in mapping areas that were prone to soil erosion. Soil nutrient losses through erosion were determined using 44 runoff plots of 4m by 2m. This study administered a questionnaire to a total of 152 respondents to document farmers' knowledge, perception, and soil conservation practices toward soil erosion. According to the RUSLE model, small-scale agriculture was the dominant land use and experienced the highest magnitude of soil erosion (9,724 tons/ha/yr) in the study area. The amount of soil eroded in the fields under terracing, contour cropping, no soil erosion conservation practice, natural grass, and eucalyptus plantation varied significantly ($p = 0.000$). The majority of the farmers (99.3%) perceived that eucalyptus growing on hills heavily influenced soil erosion to take place. Farmers' fields with no soil conservation measures experienced the highest soil nutrient losses. Results have indicated that soil erosion leads to loss of major nutrients such as Nitrogen, Phosphorus, and Potassium especially when no soil conservation practice is used. Farmers are therefore encouraged to practice soil erosion conservation practices such as terracing and contour cropping.

Keywords: RUSLE, GIS, Remote Sensing, Land use

4.1.3 Environmental hazards' occurrence in highland fragile ecosystems of Kisoro and Buhweju districts: Distribution of crop pests and diseases

David Mubiru, Grace Kagoro, John Sekajugo

Human occupation of high altitude environmentally fragile ecosystems in association with the increased extreme weather events exacerbates the occurrence of environmental hazards such as soil erosion, landslides, floods, hailstorms, droughts, crop pests and diseases onto the country's crucial sectors like agriculture. This in turn affects economic growth as 80% of the households directly or indirectly derive livelihood from the sector and mostly in the rural areas. Region based information about these hazards under the scope of crop production is fundamental for addressing the environmental hindrances the sector faces, more so among the rural farmers who are the initial producers in the whole chain of food production. Therefore, the study aimed at establishing various selected environmental hazards' occurrences in Kisoro and Buhweju districts with emphasis on crop pests and diseases using Murora and Bihanga as case study Sub- counties. A citizen Scientist approach was used to record real time events of natural hazards in the selected Sub counties of Kisoro and Buhweju. 105 and 130 farmers in Bihanga and Murora respectively were randomly sampled, administered with both an open

and close ended questionnaire and Alsofield surveys were conducted on their gardens. The environmental natural hazards showed a temporal pattern of occurrence with October and November having the highest occurrence records. Crop pests and diseases showed seasonal occurrence patterns; pest occurrences showed variations with slope degree with more occurrences at low to moderate slope degree while no variations with slope were seen for disease occurrences. Bihanga had more pest categories than Murora; and both had bacterial diseases with highest- and viral diseases with lowest- occurrences. Crop diseases locally named “Ikaata” and “Toduuura” for banana and “Katayanga” for potatoes were encountered though not categorized. The productivity of annual crops such as legumes, cereals and vegetables were more affected by the environmental challenges in both Sub- counties than that of the tubers, fruits, banana and coffee. Therefore, natural environmental hazards occurrences are more in the last quarter of the year, crop pests occur more at lower altitude than at higher altitude while crop disease occurrences are independent of the altitude, Noctridae and Aphidae families are the most crop pest categories experienced, and Banana Xanthomonas Wilt, Potato Viral Disease, Potato Bacterial Wilt are the most experienced diseases. Crop tubers are least affected by the selected environmental challenges. Further studies on the uncategorized diseases and ground breaking studies on potato bacterial wilt, potato viral disease and banana xanthomas wilt diseases are highly recommended.

Keywords: crop pests and diseases, s environmental hazards, fragile ecosystems, Buhweju and Kisoro.

4.1.4 Effects of Postharvest Insecticides on growth and Toxin Production by Mycotoxigenic *Aspergillus* and *Fusarium* Strains infecting Stored Maize

Nekesa Gloria Wanyonyi, Jeninah Atwebembeire, Dennis M.W. Ochieno

The problem of mycotoxins has been on the rise in Kenya and Uganda among other African countries that heavily consume maize and other cereal crops. Improved maize varieties that are not purposively bred for resistance to storage insect pests and mycotoxigenic fungi require protection by synthetic insecticides, which in turn may serve as nutrient sources to mycotoxigenic fungi, leading to invasive growth and enhanced toxin production. This study therefore aimed at determining the effect of post-harvest insecticides on the growth and toxin production of mycotoxigenic fungi in different maize varieties. It utilized six commonly used synthetic insecticides (Actellic Super Dust, Actellic Gold Dust Dust, Super Blue Cross Dust, Super Grain Dust, Skana Super and Sumicombi), Ash derived from *P. vulgaris* was also included as a non-synthetic insecticide, four maize varieties (improved maize variety hybrid WH505, local yellow landraces Spindi/Nyamula, Local white landrace NambaNane/Rachar, retained white flour Dola) and six fungal strains belonging to genus *Aspergillus* and *Fusarium*. The design comprised two in vitro assays on PDA and an in vivo assay that was analysed using an Enzyme-Linked Immunosorbent Assay (ELISA). Results from this study revealed that; Flour from the improved white maize variety (Western 505) had the highest level of colonisation by *A. flavus* and *Fusarium* sp., with consequently elevated mycotoxin concentrations. Flour from the local yellow maize variety exhibited the least colonisation and mycotoxin production by both *A.flavus* (4,133 CFU g-1) and *Fusarium* sp., (6,145 CFU g-1) especially under high moisture conditions 1.0 aw. The synthetic insecticides Blue Cross

(C10H19O6PS2) and Actellic Super Dust (C11H20N3O3PS; C22H20Cl2O3) promoted growth and mycotoxin production by *A. flavus* and *Fusarium* sp. The *P. vulgaris*-derived ash promoted the growth of the two mycotoxigenic fungi but suppressed mycotoxin production (Aflatoxin and Fumonisin: control=114 ppb and 1.46 ppm; Ash=114 ppb and 1.29 ppm; Actellic Super Dust=270 ppb and 3.55 ppm; Blue Cross=320 ppb and 2.31 ppm respectively). Based on these findings, it was concluded that flours from the local yellow and local white maize varieties are less susceptible to infection and mycotoxin contamination by *A. flavus* and *Fusarium* sp. compared to the improved white maize variety, which accumulates higher levels of the mycotoxigenic fungi (6633 CFU g⁻¹ and 10870 CFU g⁻¹) and their toxins, especially when treated with the synthetic insecticides such as Blue Cross and Actellic Super Dust which act as fungal nutrient sources, especially under high moisture conditions. It was therefore concluded that post-harvest insecticides have an enhancing effect on the growth and toxic production by mycotoxigenic fungi in stored maize, with the improved varieties that are not purposively bred against insects and mycotoxigenic fungi being more susceptible, especially in high moisture conditions.

Keywords: Aflatoxin, Aspergillus, Fumonisin, Fusarium, Insecticide, Resistant variety

4.1.5 Impact of Anthropogenic Activities on Kakingoora Wetland in Ntungamo District, Uganda

Aron Namanya Katwesigye, Justine Nakintu Grace Kagoro

Kakingoora wetland in Ntungamo district is being severely affected by the rapidly expanding human population despite its numerous ecological functions. However, the extent of degradation inflicted on this natural resource on which its restoration strategies can be based lacks adequate documentation. For the restoration procedures to be successful, information on the level to which it has been altered by human activities is vital. Therefore, this study was undertaken to reveal the impacts of human disturbance on Kakingoora wetland with an aim of informing its restoration stratagems. Impact of anthropogenic activities on Kakingoora wetland was studied in 19 political administrative cells through which it traverses. Nine of these cells lie in the Municipality while ten in the district local government. The study focused on the land use and land cover changes over the last 30 years, current human activities degrading Kakingoora wetland, state of the physical chemical properties of water and the level of compliance to National guidelines of wetland management in Uganda. Thirteen sampling sites were selected purposively where twelve were based on existence of threatening human activities along Kakingoora wetland and one on non-existence (did not have observable evidence of disturbance by human activities) and it was used as a control site for comparison. Land use and land cover changes was determined by analyzing satellite images from 1990 to 2020 with an interval of 10 years. Current human activities were studied through field surveys using direct observations at an interval of 0.5 km and interviews of 191 respondents who included 11 key informants, 38 local leaders and 142 local residents. Water quality was determined by in situ and ex situ analysis of physical chemical parameters following standard water analysis procedures and of macro zoobenthos as biological indicators from the 13 sites with consideration of both dry and wet seasons. Average Score Per Taxa (ASPT) results, revealed that the wetland was heavily polluted (dry season = 4.004 and for wet season = 4.541) where agriculture and urbanization activities were the most detrimental human activities to Kakingoora wetland. Areas in the vicinity of these activities

registered the worst water quality as revealed by ASPT at the sites of garage (0.0) and waste from the market (0.0) and their physicochemical properties significantly differed from the control values ($p = < 0.01$). Based on the findings of this study, restoration and conservation of the integrity of Kakingoora wetland ecosystem should focus on regulation of agricultural and urban activities in and around the wetland.

Keywords: Human activity, Land use, land cover, water quality, satellite image

4.1.6 Assessment of the potential of *Tithonia diversifolia* for bioslurry liquid fertilizer enrichment

Kezimana Paul Ferréol, Nkurunungi John Bosco

Soil degradation is one of the major issues affecting modern agriculture. The fertility of the agricultural lands is declining, due to intensification of cultivation. This has resulted into excessive application of synthetic fertilizers in modern agriculture which is associated with adverse effects on the environment such as residual chemicals, wetland, and water body contaminations. Overtime, this has aroused interest among scientists to look for environment friendly alternatives such as the use of organic based fertilisers. The main objective of this study was to assess the potential of *Tithonia diversifolia* leaf extract to enrich bio-slurry liquid organic fertilizer and its effects on plant growth and yield. Nutrient release patterns of *Tithonia diversifolia* leaf biomass decomposing in water were analysed for presence of Nitrates and Phosphates. Hydroponic test with different concentrations of *Tithonia diversifolia* were conducted to assess its influence on growth and root development of bean (*Phaseolus vulgaris*). Experimental trials were done by applying various concentrations of *Tithonia diversifolia* filtrate on two test crops green pepper (*Capsicum annuum* L.) and Lettuce (*Lactuca sativa*). Growth parameters (leaf length, width) were compared with those from bioslurry which is a known organic fertiliser to obtain comparative data. Results from *Tithonia diversifolia* biomass nutrient release showed a decrease in pH over time which may be attributed to the oxidation of phosphates into phosphoric acid, and increased nitrates with strong negative and positive correlation ($P < 0.05$). Higher concentration of *Tithonia diversifolia* in water was found to significantly inhibit root development of beans ($P < 0.05$), it was also observed on vegetable green pepper ($P < 0.05$) and lettuce ($P < 0.05$), whereby the application of *Tithonia diversifolia* resulted into stunted root development compared to other fertilizer treatments. The experimental testing with *Tithonia diversifolia*-Bioslurry fertilizer on vegetables did not show significant differences among the treatments on growth and yield parameters. However, for lettuce, plant height was low under bioslurry application. These results lead to the conclusion that *Tithonia diversifolia* mixed with bioslurry was not as much profitable as it was expected, nevertheless it was noticed that *Tithonia diversifolia* when used in little concentration after being left to decompose in water for less than a week., can be used as a complete fertilizer as well as like bioslurry.

Keywords: Organic fertilizer, invasive plants, green pepper, lettuce, soil proprieties.

Species' Richness and Distribution of Extremophile Bacteria in Kitagata and Ihimbo Hot Springs in Southwestern Uganda

Nabagye Andrew, Jane Yatuha

Extremophiles are organisms that thrive in habitats which are intolerably hostile or even lethal for other life-forms. Such environments include extreme anoxia, temperature, salinity, water velocity among others. Extremophiles consist all three domains of life i.e., bacteria, archaea, and eukaryotes but a high proportion of these being archaea. Extremophiles which thrive in high temperature media are referred to as thermophiles. A number of thermophilic micro-organisms have been isolated and they include thermophilic bacteria which inhabit hot spring environments. Thermophilic bacteria have attracted several studies due their significance in biotechnological breakthroughs, such as sources of thermo-stable enzymes used in the food, detergent and pharmaceuticals industries, as well as in the polymerase chain reaction in DNA fingerprinting protocols. Hot springs have been well studied in some countries like USA, India, Ethiopia and South Africa. In Uganda, few studies have been done within the East African rift in the geothermal area of Kibiro, Katwe and Buranga. Thus the information on the status and biological assemblage of hot springs outside the rift valley region including (Kitagata and Ihimbo) is barely known. This study sought to identify the thermophilic bacteria inhabiting Kitagata and Ihimbo hot springs, as well as ascertaining the health of the hot springs due to prevalence of these bacteria. Water samples were collected in a sterile thermo flask and taken to the laboratory, and then the colonial and biochemical tests were done and in comparison to the Bergey's Manual of Determinative Bacteriology nine species were identified. These include *Bacillus subtullis*, *Enterobacter cloacle*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Enterobacter agglomerans*, *Pseudomonas aeruginosa*, *Escheichia coli*, *Enterobacter aerogenes* and *Enterococcus faecalis*. Though, some belong to intra-intestinal bacteria which are thermotolerant that suggests faecal contamination of the two hot springs. The physicochemical parameters (Temperature, pH. and Ec) were measured in-situ. The ranges were temperature 38.00°C to 68.25°C, pH 8.57 to 9.77 and electrical conductivity 1066.25s/m to 1315.50s/m in the two hot springs. The physicochemical parameters showed an effect on thermophilic assemblage though temperature has the highest impact on the thermophilic bacteria present in Kitagata and Ihimbo hot spring. This study has profiled the thermophilic bacteria species in Kitagata and Ihimbo hot springs and thus recommends for further studies on the screening of identified thermophilic bacteria for thermo-stable enzymes such as amylase, xylanase and cellulase production for the utilization in the bio industries.

Keywords: Extremophiles; Thermophilic bacteria; Hot springs

4.2 MASTER OF SCIENCE IN CHEMISTRY

4.2.1 Heavy metal concentrations and their speciation in selected metal fabrication workshop soils in Mbarara City, Uganda

Eunice Nuwamanya, Denis Byamugisha, Emmanuel Ntambi

Metal fabrication workshops are a common business in urban centres of Uganda dealing in production of majorly construction materials such as security gates, metallic window and door frames (burglar proofs), balcony and stare case rails. These workshops are accompanied by activities such as metal cutting, grinding, welding and vanishing. The materials used in fabrication processes have been reported to be majorly steel alloys made up various heavy metals such as cadmium, chromium, nickel, molybdenum, titanium, manganese, vanadium, copper, silicon, cobalt, zinc, iron and aluminium in different proportions. Therefore, this study aimed at determining the pH, electrical conductivity, total organic carbon, total heavy metal concentration (Mn, Cr, Cd, Pb and Ni) and their chemical species in soil samples collected from metal fabrication workshops in Mbarara City. The total concentration of each heavy metal was determined using inductively coupled plasma – optical emission spectrometer (ICP-OES) while metal speciation was determined using a six-step sequential extraction standard procedure. The pH results of the soil samples collected from the selected metal fabrication workshops, ranged as follows; site 1 (8.2 to 8.7), site 2 (8.3 to 8.8), site 3 (7.7 to 7.8) and site 4 (7.4 to 7.9). Electrical conductivity ($\mu\text{S}/\text{cm}$) ranged from; site 1 (768 ± 103 to 1663 ± 200), site 2 (723 ± 117 to 1564 ± 76), site 3 (380 ± 22 to 460 ± 42) and site 4 (126 ± 47 to 293 ± 129). The total organic carbon (%) ranged from; site 1 (0.49 to 0.86), site 2 (1.0 to 1.18), site 3 (0.76 to 1.01) and site 4 (1.08 to 1.31). The mean concentrations of the heavy metals in pooled soil samples ranged from (mg/kg); Cd (0.242-0.431), Cr (86.849-141.643), Pb (35.934-87.337), Ni (24.945-70.458), Mn (670.917-1125.712) giving the trend as; Mn>Cr>Pb>Ni>Cd. The concentrations of Cd, Cr, Pb, Ni and Mn at all the four sites were significantly greater than at the control site ($p < 0.05$), and well above the WHO recommended permissible limits ($p < 0.05$). On average, the highest percentage of metal species existed in the reducible fraction on site 2; Cd (16.6%), Pb (27.5%) and Mn (55%), site 3; Cd (24.8%), Cr (48.8%), Ni (35.6%) and Mn (68.9%); and site 4; Cd (32.5%), Cr (55.1%), Ni (28.4%) and Mn (46.1%) while the metal species were more abundant in the residual fraction on site 1; Cr (55.4%), Ni (37.6%) and Pb (34.7%). These findings show that the soils from the metal fabrication workshops in this study are alkaline, saline with low total organic carbon and polluted with Cd, Cr, Pb, Ni and Mn. These heavy metals can easily leach into the underground water or be carried into surrounding surface water sources and affect animal and human health. Therefore, effective regulation of the operations and location of metal fabrication workshops is essential to protect public health in Mbarara City.

Keywords: Metal workshops, heavy metals, speciation, soils, soil pollution.

4.2.2 Assessment for the levels of acid rock drainage along River Nyamwamba and the selected vegetables grown on Kilembe Copper Mines Waste Rock, in Kasese District, Western Uganda

Jockus Masereka, Denis Byamugisha, Christopher Adaku

Active mining of minerals from Kilembe copper rocks in Kasese district, Western Uganda ended about four decades ago. However, various health problems are believed to be from the

effect of mining activities that took place in the area. This study was therefore conducted to provide information on the levels of heavy metals (HMs) in water from River Nyamwamba (R. Nyamwamba) and vegetables grown on Kilembe mine soils, and assess the health risks associated with their consumption. The specific objectives of the study were to; (1) determine the seasonal variations in the concentration of acid rock drainage HMs metals (Fe, Cd, Pb, Cu, As, Zn and Cr) in water sampled from along R. Nyamwamba; and (2) evaluate the bioaccumulation levels of HMs (Fe, Cd, Pb, As, Cu, Zn and Cr) in cabbages and tomatoes grown in Kilembe mines catchment, Kasese, Western Uganda. Seasonal variations in the physicochemical quality (pH, conductivity, total dissolved solids, total suspended solids and HMs content) of water from down, middle and upstream of R. Nyamwamba were comparatively analyzed with samples from River Mubuku, Western Uganda. Cabbages (*Brassica oleracea* var. *cupitata*) and tomatoes (*Solanum lycopersicum* L.) were grown in Kilembe mine soils and sampled after 40 days and 120 days of growth. All the samples were analyzed for HMs: chromium (Cr), cadmium (Cd), zinc (Zn), iron (Fe), lead (Pb), arsenic (As) and copper (Cu) by atomic absorption spectrometry. Health risks from ingestion and dermal contact with water, and consumption of the vegetables were assessed using estimated daily intake, target hazard quotient (THQ) and incremental lifetime cancer risk. Results of the study revealed that most physical parameters of water samples only met WHO guidelines for drinking water in the upstream. The mean concentration of Fe, Cu, Pb, Zn, Cr, Cd and As were 0.90-29.66 mg/L, 0.21-10.74 mg/L, 0.40-8.21 mg/L, 1.10-13.47 mg/L, 0.79-13.47 mg/L, 0.05-1.40 mg/L and 0.22-4.34 mg/L, respectively. The wet season recorded higher metal concentrations when compared to the dry season while the upstream water samples had the highest concentration of the HMs. For vegetables, the levels of Fe, Cu, Zn and Cr recorded after 40 days and 120 days of growth did not exceed the WHO/FAO maximum permissible limits. Health risk assessment indicated that the estimated daily doses through dermal contact with water ranged from 0.015 mg/kg/day to 4.150 mg/kg/day while through ingestion of contaminated water, the values ranged from 0.008×10^{-6} mg/L/day to 38.266×10^{-6} mg/L/day. Some of the estimated daily doses were higher than the corresponding reference doses for ingestion and contact with the HMs in water. Total THQ exceeded 1 while the cancer risk assessment gave risk values beyond the US EPA cancer risk borderline. On the other hand, the daily intake of Fe from consumption of 40 day-old cabbage leaves by children (294.678×10^{-4} mg/kg/day) was the highest while the lowest was 0.052×10^{-4} mg/kg/day for chromium consumed by adults in cabbages cultivated for 120 days. The THQ

of the HMs ranged from 4×10^{-5} mg/l for Cr in cabbages eaten by adults to 1.3134 for Pb in cabbages consumed by children. The cancer risk values ranged from 0.126×10^{-4} for Pb consumed in tomatoes by adults to 28650×10^{-4} for arsenic in cabbages consumed by children. In conclusion, there are potential non-carcinogenic and carcinogenic health risks that could arise from consumption and contact with water from R. Nyamwamba but these are not discernable from consumption of cabbages and tomatoes by the local inhabitants. The results show that consumption of the vegetables after 120 days of growth poses lower health risks than when they are eaten after 40 days of growth. Thus, there is need for the regulatory authorities to put in place measures to remediate the Kilembe copper mines which is the source of HMs polluting R. Nyamwamba.

4.2.3 Speciation of Selected Heavy Metals in Bottom Sediments of River Rwizi, Mbarara City, Uganda

Eustache Nijeje, Emmanuel Ntambi, Denis Byamugisha

This research focused on chemical speciation of six heavy metals in the bottom sediments of River Rwizi in Mbarara City, Uganda. Heavy metals cadmium (Cd), copper (Cu), nickel (Ni), lead (Pb), zinc (Zn), and iron (Fe); physicochemical parameters, namely pH, oxidation-reduction potential (ORP), and organic matter (OM) were assessed during wet and dry seasons. Sequential extraction procedure was applied to fractionate metals into six fractions: water-soluble, exchangeable, carbonate bound, Fe-Mn oxides bound, bound to organics, and residual fraction. Quantitative determination of heavy metals was carried out using flame atomic absorption spectrophotometer. Speciation results revealed that the potential mobility of heavy metals decreased from wet to dry season, and it was in the increasing order of $Zn > Cu > Cd > Pb > Ni > Fe$, in both seasons. Higher concentrations of heavy metals were present in their immobile chemical forms than in their potentially mobile chemical forms. The total mean contents in $mg\ kg^{-1}$ (except Fe in %) of the metals were Cd: 1.63 ± 0.21 ; Cu: 106.10 ± 23.22 ; Ni: 38.17 ± 6.07 ; Pb: 33.45 ± 3.33 ; Zn: 108.34 ± 30.51 ; Fe: 3.04 ± 0.75 , and Cd: 1.64 ± 0.23 ; Cu: 111.10 ± 27.36 ; Ni: 39.81 ± 7.90 ; Pb: 33.98 ± 3.63 ; Zn: 115.72 ± 31.64 ; Fe: 3.08 ± 0.75 during wet and dry seasons respectively. The geochemical accumulation indices of Cd, Cu, Pb, and Zn showed that the bottom sediments of River Rwizi ranged from unpolluted to severe polluted sediments, which implied anthropogenic input. Other parameters measured from wet to dry season were, pH: $6.8 \pm 0.35 - 6.21 \pm 0.08$; ORP: $308.4 \pm 44.7\ mV - 342.1 \pm 39.6\ mV$; OM: $2.0 \pm 0.35\% - 1.4 \pm 0.31\%$. Conclusively, it was found that heavy metals (Zn, Cu, and Cd) were significantly present in their potential mobile fractions alarming that they may pose serious human and environmental problems.

Keywords: Mobility factor; River Rwizi; Sequential extraction; Enrichment factor; Müller geoaccumulation index

4.2.4 Perfluoroalkyl carboxylic acids in superficial sediments of Lake Victoria: occurrence and source apportionment

Lydia Mwikali, Grace Birungi, Kenneth Arinaitwe

Chemical pollution has threatened Lake Victoria ecosystem and over the last decades; anthropogenic pressures such as growth in agriculture, urbanization, industrialization coupled with poor waste management systems have led to a significant accumulation of chemical pollutants such as perfluoroalkyl carboxylic acids (PFCAs), a constituent group of poly- and perfluoroalkyl substances (PFASs), in the lake catchment areas. PFASs, which include PFCAs have been recognized as contaminants of emerging concern due to their widespread occurrence, persistence and potential toxicity even at low concentrations and have raised great concerns in the world. This study investigated the occurrence of long chain PFCAs in surface sediments of Lake Victoria and their probable sources. Forty-one surface sediment samples were collected from Lake Victoria and analyzed using liquid chromatography with tandem mass spectrometry. SPSS v20 software was used for descriptive and inferential statistical analyses. The total concentration of the PFCAs ranged from 260.33 to 1916.20 ng/kg d.w. PFNA and PFTeDA were the dominant PFCAs with 100% detection frequencies. The detection frequencies for all the PFCAs were $\geq 95\%$. The mean concentrations of the analyzed PFCAs did not differ significantly among Kenya, Uganda and Tanzania ($P = 0.951$, $\alpha = 0.05$). The concentrations of the analyzed PFCAs in Lake Victoria were lower than those reported for lakes in China, North America and South Korea, but comparable to those reported in Lake Tana, Ethiopia. Sample SD32, collected near Mfangano reported the highest levels of PFCAs while sample SD37, collected near Takawiri island had the lowest. The coefficients of variations of the individual PFCAs ranged from 74.48 % to 101.09 %. The probable sources of PFCAs in Lake Victoria surface sediments were identified using United States Environmental Protection Agency Positive Matrix Factorization v.5 software as domestic sources (46%) through surface runoffs and wastewater discharges, and atmospheric deposition (54%). The occurrence of PFCAs in Lake Victoria is of great concern due their persistence, bioaccumulative properties and potential toxicity even at low concentrations to the aquatic organisms, and even humans and, thus prevention and remedial measures are needed

4.2.5 Aflatoxin Contamination of Cattle's concentrate Feeds: A Case Study of Dar es Salaam

Jonathan Sylvester Sahan, Irene Nalumansi, Grace Birungi

Presence of aflatoxins in livestock feed is an issue of public health concern worldwide because, in addition to reducing livestock growth rate and milk production, aflatoxins may eventually reach humans through consumption of meat and milk products leading to aflatoxicosis. The African continent's environment, agricultural and storage conditions of food commodities favour *Aspergillus* fungi infection and aflatoxin biosynthesis however, data on aflatoxin contamination of livestock feed is scarce. Hence we investigated the

prevalence, awareness, and control of aflatoxin in cattle concentrate feeds produced and sold in Dar es Salaam-Tanzania as a case study.

In this qualitative and quantitative study, eighty-one respondents were interviewed to assess knowledge, and human practices associated with aflatoxin contamination and control. Furthermore, eighty-one samples of cattle concentrate feed obtained from processors and sellers in four districts of Dar Es Salam were analyzed for aflatoxins using Enzyme-linked Immuno-sorbent Assay and High-Performance Liquid Chromatography with a Fluorescent Detector.

The level of awareness about aflatoxin contamination was 38% and insignificant ($p = 0.353$), and the awareness about adverse health effects of aflatoxin exposure was 28%. Aflatoxins were detected in 78% of the samples in the range LOD to 161.32 ng/g. The mean total aflatoxins (TAFs) was 25.89 ± 3.3 ng/g and was higher than WHO/US-FDA acceptable limit of 20 ng/g in feed although the difference was insignificant ($P = 0.81$). Aflatoxin B1 (AFB1) mean was 18.87 ± 2.45 ng/g and significantly exceeded the WHO/US-FDA acceptable limit of 5 ng/g of AFB1 in dairy feed ($P = 3.05 \times 10^{-10}$). Aflatoxins B2, G1 and G2, were also detected ranging from ND – 75.06 ng/g.

Concentrate feeds sold in Dar es Salaam were contaminated with aflatoxins in some cases with concentrations above the WHO/US-FDA regulatory limits and thus may pose a health risk to animals and human beings who consume animal products. Economic loss through product dumping, treatment costs, and lower cattle production is also a risk. Improving pre and post-harvest management practices and promoting awareness in the animal feed value chain may alleviate aflatoxin contamination of cattle feed and associated risks.

Keywords: Aflatoxin, contamination, Dar es Salaam, Tanzania, concentrate feeds.

4.2.6 Antifungal Properties and Characterisation of Phytochemicals from the Aerial Parts of *Mitracarpus scaber*

Amos Senyonjo, Christopher Adaku, Benson Oloya

About 80 % of the population in rural areas in Uganda rely on medicinal plants for the management of fungal skin infections like *Tinea versicolor* caused by *Malassezia furfur*. However, the effectiveness of the medicinal plants used such as *Mitracarpus scaber* has not been widely explored. This study aimed at determining the efficacy of crude extracts of *M. scaber* against *M. furfur* and characterising the compounds in the extracts that exhibited antifungal properties. In this procedure, the plant samples of 1000 g were extracted by cold solvent extraction sequentially using hexane, ethyl acetate, methanol, and distilled water. The antifungal activity of each crude extract of *M. scaber* was carried out using the agar well diffusion method against both sensitive and resistant strains of *Malassezia furfur*. The zones of inhibitions of hexane, ethyl acetate, methanol, and aqueous crude extracts and the minimum inhibitory concentration (MIC) of the active extracts were determined. The isolated compounds were then characterised by NMR and MS techniques.

The results obtained showed that the solvents had a percentage yield of 11.3%, 4.1%, 7.9%, and 23.4% respectively. With the exception of hexane extract, the zones of inhibition in mm of the crude extracts against sensitive and resistant strains of *Malassezia furfur* were 22.67 ± 1.15 ; 21.33 ± 1.15 for aqueous extract, 17.00 ± 1.73 ; 13.00 ± 1.00 for methanol and 11.67 ± 1.52 ; 09.67 ± 0.58 for ethyl acetate extracts respectively. The MIC value in mgmL⁻¹ of active crude extracts of *M. scaber* against sensitive and resistant strains of *M. furfur* were 7.81; 15.63 for aqueous extract, 15.63; 15.63 for methanol and 62.50; 62.50 for ethyl acetate extracts respectively. The MIC of the aqueous extract against the sensitive strain of *M. furfur* was the lowest compared to methanol and ethyl acetate extracts. When the extracts were tested against a resistant strain both aqueous and methanolic extracts showed equal MIC of 15.63 mgml⁻¹. Two compounds, dibutyl phthalate and oleanolic acid were isolated and identified for the first time from the genus of *M. scaber*. Studies show that oleanolic acid exhibits antifungal activity against *Candida albicans* with MIC₈₀ of 8 µg/mL. Thus, the traditional claims about the use of *M. scaber* as an antifungal agent for treating *T. versicolor* were therefore supported by the present study.

Keywords: Antifungal properties, Characterization, Phytochemicals, *Mitracarpus scaber*

4.2.7 Optimization of Nutritional and Anti-Nutritional Properties of Finger Millet and Cassava Flour Composite

Robert Mweteise, Hannington Gumisiriza, Christopher Adaku

Malnutrition continues to seriously prevail around the globe today and threatens to destroy generations. The problem goes deep in developing countries, especially in sub-Saharan African countries of which Uganda is among. In Uganda, malnutrition is among the leading causes of death, especially in remote settings of the country. This problem in Uganda is attributed mainly to lack of nutritious foods and over reliance on staples which are not properly used to balance the diet. Cassava and cereals such as millet, sorghum, maize and rice are some of the staple foods that Ugandans depend on. Finger millet flour in particular is mixed with cassava flour to form a composite flour which is then used for making mingled bread. However, nutrient optimization and anti-nutrients of these flours have not been done and this has left a gap in knowledge on the best processing methods and the combination ratios to ensure generation of a nutrient rich meal. Therefore, the current study aimed at optimizing the nutrient content of finger millet and cassava flour composite for development of nutritious meals. This was achieved through determination of nutritional and anti-nutritional values of mingled bread made from composite flour prepared under different processing conditions. The nutrient content which included carbohydrate, protein, fat, calcium, iron, fiber and the anti-nutritional content (total phenolic content and HCN) were determined using AOAC International's Official Methods of Analysis. The data generated were statistically analysed using IBM SPSS statistics version 20 (ANOVA). The findings of this study revealed that roasting enhanced total carbohydrate, iron and calcium content. A decrease in total dietary fiber, fat, protein, phenolics and HCN was detected in mingled bread from roasted samples. The bread from millet flour with no cassava flour substitution had

significantly higher protein content, fat content, fiber content, calcium content and total phenolic content as compared to composite flour. Moreover, this study revealed that the formulation ratio F : C = 3 : 1 yielded bread with the optimal nutritional values that meet the Reference Nutrient Intake (RNI) for the vulnerable groups in 200 g serving.

4.2.8 Concentrations of Synthetic Colorants and Preservatives in Locally Made Functional Beverages on Market in Mbarara City, Uganda

Brian Kwikiriza, Hannington Gumisiriza, Paul Mukasa

Consumption of locally made functional beverages has increased due to their sought-after health benefits. However, these beverages may contain high concentrations of synthetic colorants and preservatives posing potential health risks to the consumers. This study analysed the concentrations of synthetic colorants and preservatives in locally made functional beverages on market in Mbarara City, South Western Uganda. Semi-structured questionnaires were used to collect data on locally made functional beverages from 269 traders and 269 consumers. Thin Layer Chromatography was used to identify synthetic colorants in beverage samples using methanol and chloroform (50:50 v/v). High Performance Liquid Chromatography was used to determine concentrations of synthetic colorants and preservatives in beverage samples. The study revealed that Akandi, alleluia, Kazire, Kirungi, Kituzi, Tayebwa, and Yausafi health drink products were the highly sold and consumed locally made functional beverages on market in Mbarara City. Sunset yellow, brilliant blue FCF and tartrazine were identified as the synthetic colorants added to the beverage samples and their concentrations ranged from 15.38 ± 5.62 to 216.65 ± 4.25 mg/l. The concentration of sodium benzoate in beverage samples ranged from 125.22 ± 4.62 to 364.00 ± 4.25 mg/l and the mean concentration 260.02 ± 2.15 mg/l was significantly higher than the permissible limit (150 mg/l) set by World Health Organization. There is need for regulatory authorities to carry out routine check up to ascertain the concentrations of synthetic colorants and preservatives added to locally made functional beverages.

Keywords: concentration, sunset yellow, brilliant blue FCF, tartrazine.

4.3 MASTER OF SCIENCE IN MATHEMATICS

4.3.1 Modeling the Role of Treatment, Public health education and Chemical control strategies on Transmission Dynamics of Schistosomiasis

Timothy Kamara, Michael Byamukama, Martin Karuhanga

Schistosomiasis is a disease caused by parasitic flatworms of genus *Schistosoma* and is listed among the Neglected Tropical Diseases (NTDs). It is still endemic in many tropical and sub-tropical countries. In this study, a mathematical model for the transmission dynamics of schistosomiasis was studied. A system of six ordinary differential equations consisting of human population, divided into two epidemiological classes, the snail population, divided

into two epidemiological classes, the free living larva stages, the miracidia and cercariae was used to study the disease dynamics. Model analysis was carried to establish the existence and stability of the steady states. It was revealed that the disease free equilibrium point is globally asymptotically stable if and only if the the basic reproduction number, $R_0 < 1$ indicating that the disease would be wiped out of the community and the endemic equilibrium point is globally asymptotically stable if $R_0 > 1$ and the disease would persist at the endemic steady state. Numerical simulations revealed that a combination of treatment, public health education and chemical control intervention strategies significantly increased the number of susceptible human population and susceptible snail population and significantly decreased the number of infected human, miracidia, infected snails and cercariae. The effect of control strategies on schistosomiasis transmission was studied. The results indicated that a combination of treatment, public health education and chemical control intervention strategies can effectively manage the transmission of schistosomiasis in endemic areas. However, with treatment only, the disease persists in the community.

4.3.2 On the Spectrum of a Twisted Dirichlet-Robin Quantum Waveguide

Nabakooza Peace, Martin Karuhanga

A quantum waveguide modeled by the Laplacian in a straight infinite planar strip with twisted Dirichlet-Robin boundary conditions applied on the boundary is considered. It is obtained that the bottom of the essential spectrum starts by first eigenvalue of the one-dimensional transverse Laplacian considered along the width of the strip and there are no isolated eigenvalues below the essential spectrum. In addition, it is shown that the essential spectrum is absolutely continuous.

4.3.3 On eigenvalues of a Robin problem with two parameter values on the boundary

Ocen Moses Robert, Karuhanga Martin

This study deals with the behavior of the eigenvalues of a Robin eigenvalue problem with two parameter values in the boundary condition for the Laplace operator in a bounded domain with C^2 boundary via variational methods, by associating the operator with the Rayleigh quotient. It is shown that the eigenvalues are monotone, the first eigenvalue is differentiable and concave. In addition, an upper estimate for the difference between the eigenvalues of the Robin parameter and those of the corresponding Dirichlet problem is obtained, in which it is established that the estimating constant depends on the parameter values.

Keywords: Laplacian; Robin boundary conditions; Eigenvalues; parameter values.

4.3.4 On Bound states of a two- dimensional quantum waveguides with mixed boundary conditions and Neumann window

Mpirirwe Charity, Martin Karuhanga.

We study the spectrum of the Hamiltonian describing the motion of a quantum particle living in a twodimensional straight strip with combined Dirichlet and Robin conditions, imposed on different parts of the boundary with Neumann window. We prove that its essential spectrum is in interval from λ_1 up to infinity, where λ_1 is the first eigenvalue of the one dimensional Laplacian along width of the strip, and that there exists the isolated eigenvalues below the bottom of essential spectrum. We also give an upper bound for infimum of its spectrum.

4.3.5 Models of κ -Categorical theories

Bikorwomuhangi Narsi, Feresiano Mwesigye

This work is about of κ - Categorical theories and classification of κ - Categorical linear orderings. According to Shelah's Classification theory, models of unstable theories should be difficult to classify. For example, the theory of linear orders is generally unstable as for any model, there are uncountably many complete types. In such a case, the best we can do is to try to classify natural subclasses and the problem studied here is of this kind.

We demonstrate how models of countable theories may be built using the Henkin's construction method, then look at isolated and non-isolated types leading us to the proof of the omitting types theorem. We go ahead and characterize κ -Categorical theories in terms of their complete types and prove a series of lemmas and a proposition all of which constitute the proof of Ryll-Nardzewski's theorem. Let M be the smallest class of order types containing 1, containing $r + s$ whenever it contains r and s and containing the shuffle $\delta(F)$ whenever it contains the elements of F . We find out that a complete theory T of linear orderings is κ - Categorical if and only if it has a model whose order type is in M . Based on this condition, we prove Rosenstein's theorem which gives a complete classification of countable κ - categorical linear orderings.

4.3.6 Classification of linear orders up to 3-equivalence and ordinals up to n-equivalence

Birungi Lillian, Feresiano Mwesigye

For any integer n , we study the problem of classification of linear orders up to n -equivalence. In particular we characterize all the linear orders up to 3 - equivalence and ordinals up to n -equivalence. Here two structures and being n -equivalent means that player II has a winning strategy in the Ehrenfeucht-Fraïssé games of n moves, which consequently implies that there is no first order formula of quantifier depth n that tell the difference between the two structures. We use the method of n -characters to classify linear orders up to 3-equivalence and use the Ehrenfeucht-Fraïssé games to study the ordinals. We generate the 3-equivalence classes of all the linear orders of and give an insight into what the classification of linear orders up to n -equivalence looks like. We give a complete characterization of all ordinals up to n - equivalence.

4.3.7 Numerical Solution to Coupled System of Telegraph Equations using the Galerkin Finite Element Method

Mbabazi Peter Kazoora, Ronald Mwesigwa

The telegraph equation models a telegraph wire of a given length having the voltage at both ends, which is given by the values specified in the boundary conditions. The initial conditions represent an idealized signal consisting of a spike at time zero. In this study, the Galerkin FEM was used to convert the partial differential equation that represents the telegraph equation to a coupled system of ODEs. This was done by first finding the weak formulation of the equation, and then approximate the solution using linear Lagrange piecewise polynomial basis functions. The numerical solution to the coupled system of the derived ODEs has been obtained by applying backward difference scheme. Three test problems with initial and either essential or natural boundary conditions have been considered to illustrate how the suggested method is implemented and the nature of the approximate solutions. Two of the test problems are homogeneous and illustrate how each of the two types of boundary conditions, essential and natural, are implemented. The third problem illustrates how to solve the non-homogeneous equation using the method in this study. The results obtained using the method here suggested, have been presented in a number of tables and illustrated using figures, all generated by using MATLAB with codes indicated in the appendix. The absolute and root mean square errors were computed for all the three test problems and these were used as basis for the discussion of results. Basing on the results from simulations, it was noted that the Galerkin FEM was stable and consistent, and hence convergent, since further reduction of the element size produced insignificant change in the errors. Therefore, the proposed method performs well with the linear telegraph equation. Key words: Telegraph equation, Galerkin finite element method.

4.3.8 On eigenvalues of a Robin problem with two parameter values on the boundary

Ocen Moses Robert, Karuhanga Martin

This study deals with the behavior of the eigenvalues of a Robin eigenvalue problem with two parameter values in the boundary condition for the Laplace operator in a bounded domain with C^2 boundary via variational methods, by associating the operator with the Rayleigh quotient. It is shown that the eigenvalues are monotone, the first eigenvalue is differentiable and concave. In addition, an upper estimate for the difference between the eigenvalues of the Robin parameter and those of the corresponding Dirichlet problem is obtained, in which it is established that the estimating constant depends on the parameter values.

Keywords: Laplacian; Robin boundary conditions; Eigenvalues; parameter values.

4.4 MASTER OF SCIENCE IN PHYSICS

4.4.1 Probing stellar age dependency on stellar model inputs: Atomic diffusion and convective overshoot

Immaculate Nantaba, Edward Jurua, Trust Otto

The determination of stellar age using stellar models has been recommended in literature as a reliable method. However, there is need to reduce the error in stellar age since it depends on model inputs (atomic diffusion and convective overshoot).

Stellar modeling was performed using the MESA code and the relative percentage deviations of stellar age were calculated by considering models with and without model input physics (atomic diffusion, convective overshoot). The relative deviations in stellar age were seen to increase with mass and overshoot, for the target stars in the mass range 1.1--1.9 solar mass. From the findings, the largest relative percentage deviations on age due to overshoot peaked between 45 percent and 60 percent. The relative percentage deviation due to atomic diffusion was found to be about 5 percent.

In conclusion, convective overshoot value below 0.15 greatly affects stellar-age and atomic diffusion effect on stellar-age for sub-giant stars is not predominant, however when modeling stellar-age it can also be put into account. Based on the insight in deviations, to reduce the uncertainty in stellar-age, a model of the best convective overshoot values to use for given stars should be put into consideration before modeling stellar-age.

4.4.2 Investigating the Neutral Gas Outflows and Inflows in the Local 12 μm Seyfert Galaxies

Daniel Zihabake, Pheneas Nkundabakura, Petri Väisänen, Tom Mutabazi

Gas outflows are frequently observed in Star Forming Galaxies (SFGs) and Active Galactic Nuclei (AGNs). Such outflows transfer a vast amount of energy and momentum into the interstellar medium (ISM) plausibly affecting the evolution of host galaxies. Particularly, AGN driven outflows may play a crucial role in quenching star formation in galaxies as theoretical studies suggest. However, we still do not have a comprehensive role of outflows and inflows in galaxy evolution, its connection with star formation and the details of the quenching picture as explained above. Therefore, the intention of this study was to determine the properties of outflows and inflows using sodium doublet absorption lines $\lambda\lambda$ 5890, 5896 Å (NaI D). We used a sample of 39 nearby Seyfert galaxies ($z < 0.05$) observed by the Southern African Large Telescope (SALT). We used STARLIGHT to get rid of stellar continuum and compared the equivalent width of NaI D and Magnesium triplet $\lambda\lambda$ 5167, 5173, and 5184 Å (MgI b) to get the amount of NaI in the ISM and hence to determine potential candidates of neutral gas outflows/inflows. We obtained a total of four potential candidates (as explained in detail in Chapter 3). After subtracting the stellar continuum, we modeled NaI D absorption lines in the four potential candidates using non-linear least squares minimization and curve-fitting (lmfit). Two galaxies MCG+00-29-023 and NGC6810 showed two Gaussian components in fitting NaI D absorption line implying the presence of winds whose outflow velocities were found to be 291.73 ± 18.02 km/s and 258.56 ± 38.30 km/s respectively. The range of these velocities are in agreement with the previous work done on Seyfert 2 galaxies. For the two remaining candidates, the gas in the ISM was likely participating in rotation since it could be fitted with only one component. However, for further search for a second component (outflows), higher resolution data are needed.

4.4.3 Analysis of Geomagnetic storm Effects on Ionospheric Vertical Drifts over the East African Low Latitude Region

Niwamanya Duncan, Valence Habyarimana, Edward Jurua

The low latitude ionosphere has been known to become significantly disturbed and thus rendering space-based navigation unreliable during space weather events, such as geomagnetic storms. During the onset of either Corotating Interaction Region (CIR) or Coronal Mass Ejection (CME)- driven geomagnetic storms, there is always modification of low/equatorial latitude electric fields, mainly due to ionospheric Disturbed Dynamo Electric Fields (DDEFs) and Prompt Penetrating Electric Fields (PPEFs) of magnetospheric origin. To mitigate the effect of these space weather events, considerable efforts are being done to understand and model the low/equatorial electrodynamics. However, over the East African low latitude, the effect that these space weather events have on the ionospheric electrodynamics is not yet well studied due to lack of multiple ground based instruments. Using Communication Navigation Outage and Forecasting System (C/NOFS) Satellite data, magnetometer data and geomagnetic storm data, analysis of the geomagnetic storm effects on ionospheric vertical drifts over the East African low latitude region during the period 2008-2015 has been carried out. A total of 608 CIR-driven and 23 CME-driven geomagnetic storms were identified in this study. Most CIR-driven storms were observed during the declining phase of solar cycle 24 in 2015.

The CME-driven geomagnetic storms, on the other hand, were dominant during the high solar activity phase of solar cycle 24 in 2012. The C/NOFS satellite data was also found to be consistent with magnetometer observations in identifying both upward vertical **EXB** drifts and downward vertical **EXB** drifts occurrences during all the periods. The common result of all the analyzed CME-driven geomagnetic storms was enhancement in **EXB** drifts due to presence of eastward PPEFs during the storm main phases. There was also decrease in **EXB** due to decrease in horizontal component of the magnetic field (ΔH) during the recovery phases of the CME-driven storms, which is a manifestation of downward **EXB** drifts associated with westward electric field, which could be due to the disturbance dynamo contribution. During CIR-driven geomagnetic storms, the storm main phases were also dominated by downward **EXB** drifts associated with westward electric field, which is due to disturbance dynamo.

4.4.4 Assessment of natural radioactivity levels in soil, water, and fish samples collected from Lake George and Kilembe mines in Kasese district, Western Uganda

Alfred Muhindo, Edward Jurua, Oryema Bosco

The current study assessed natural radioactivity levels in soil, water, and fish samples collected from different sites around Kilembe mines and Lake George in Kasese District. The samples were prepared and thereafter analysed using Sodium Iodide (NaI) gamma detector for various natural radionuclides of uranium (^{238}U), thorium (^{232}Th), and potassium (^{40}K). The gamma spectrometry results showed that the mean specific activity concentrations of ^{238}U , ^{232}Th , and ^{40}K were respectively, 146 ± 5 , 59 ± 1 , and 670 ± 10 Bq kg⁻¹ for soil samples; 72 ± 3 , 35 ± 1 , and 544 ± 9 Bq l⁻¹ for water samples; and 56 ± 4 , 42 ± 3 , and 2392 ± 36 Bq kg⁻¹ for fish samples. The specific activity concentration levels of ^{40}K were higher in fish than in water and soil samples for all the sites. Meanwhile for both ^{238}U and ^{232}Th , the specific activity concentrations were more in soil than in water and fish samples. The radiological

hazard parameters and indices such as absorbed dose rate (D), the radium equivalent activity (R_{eq}), the annual effective dose (AED), Excess Lifetime Cancer Risk (ELCR), the representative gamma index (I), external (H_{ex}) and internal (H_{in}) hazard indices were also calculated. The results showed that for most sites, the average representative gamma level index and absorbed gamma dose rate exceeded the UNSCEAR maximum permissible limits of a unity and 59 nGy h^{-1} respectively. The statistical multivariate analysis of the elemental contribution of the radionuclides towards the absorbed dose rate were determined using the conversion factors recommended in an IAEA technical document (IAEA, 2007). The arithmetic mean values of the Th/U ratios were 2.06, 1.48, and 3.34 for water, soil, and fish samples respectively. For the case of fish samples, the mean value was slightly above the theoretical value of 3 as recommended in the IAEA technical document (IAEA, 2007), an indication of enrichment of thorium. This makes fish from Lake George not suitable for consumption since they may pose a health risk. Also, the arithmetic mean values of K/U for water, soil, and fish samples were 0.40, 0.20, and 2.77 respectively. More so, the arithmetic mean values of K/Th were 0.21, 0.14, and 1.34 for water, soil, and fish samples respectively.

4.5 MASTER OF EDUCATION IN EDUCATIONAL PSYCHOLOGY

4.5.1 Parental Involvement, Mathematics Anxiety and Performance in Mathematics among Secondary School Students in Nakivale Settlement Camp, Western Uganda

Arinaitwe Afra Barugahare, Aloysius Rukundo

The study aimed at examining the mediating role of Mathematics anxiety in the relationship between parental involvement and mathematics performance of secondary school students in Nakivale refugee settlement camp. It was guided by the specific objectives: to determine the level of parental involvement, to determine the level of Mathematics anxiety, to examine the relationship between parental involvement and mathematics performance and to examine the mediating role of mathematics anxiety in the relationship between parental involvement and performance in mathematics among secondary school students.

The study adopted a cross-sectional design, using quantitative approach. The target population was 250 S4 students in secondary Schools in Nakivale settlement camp. The study used census approach to select all the 250 S4 students. A self-administered questionnaire and math performance test were used to collect the data. The findings revealed; a high level of mathematics anxiety ($M = 68.9793$, $SD = 14.83650$); a low level of parental involvement; a moderate significant positive correlation between parental involvement and mathematics performance ($\beta = .511$, $P < .01$) and finally mathematics anxiety partially mediates the relationship between parental involvement and mathematics performance (the effect strength of parental involvement decreased from ($\beta = .511$, $P < .01$) to ($\beta = .404$, $P < .01$) when controlled for mathematics anxiety). The study concludes that among students in secondary schools of Nakivale refugee settlement; there is a low level of parental involvement; there is a high level of mathematics anxiety, parental involvement is important in improving mathematics performance and that increased parental involvement reduces mathematics anxiety which in turn results into improved mathematics performance. The study recommends that school administrators, policy makers, parents and other stakeholders in education in Nakivale Refugee Settlement; should put more effort to improve the level of parental involvement by

encouraging home based, school based and home-school communication; they should put effort to change the learner perception of difficulty in mathematics; they should enhance mathematics performance of learners by encouraging parents to get more involved in education of their children and finally they should aim at reducing mathematics anxiety as an alternative means of enhancing mathematics performance

4.5.2 Career Attitudes, Wellbeing and Academic Motivation among Students in Secondary Schools in Mbarara City

Davis Muhwezi, Charles Magoba Muwonge

Although well-being globally provides a sense of self, belonging, and skills that make healthy students' career path, In Africa and especially within the Ugandan context, schools are raising yet another generation of learners with a deficit in career pursuit that impedes their academic motivation. Previous research had indicated a high correlation between variables towards learning, however; research focusing on possible effects seems to have received less attention. Guided by Self-determination theory, in the present study, we examined the relationship between career attitudes, well-being, and academic motivation and their differences across socio-demographics among secondary school students in Mbarara City. We also investigated the mediating role of well-being between career attitudes and academic motivation among students. The sample comprised of 297 students selected from 10 secondary schools. Data were collected using self-administered closed ended standardized questionnaires and analyzed using: descriptive statistics, Pearson product moment correlation analysis with linear regression and Structural Equation modeling in SPSS version 25, SPLS version 3.0, and Med Graph version 3. Data collected from students' self-reports revealed that males showed a higher career attitude ($M = 60.24$, $SD = 5.94$, $p = 0.030$) than females ($M = 58.68$, $SD = 6.16$). Findings also revealed weak significant positive correlations between career attitudes and academic motivation ($r = .178$, $p < 0.05$) and between well-being and academic motivation ($r = .178$, $p < 0.05$) compared to self-directed career attitude and academic motivation ($r = .222$, $p < 0.05$). We also found out that well-being partially mediates the relationship between career attitudes and academic motivation ($\beta = 0.13$, $p = .033$). Therefore, interventions that lead to academic motivation should focus not only on students' well-being but also on motivating strategies for perfecting their career path

4.5.3 Perceived Parental Autonomy Support, Self-Esteem and Career Decision-Making Difficulties among Secondary School Students in Bushenyi District, Western Uganda

Christine Kyokunda, Aloysius Rukundo

The study aimed at establishing the relationship between perceived parental autonomy support, self-esteem and students career decision-making difficulties among secondary school students in Bushenyi District. It was guided by the specific objectives: to explore the relationship between perceived parental autonomy support and career decision-making difficulties among secondary school students in Bushenyi District and to examine whether self-esteem mediates the relationship between perceived parental autonomy support and career decision-making difficulties among secondary school students in Bushenyi District. The study adopted a cross-sectional design using quantitative approach. The population was

2280 advanced level candidates of S6 from 36 secondary schools in Bushenyi District. Out of the 36 secondary schools, 6 schools were selected using a three stage stratified random sampling technique. This resulted into a sample size of 500 students. A self-administered questionnaire was used to collect the data. The findings revealed that there is a statistically significant Moderate positive correlation between perceived parental autonomy support and students career decision-making difficulties in secondary school of Bushenyi District ($\beta = -.619, P < .01$). The findings also revealed that self-esteem partially mediates between perceived parental autonomy support and students career decision-making difficulties in secondary school of Bushenyi District since the effect strength of perceived parental autonomy support decreased from ($\beta = -.619, P < .01$) to ($\beta = -.572, P < .01$) when controlled for self-esteem. The study concludes that perceived parental autonomy support reduces students' career decision-making difficulties since there is a statistically significant moderate negative relationship between it and students' career decision-making difficulties and that perceived parental autonomy support enhances self-esteem which in-turn reduces students' career decision-making difficulties. The study recommends that parents, counsellors, career guidance teachers and other stakeholders in education should give both psychological and autonomous support to their children since they reduce career decision-making difficulties by 44.8% and finally the study recommends that parents, counsellors, career guidance teachers and other stakeholders in education should aim at boosting the self-esteem of their children since self-esteem also reduces career decision-making difficulties by 14.3%.

4.5.4 Parental Involvement and Academic Performance among Learners in Universal Primary Education Schools: A Case Study of Bubaare Sub County, Rubanda District.

Daniel Byomugabe, ImeldaKemeza

The study sought identified the impact of Parental Involvement on Academic Performance of Learners in Universal Primary Schools of Bubaare Sub County Rubanda District. Its interest was to enhance parental engagement and improve on the quality of results of learners in universal schools of Bubaare Sub County Rubanda District. The study was guided by the following objectives; i) To examine the influence of parent created home learning environment on academic performance among learners in Universal Primary Schools of Bubaare Sub County, Rubanda District. ii) To investigate the influence of parental socio economic status on the involvement of academic performance among learners in Universal Primary Schools of Bubaare Sub County, Rubanda District. iii) To establish the relationship between parental levels of education and academic performance among learners in Universal Primary Schools of Bubaare Sub County, Rubanda District, The study was guided by Theory by Ryan (2018) which was based on four areas: Parents of level Education, Income and Economics of the parent, Involvement measures, geography and Demographics on academic performance of school children. A cross-sectional survey with quantitative and qualitative approaches was done. A total of 440 study participants, including 76 teachers, 4 head teachers, 112 parents and 288 learners were recruited. Data were collected using self-administered questionnaires for learners and interview guides for head teachers, teachers and parents. Data from learners were entered into Statistical Package for Social Sciences version 16.0. Totals were obtained for each of the study variables. Frequencies and percentages were obtained for the characteristics of learners and Pearson Correlation analyses followed by regression were conducted. In conclusion parental home involve mental has strong influence on academic performance among learners in Universal Primary Schools. Therefore, the

researcher recommends for the public be sensitized about parents' role in supporting their children's education in order to have strong involvement in all programs carried out in schools and outside the school and they provide most of the learning aids used at home and at school. The influence should be done by the government, school administrators and community members

4.6 MASTER OF EDUCATION IN EDUCATIONAL ADMINISTRATION & PLANNING

4.6.1 Teacher Compensation and Teachers' Retention among Government Aided Secondary Schools in Bushenyi-Ishaka Municipality

Ahimbisibwe Deborah, Sudi Balimuttajjo

Teacher compensation is recognized under the Sustainable Development Goals (SDG4) as a key motivating factor of teachers and a central determinant of retention of highly qualified teachers and improved education quality. This study was conducted to establish the relationship between teacher compensation and teachers' retention among government aided secondary schools in Bushenyi-Ishaka Municipality. The specific objectives of the study were; 1) to establish the relationship between salary and teachers' retention, 2) to establish the relationship between bonuses and teachers' retention and 3) to establish the relationship between fringe benefits and the retention of teachers in government-aided secondary schools in Bushenyi-Ishaka Municipality. The study adopted cross-sectional research design employing a quantitative approach in collecting and analyzing the data. The study population included teachers in four (4) government aided secondary schools in Bushenyi-Ishaka Municipality. The sample size of 132 respondents was targeted but only 113 teachers afforded to answer and return the instruments. The study used structured questionnaires to collect data from teachers. The collected data was analyzed using SPSS version 26.0. From the analysis, the study revealed that there is a positive significant relationship between salary and teacher retention, a positive significant relationship between bonus and teacher retention and a positive significant relationship between fringe benefits and teacher retention in government aided secondary schools in Bushenyi-Ishaka municipality. The study concludes that all the teacher compensation dimensions (salary, bonus, fringe benefits) are positively related with teacher retention in Bushenyi-Ishaka Municipality. The study recommended schools to offer all forms of teacher compensation such as salaries, bonuses and fringe benefits simultaneously and equitably to all teachers in order to increase teacher retention.

4.6.2 Perceived Human Resource Management Practices and Job Satisfaction of Teachers in Government Aided Secondary Schools in Mbarara City

Elizabeth Mirembe, Alice Mwesigwa

The study intended to assess the perceived human resource management practices and job satisfaction of teachers in government aided secondary schools in Mbarara City. Objective one intended to establish the ways in which different Human Resource Management (HRM) practices are conducted in government aided secondary schools in Mbarara City. Objective

two intended to examine the relationship between socio-demographic characteristics and job teachers' in government aided secondary schools in Mbarara City. The third objective was to determine the relationship between HRM practices and job satisfaction among secondary school teachers in Mbarara city. Using a cross sectional study, the researcher collected both qualitative (from 9 head teachers) and quantitative data (from 213 teachers, 69.8% male) using interview guides and self-administered questionnaires respectively. HRMP within government aided schools were based on government policies and differed mostly on the basis of whether employed by government (MoES) or by the board of governors. Several similarities and differences were found regarding execution of different HRM practices. Compensation practices varied depending on the level of income of the school, teaching subjects, and the extra responsibilities teachers had. Recruitment and performance appraisal hierarchies were somehow similar across schools. Some demographic characteristics such as age, years of service as a teacher and years of service in a school were found to influence job satisfaction. Results from mean comparison tests showed that teachers who had spent more time teaching were more not satisfied with their jobs. However, teachers' job satisfaction was independent of their work load, gender, and administrative responsibilities. Significant positive effects of the HRM practices on job satisfaction were found although the strength relationship varies among practices. Compensation and training were the most crucial predictors of teachers' job satisfaction. The study recommends that; (1) Head teachers/ school administrators should consider reviewing compensation and training of teachers, (2) Policy makers like the Ugandan parliament should review the most suitable Human Resource Practice packages that school administrators can use to increase job satisfaction among teachers in secondary schools, (3) Policy implementers such as the MoES and school management to implement policies that improve teachers job satisfaction. Taken together, the findings of the present investigation hold substantive practical implications for schools' stakeholders studying issues relevant to satisfaction and motivation of teachers.

4.6.3 Support Supervision, Discipline and Academic Performance of Advanced Level Learners in Government Aided Secondary Schools of Rukungiri District

James Berigwe, Sudi Balimuttajjo

The study aimed at establishing the relationship between support supervision, discipline and academic performance of advanced level learners in government aided secondary schools of Rukungiri district. It was guided by the specific objectives: to establish the relationship between support supervision and academic performance of advanced level learners; to establish the relationship between discipline and academic performance of advanced level learners; to establish the combined relationship between support supervision, discipline and academic performance of advanced level learners. The study adopted a cross-sectional design, using quantitative approach. The population was 503 Senior Six (S.6) learners from the 16-government aided secondary schools in Rukungiri district. A sample of 290 candidates was selected using simple random sampling. A self-administered questionnaire was used to collect the data. The study findings revealed that: there is a statistically significant substantial positive correlation between support supervision and academic performance ($r=0.619^{**}$, $P<.01$), there is a statistically significant substantial positive correlation between discipline and academic performance ($r=0.757^{**}$, $P<.01$) and a combination of support supervision and

discipline also has a substantial statistically significant correlation ($r = 0.668^{**}$, $p < .01$) with academic performance and all the combined variables explain 44.5% ($\text{Adj } R^2 = .445$) variation in academic performance. The study concludes; support supervision is important in candidates' performance since there is a significant substantial positive relationship between it and academic performance, discipline is another key driver to improved academic performance since there is a significant moderate positive relationship between it and academic performance and that a combination of support supervision and discipline has a stronger association with candidates academic performance than the individual separate variables. It is recommended that policy makers, the management and other stakeholders in Government aided secondary schools should: improve their support supervision through connection/team building, being empathy and ensuring reliability so as to enhance the academic performance of their learners, they should nurture both negative and positive discipline so as to enhance their performance and they should simultaneously invest in enhancing both support supervision and discipline since a combination of the two variables has a stronger association with academic performance than the individual separate variables.

4.6.4 Teacher Performance Appraisal and Teachers' Motivation to Work: A Comparative Study of Private and Public Secondary Schools in Mbarara City

Mugerwa Isaac, Sudi Balimutajjo

In many institutions, performance appraisals are one of the key means to motivate employees especially depending on their performance. In Uganda, the evidence available about teacher appraisals and motivation in public and private schools seems to vary between urban settings and rural ones. In addition, the appraisal process carried out in public institutions seems to defer from that in private institutions. Little research has been carried out in comparing the performance appraisal processes in public and private institutions. This study, therefore, examined and compared the effect of performance appraisal on teachers' motivation to work in private and public secondary schools in Mbarara city. Specifically, the study: (1) determined the relationship between performance appraisal and teachers' motivation to work, and (2) compared the effect of performance appraisals on teachers' motivation to work in secondary schools in Mbarara city. The study used a sample of **309** teachers selected randomly from a sample of **15** private and **5** public secondary schools (sampled using multistage sampling). Data was collected using questionnaires and analysed using Pearson's Correlation coefficient, regression, and independent sample t-test. The study established a significant positive relationship between setting goals and teachers' motivation to work ($r = 0.803^{**}$, $p < 0.05$); fairness of appraisals and teachers' motivation to work ($r = 0.765^{**}$, $p < 0.05$); performance feedback and motivation levels of teachers ($r = 0.802^{**}$, $p < 0.05$); and a significant positive relationship between post feedback actions and teachers' motivation to work ($r = 0.725^{**}$, $p < 0.05$). The independent sample t-tests showed a significance value (0.000) for equality of means which was less than the P-value (0.05), implying that there is a statistically significant mean difference between the motivation levels of teachers in private and public schools in Mbarara City. The study concluded that: that performance appraisal in terms of setting goals, fairness of appraisals, feedback, and post-feedback action play a positive significant role in improving teachers' motivation to work. It was further concluded that teachers in private secondary schools are more motivated by the performance appraisal to work than in public secondary schools in Mbarara city. It was recommended that: schools

should develop goals that are realistic and attainable; involve all teachers when setting up goals as this makes teachers own the process and minimize resistance; There should be constant feedback during the performance appraisal process as this helps to inform employees of their performance and allows managers to recognize top performers and identify areas for training to improve performance; and that there is need for schools to have a uniform performance appraisal cycle. Conducting all evaluations at the same time helps supervisors devote enough time to write good evaluations, ensures consistency between employees, and allows management to assess individual contributions to organizational goals.

4.6.5 Continuous Professional Development and Performance of Science Teachers in USE Schools of Mbarara City

Kato Paul, Sudi Balimuttajjo

The study aimed at establishing the relationship between continuous professional development (CPD) and science teachers' performance in USE schools of Mbarara City. The specific objectives included analyzing the effectiveness of CPD in USE schools of Mbarara City, assessing the performance of science teachers in USE schools in Mbarara City, and establishing the relationship between the effectiveness of CPD and the Performance of science teachers in USE schools of Mbarara City. The study adopted a cross-sectional design, using a quantitative approach. The population was 99 science teachers from 6 USE schools in Mbarara city. All the 99 science teachers from the 6 schools were considered by census sampling. The findings revealed that the CPD effectiveness in USE school of Mbarara City was low (mean=64.4947, std deviation=9.87138), the level of science teacher performance in USE school of Mbarara City was moderate (mean=59.2632, std deviation=11.04942). There is a statistically significant moderate and positive correlation between CPD effectiveness and science teachers' performance ($r=0.573^{**}$, $P<.01$). The study concludes that CPD effectiveness in USE school of Mbarara City is low, the level of science teacher performance in USE school of Mbarara City is moderate and CPD effectiveness is important towards improving science teachers' performance in USE schools of Mbarara City. The study recommends that school administrators, policymakers, parents, and other stakeholders in education: should ensure CPD effectiveness among science teachers through training, mentoring, and continuous assessment, they should improve the performance of science teachers by ensuring effective classroom management, ensuring teacher subject command, encouraging the use of audio-visual aids, laboratory facilitation, and being more time conscious and lastly, they should invest in activities that make CPD more effective since it contributes 32.9% of the variations in science teachers' performance.

4.6.6 Perceived Organizational Justice, Support and Teachers' Performance in Private Secondary Schools of Mitooma District

Precious Natureeba, Aloysius Rukundo

The study aimed at establishing the relationship between perceived organisational justices, support and teacher performance of private secondary schools in Mitooma District. It was

guided by the specific objectives: to establish the relationship between perceived organisational support and teacher performance; to establish the relationship between perceived organisational justice and teacher performance and to establish the combined relationship between perceived organisational support, justice and teacher performance. The study adopted a cross-sectional design, using quantitative approach. The population was 463 teachers of all the 19 private secondary schools in Mitooma district. The study used census approach to select the private secondary schools and their teachers. A self-administered questionnaire was used to collect the data. The findings revealed a statistically significant and positive relationship between perceived organizational justice and teachers' performance ($\beta=0.537$, $P<.01$); a statistically significant moderate positive relationship between perceived organizational support and teachers' performance ($\beta =0.442$, $P<.01$). A combination of organisational justice and support has a substantial statistically significant relationship ($\beta = 0.620$, $p<.01$) with teacher performance and it accounted for 41.0% ($\text{Adj } R^2 = .410$ $p = p<.01$) variation in teacher performance. The study concludes that that organizational justice is important in teachers' performance since there is a significant substantial positive relationship between it and teacher performance. Furthermore, organizational support is also important in teacher performance since there is a significant moderate positive relationship between it and teacher performance and that a combination of organisational justice and support has a stronger association with teacher performance than the individual separate variables of variation. It is recommended that policy makers, the management and other stakeholders in Private secondary schools ensure better distributive, procedural and transactional justice among their teachers to enhance their performance. They should also ensure better managerial, supervisor and coworker support to enhance their performance and finally they should simultaneously invest in enhancing both organisational justice and organisational support since a combination of the two variables has a stronger association with teacher performance than the individual separate variables.

4.6.7 Performance Appraisal, Job Satisfaction and Teachers' Organizational Commitment in Private Secondary Schools of Nyendo- Mukungwe Division, Masaka City

Rashid Sekabira, Charles Muwonge Magoba

The present study was guided by three objectives namely: 1)To establish the relationship between performance appraisal, job satisfaction and teachers' commitment in private secondary schools of Nyendo-Mukungwe Division Masaka City; 2)To establish the gender differences in teachers' commitment in private secondary schools of Nyendo-Mukungwe Division Masaka City; and 3)To establish the mediating role of job satisfaction in the relationship between performance appraisal and teachers' commitment in private secondary schools of Nyendo-Mukungwe Division Masaka City. The study adopted a cross-sectional design, using quantitative approach among a target population of 524 teachers from 18 private secondary schools in Nyendo-Mukungwe Division, Masaka City. A census sample was used to select all 18 private secondary schools, and Yamane's 1967 statistical formula was used to select 295 teachers. A self-administered questionnaire was used to collect the data. Data were collected from 276, giving a response rate of 95.6%. The findings revealed; a statistically significant substantial positive correlation between performance appraisal and job satisfaction ($r = 0.61$, $p<.001$), a statistically significant moderate positive correlation between job satisfaction and teacher's commitment ($r = 0.46$, $p<.001$), a statistically

significant substantial positive correlation between performance appraisal and teacher's commitment ($r = 0.73, p < .001$) and that job satisfaction partially mediates the relationship between performance appraisal and teacher's commitment since the effect strength of performance appraisal decreased from ($\beta = .74, p < .01$) to ($\beta = .71, p < 0.001$) when controlled for job satisfaction. There was no a non-significant gender difference in teacher's commitment [Male; $M = 3.66, SD = 0.60$; Females, $M = 3.69, SD = 0.68, p = 0.770$]. This study concludes that performance appraisal predicts job satisfaction, job satisfaction determines teacher's commitment, performance appraisal also contributes to teacher's commitment and that performance appraisal enhances job satisfaction which in turn improves teacher's commitment. The study recommends those policy makers, the management and other stakeholders in Private secondary schools especially in Nyendo-Mukungwe Division Masaka City should ensure that they appraise teachers in order to get committed to their job. They should also ensure that their teachers are satisfied with their job in order to get committed.

4.6.8 Participation in Staff Committees and Job Satisfaction of Teachers in Government Aided Secondary Schools in Ntungamo Municipality

Penina Nambuya, Aloysius Rukundo

The study examined participation in staff committees and job satisfaction of teachers in government aided secondary schools in Ntungamo Municipality. Particularly, the study assessed the level of teachers' participation in staff committees in government aided secondary schools, examined the level of job satisfaction of teachers in government aided secondary schools and determined the relationship between participation in staff committees and job satisfaction of teachers in government aided secondary schools. The study adopted a correlational research design. Primary data was collected from a sample of 280 respondents who participated in the study using questionnaires. Quantitative data was analyzed using Pearson correlation. From the findings, the level of participation is moderate while the level of teachers' job satisfaction is low in government aided secondary schools. Participation in staff committees showed a positive and significant relationship with teachers' job satisfaction. It was concluded that the current degree of job satisfaction is influenced by participation in staff committees. The involvement of teachers in school planning, implementing school curriculum and instruction; and decision concerning students' affairs and discipline, school policy, rule and regulation meetings have a strong bearing on job satisfaction. The extent of staff participation in committees was found to be minimal in the sampled schools because less attention was given to staff participation for efficient and effective job satisfaction. This affects the overall activities of school in general and teaching-learning process in particular. It was recommended that the school administrators and other stakeholders should endeavour to make the Teachers be actively involved in decision-making in their schools to encourage, motivate and utilize their wide range of experience and personal characteristics, and capability. for them to get satisfied with their job. Teachers' participation in school management should be a key priority of the school to avoid the costs associated with the recruitment of the new teachers who might quit their jobs as a result of dissatisfaction with their work.

4.7 MASTER OF EDUCATION IN CURRICULUM INSTRUCTION & MEDIA STUDIES

4.7.1 Study Habits and Mathematics Proficiency of Teacher Trainees in Primary Teachers' Training Colleges in South Western Uganda

Bwogi Mbeera Baron, Sudi Balimuttajjo

The study aimed at establishing the relationship between study habits and mathematics proficiency of teacher trainees in primary teachers' training Colleges in Southwestern Uganda. The specific objectives included establishing study habits of Teacher Trainees in PTCs in South Western Uganda, assessed the level of Mathematics proficiency in general arithmetic skills among teacher trainees in PTCs in South Western Uganda and determined the relationship between study habits and Mathematics proficiency of PTC Trainees in South Western Uganda. The study adopted a correlational design, using quantitative approach. The population was 254 teacher trainees in PTCs in SouthWestern Uganda. All the teacher trainees in PTCs in South Western from 6 PTCs were considered by proportionate sampling. The findings revealed that the studyhabits of Teacher Trainees in PTCs in South Western Uganda were low (mean=2.562, std deviation=.3837), level of Mathematics proficiency low (mean=5.6969, std deviation=1.4926). There is statistically significant high and positive correlation between study habits and Mathematics proficiency ($R = .686^{**}$, $p=.000$). The study concludes that study habits of Teacher Trainees in PTCs in South Western Uganda is low, the level of Mathematics proficiency low and study habits are important towards improving Mathematics proficiency of PTC Trainees in South WesternUganda. The study recommends those PTC administrators, policy makers, and other stake holders in education: should ensure study habits of Teacher Trainees in PTCs for improvement through training, mentoring and continuous assessment, they should improvemathematics proficiency of PTC Trainees in South Western Uganda.

5.0 FACULTY OF BUSINESS AND MANAGEMENT SCIENCES

5.1 MASTER OF BUSINESS ADMINISTRATION

5.1.1 Employee Competencies, Inventory Management and Performance of Pharmacies in Mbarara City

Nakalinzi Joanita, Aryatwijuka Wilbroad

Today, the performance of pharmacies in Uganda particularly Southwestern region is a still a major concern following the high rate of closure of pharmacies due to illegal operations, failure to comply to good distribution practices and high level of drug expiries that compromise service delivery and patient safety. This study therefore was conducted to examine the relationship between employee competencies, inventory management and performance of Pharmacies in Mbarara City. Specifically, the study aimed at investigating the relationship between employee competencies and pharmacy performance, the relationship between inventory management and pharmacy performance and compare the two

relationships to get the Contributory Power of Employee competencies and Inventory management towards pharmacy Performance in Mbarara City. The study was guided by the resource-based view and dynamic capabilities theories which recognizing the significant role of utilization of tangible resources such as inventory and non-physical resources such as capabilities and competencies towards enhancement of a firm's competitive advantage and performance. Prior studies had revealed that employee competencies and inventory management could have a positive significant relationship with organizational performance, though most of the studies had been conducted in other countries and sectors leaving a wide research gap in the pharmacy sub-sector in the Ugandan context. The study employed a cross sectional study design to collect and analyze from 70 human drug pharmacies in Mbarara city out of which a sample size of 64 pharmacies was determined and selected using simple random sampling. The data was collected using structured questionnaires with validity (CVI=0.865) and reliability ($\alpha = 0.767$). The study employed quantitative data analysis techniques where inferential statistics were applied on the aggregated data to generate correlations and regressions. The study findings revealed that both employee competencies and inventory management are positively and significantly related with pharmacy performance in Mbarara city. Higher levels of performance can be achieved if inventory management is conducted by highly competent employees. The study concluded that pharmacies can significantly improve their financial and non-financial performance by enhancing employee competencies including enhancement of employees' knowledge, skills and abilities in inventory management. The study confirms the relevance of the assumptions of the resource-based view theory and dynamic capabilities theory and provides implications for policy making and what pharmacy proprietors need to do in order to improve pharmacy performance.

5.1.2 Contract Management Managerial Competence and Value for Money In Procuring and Disposing Entities in South Western Uganda.

Akampwera Sheilla , Aryatwijuka Wilbroad

This study sought to establish the relationship between procurement management practices and value for money in procuring and disposing entities in south western Uganda. Specifically, the study sought to establish relationship between contracts management, managerial competence and value for money. The study adopted across-sectional design that used questionnaires to collect data from 38 procuring and disposing entities in south western Uganda. The PDEs were simple randomly selected. Quantitative data was analyzed using descriptive statistics and correlation analysis. The study found out that there was a positive relationship between contracts management, managerial competence and value for money. The study concluded that contracts management and managerial competence relate to value for money. It was thus recommended that government agencies, local governments and organizations involved in procurement should ensure that proper contract management is carried out effectively to ensure value for money, should ensure contracts are managed in a way that leads to value for money and procurement should establish effective relationships with suppliers.

5.1.3 Teamwork and Employees' Performance in Local Governments in Uganda: A case of Kumi District Local Government

Akol Arthur, Diana Kabarangira

The study was about teamwork and employees' performance of Kumi district local government. Specifically, the study aimed at establishing the relationship between teamwork approaches and employees' performance, examine the relationship between teamwork elements and employees' performance, and find out the relationship between teamwork structure and employees' performance. The study presented the theoretical review and later thematic literature review. The study was guided by Thompson's team performance model (2007). The literature review was guided by conceptual framework and study objectives. The study adopted cross-sectional and correlational research designs. The study population comprised of top district officers, middle level officer employees and lower level officer employees. Questionnaire survey and interview methods were used in data collection. Data analysis was based on descriptive as well as inferential statistics whereby Pearson correlation coefficient and regression analysis were used to determine the relationship between teamwork and employees' performance in Kumidistrict. The study findings revealed that teamwork approaches had a positive and statistically significant relationship with employees' performance ($r=.255^{**}$, $p < 0.05$). Teamwork elements had positive and statistically significant relationship with employees' performance ($r = .342^{**}$, $p < 0.05$). There was a positive significant relationship between teamwork structure and employee's performance ($r=.498^{**}$, $p < 0.05$). Once teamwork is backed by the right approaches, positive outcomes will accrue to the employees hence employees' performance. Teamwork elements are positively associated with employees' performance to a large extent. The nature of teamwork structure in the district motivates and coordinates employees to enhance their cooperation in order to achieve employees' performance. There is need to integrate teamwork approaches within human resource management. There is need for bringing on board the key teamwork elements in the local government work patterns and ethics. Organizational structures should be oriented and revised to accommodate the element of teamwork and employee's performance.

5.1.4 Corporate Governance Practices and Financial Performance of Agricultural Cooperatives Societies in Southwestern Uganda

Kafura Jane, Daniel Atwine Wanito

The study aimed at establishing the relationship between corporate governance practices and financial performance of Agricultural cooperative societies in Southwestern Uganda. The specific objectives were to establish the relationship between Board composition and financial performance, to establish the relationship between Board transparency and financial performance, to establish the relationship between Board accountability and financial performance and to establish the relationship between member participation and financial performance of agricultural cooperative societies in Southwestern Uganda. The study adopted a cross-sectional design, using quantitative approach. The population was 200 primary cooperative societies under BKCU, ACPCU and UCCCU from which 133 were sampled using simple random technique. 266 participants were purposively included in the study. A self-administered questionnaire was used to collect the data. The study findings revealed that:

there is a significant substantial positive correlation between Board composition and financial performance ($r=0.609^{**}$, $P<.01$), there is a significant moderate positive correlation between Board transparency and financial performance ($r=0.499^{**}$, $P<.01$), there is a significant moderate positive correlation between Board accountability and financial performance ($r=0.500^{**}$, $P<.01$) and there is a significant substantial positive correlation between member participation and financial performance ($r=0.600^{**}$, $P<.01$). The study concludes; Board composition is a key driver of financial performance of the agricultural cooperative societies, Board transparency is another key driver of financial performance of the agricultural cooperative societies, Board accountability is a key determinant of financial performance of the agricultural cooperative societies and member participation is another key determinant of financial performance of agricultural cooperative societies. The study recommends that the management, farmers, policy makers and other stakeholders in agricultural cooperative societies in Southwestern Uganda should improve their financial performance by: improving their Board composition through ensuring the optimal Board size, improving their Board transparency through ensuring information access, improving their Board accountability through ensuring proper participation and lastly by improving their member participation through ensuring proper member representation.

5.1.5 Adoption of E-Tax System, Tax Education and Tax Compliance of Small Businesses Enterprises in Mbarara City

Kayesu Prosscovia, Nixon Kamukama

The purpose of the study was to establish the relationship between adoption of e-tax system, tax education and tax compliance of small Businesses Enterprises in Mbarara. It was guided by three objectives which were to establish the relationship between adoption of e-tax system and tax compliance among small business in Mbarara City, to establish the relationship between tax education and tax compliance among small businesses in Mbarara City and to examine the predictive power of adoption of e-tax system, tax education and tax compliance among the small businesses in Mbarara City. The study used cross-sectional design and a study population was extracted from the Business and licensing department on 31st August 2022 comprises of 14,109 SMEs registered for tax purposes in North and south Mbarara city. The procedure for determining sample size was based on the (Krejcie & Morgan, 1970) table of sample determination which considered a sample size 372 SBEs. The data were collected using self-administered questionnaires. The correlation coefficient analysis revealed positive significant relationships between e-tax system and tax compliance among small business in Mbarara City, there was also a significant relationship tax education and tax compliance among small business in Mbarara City. Furthermore, the results in the model summary indicate that 48.7% (Adjusted R Square=.484) of the variations in tax compliance is explained by tax education and adoption of electronic tax system. This further implies that the remaining 51.6% is explained by other factors not considered in this study. Therefore, it can be recommended that, there is need to improve adoption of e-tax system in terms of enabling the use of e-tax system, ensuring that every business understands how to fill taxes and file all the returns in time, this will improve tax compliance. There is also need to improve on the tax education in terms of improving awareness and understanding of the tax laws, this can be done by sensitizing more the small business owners about the role of taxes and how they can pay it, it can also be done by equipping all the business with information in newspapers.

5.1.6 Procurement Planning and Service Delivery among PDES in Ankole Sub- Region of Western Uganda

Atuhaire Sharon, Ruth Nyiramahoro

The study established the relationship between procurement planning and service delivery among Procuring and Disposal Entities of Ankole Sub-region in Western Uganda. Three specific objectives guided this study and these were; (i) to establish the relationship between stakeholder involvement in procurement planning and service delivery among PDEs of Ankole Sub-region in Western Uganda, (ii) to determine the relationship between procurement cost estimation/forecasting and service delivery of PDEs of Ankole Sub-region in Western Uganda, (iii) to determine the relationship between procurement time frame and service delivery of PDE of Ankole Sub-region in Western Uganda. The study adopted a quantitative cross-sectional survey research design to establish whether Procurement Planning affected Service delivery. A Correlation analysis was adopted to explain the relationships between the variables of the study and regression analysis was run to determine the extent to which the independent variables explained service delivery. This is because the objective was to examine the relationship between variables and the predictive potential of independent variables to the dependent variables. The study used a study population of 19 and a sample size of 9. The unit of analysis were PDEs and the unit of inquiry were 4 employees per the Procuring and Disposal Entities. The findings indicated that there is a positive significant relationship between stakeholder involvement by 52.8%, cost estimation/forecasting by 48.8%, time frame/duration by 23.1% in Procurement planning and which shows that it is able to improve Service Delivery. It can therefore be concluded that stakeholder involvement in planning, cost estimation/forecasting and time frame/duration are very important in improving service delivery of PDEs of Ankole Sub-region in Western Uganda in terms of timely delivery, quality of service and cost efficiency which really improves service delivery

5.1.7 Bidder participation, specification, procurement method and value for money in Public Procurement among selected Procuring and Disposal Entities in South Western Uganda

Kahangare Joy Provia, Wilbroad Aryatwijuka

The study aimed at finding out the bidder participation, specification, procurement method and value for money in selected PDEs in south western Uganda. The study was guided by objectives which included; To assess the relationship between bidder participation and value for money among Selected Procuring and Disposal Entities in South Western Uganda, to establish the relationship between specification and value for money among Selected Procuring and Disposal Entities in South Western Uganda, and to evaluate the relationship between procurement methods and value for money among Selected Procuring and Disposal Entities in South Western Uganda. The population was 8 procuring and disposal Entities in south western Uganda the PDEs formed the unit of analysis while the unit of inquiry was the users of public procurement services, works and supplies of the procuring entity and suppliers, the study focused on internal users. From the findings, the study found out the correlation of bidder participation and value for money was moderately positive and

significant ($r = .702, p < .01$), correlation of specification and value for money was found to be high positive and significant ($r = .752, p < .01$) and correlation of procurement methods and value for money was found to be moderately positive and significant ($r = .685, p < .01$). The relationship between the study variables was confirmed by both correlation and regression analysis. The study recommends PDEs should also ensure they train all departments how to clearly specify and outline product and or service specifications as required by PPDA, this is to avoid mistakes of specifying brand names which limit participation. Enhanced supervision of the tactical procurement practices of the PDUs in public procuring entities in Uganda by the PPDA will ensure delivery of value for money services. The entity should encourage more training, workshops and sponsoring short courses in procurement practices especially on methods of procurement since some tend to get biased with old acquaintances, paying favors and personal interest when deciding method of procurement, such behavior blocks capable supplier's hence compromising value for money.

5.1.8 Managerial Competences and Organizational Behaviour among Private Higher Institutions of Learning in South Western Uganda

Joan Mashanyu Butungi, Adrian Mwesigye

The study aimed at examining the relationship between managerial competences and organizational behaviour among private higher institutions of learning in South Western Uganda. The objectives of the study were to establish the relationship between managerial knowledge and organizational behaviour among private higher institutions of learning in South Western Uganda, to ascertain the relationship between managerial skills and organizational behaviour among private higher institutions of learning in South Western Uganda and to establish the relationship between managerial abilities and organizational behaviour among private higher institutions of learning in South Western Uganda. The study adopted both cross sectional and correlational research designs and the study population was 37 private higher institutions of learning in South Western Uganda from which 32 of them were sampled basing on Krejcie and Morgan (1970). Data was collected using a questionnaire and analyzed using SPSS version 22. The study found out that there is a significant substantial positive correlation between managerial knowledge and organizational behaviour among private higher institutions of learning in South Western Uganda, a significant weak moderate correlation between managerial skills and organizational behaviour among private higher institutions of learning in South Western Uganda; and a moderate positive correlation between managerial abilities and organizational behaviour among private higher institutions of learning in South Western Uganda. The study concludes that there is a significant substantial positive relationship between managerial knowledge and organizational behaviour, a significant moderate positive relationship between managerial skills and organizational behaviour; and a moderate positive relationship between managerial abilities and organizational behaviour among private higher institutions of learning in South Western Uganda. The study recommended that owners, policy makers and other stakeholders in private higher institutions of learning in the region should improve their knowledge, skills and abilities of their managers and employees by equipping them with more communication, accounting, research and leadership skills through organizing more training programs and refresher courses for managers and employees so that they can deal with everything that is new and create new cultural patterns they have.

5.1.9 Budgetary Controls, Inventory Management, and Financial Performance of Floriculture Industry A long Lake Victoria Basin

Akabway Stephen, Nixon Kamukama

This study investigated the relationship between budgetary controls, inventory management, and financial performance of floriculture industries along lake Vitoria basin. In particular, it examined the relationship between inventory management and financial performance of floriculture industries, to establish the relationship between budgetary control and financial performance, the effectiveness of budgetary control system used by floriculture industries along lake victoria. The study utilized a cross sectional research design coupled with quantitative research approach. The sample size of the study was 65 staff and was selected using simple random sampling. Data was collected using questionnaire with 5-point likert scale. Descriptive statistics, Pearson correlation and regression analysis were used to analyze data with the aid of Statistical Package for Social Scientist. The study found out that there is a strong positive relationship between inventory management and financial performance of floriculture industries. The study also found out that 74.9% of the variations in financial performance of floriculture industries are influenced by the use of budgetary control and inventory management. Lastly, the study also found out that there is a high effectiveness of budgetary control system used and financial performance of floriculture industries. This study recommends that the management of floriculture industries should focus on improving the aspects of monitoring and ordering, inventory control limits and replenishment decisions within the inventory management practices in a bid to enhance financial performance. As well, this study recommends that the management of floriculture industries should focus on improving the aspects of budgetary control system through strengthening budget planning, budget implementation, and budget monitoring process in a bid to enhance the effectiveness of the budgetary control system at floriculture industries along lake victoria basin.

5.1.10 Forensic Audit Practices and Fraud Management in Selected Local Governments in South Western Uganda.

Rossette Nyamaizi, Atwine Daniel Wanito

The study aimed at examining the relationship between forensic audit practices and fraud management in selected local governments in South Western Uganda. The objectives of the study were to establish the relationship between forensic accounting and fraud management in selected local governments in South Western Uganda, to establish the relationship between forensic investigation and fraud management in selected local governments in South Western Uganda and to establish the relationship between forensic litigation and fraud management in selected local governments in South Western Uganda. The study adopted both cross sectional and correlational research designs and the study population was 55 selected local governments in South Western Uganda from which 43 were sampled basing on Taro Yamane (1967). Data was collected using a questionnaire and analyzed using both descriptive and inferential statistics with the help of SPSS version 22. The study findings established that there is a substantial positive significant correlation ($r=0.413^{**}$, $P \leq .01$) between forensic accounting and fraud management among selected local governments in South Western

Uganda, a slight positive significant correlation ($r=0.365^{**}$, $P\leq .01$) between forensic investigation and fraud management among selected local governments in South Western Uganda; and a moderate positive significant correlation ($r=0.418^{**}$, $P\leq .01$) between forensic litigation and fraud management among selected local governments in South Western Uganda. The study concludes that there is a significant moderate positive relationship between forensic accounting and fraud management, a significant slight positive relationship between forensic investigation and fraud management; and a moderate positive relationship between forensic litigation and fraud management among selected local governments in South Western Uganda. The study recommended that policy makers, the government and other stakeholders such as offices of the Auditor General and Inspectorate of Government to improve on forensic accounting, investigation and litigation in local governments in South Western Uganda by improving on investigation, litigation support and dispute resolution, evidence identification, preservation, examination, analysis and presentation; case preparation, case trial and case enforcement in order to improve on management of fraud.

5.1.11 Managerial Competence, Inventory Management Techniques and Procurement Performance among Public Procuring Disposing Entities in South Western Uganda

Ainembabazi Rebeccah, Wilbroad Aryatwijuka

The study aimed at establishing the relationship between managerial competence, inventory management techniques and procurement performance in public PDEs of South Western Uganda and was guided by the objectives: to establish the relationship between managerial competence and inventory management techniques, to establish the relationship between inventory management techniques and procurement performance, to establish the relationship between managerial competence and procurement performance and to establish the mediating role of inventory management techniques in the relationship between managerial competence and procurement performance. The study adopted a cross sectional research design and a quantitative approach. The population was 30 public PDEs which were selected. The study used purposive sampling was used to select the PDE employees. A self-administered questionnaire was used to collect data. The findings revealed a statistically significant; moderate positive correlation between managerial competence and inventory management techniques ($r=0.437^{**}$, $P<.01$), substantial positive correlation between inventory management techniques and procurement performance ($r=0.606^{**}$, $P<.01$), substantial positive correlation between managerial competence and procurement performance ($r=0.686^{**}$, $P<.01$) and that inventory management techniques partially mediate between managerial competence and procurement performance since the effect strength of managerial competence decreased from ($\beta= .638$, $P<.01$) to ($\beta= .414$, $P<.01$) when controlled for inventory management techniques. The study concludes that; managerial competence is a key predictor of inventory management techniques, inventory management techniques is also a key predictor procurement performance, managerial competence is also key driver of procurement performance and finally it concludes that procurement performance is better achieved when managers of the public PDEs are competent enough to apply good inventory management techniques. The study also recommends that policy makers, the management and other stakeholders of public PDEs in South Western Uganda; should improve their inventory management techniques by employing managers with both basic and executive competences, they should also improve their procurement performance by applying just in

time, ABC analysis and economic order quantity inventory management techniques, should also improve their procurement performance by improving the basic and executive competences of their managers through organizing training and professional development courses and workshops and finally, they should employ managers who have good inventory management techniques in order to improve their procurement performance.

5.1.12 Employee Competences, Supplier Relationship Management and Procurement Performance of Public Hospitals in Western and Central Uganda

Bwesigye Neema, Twinomuhwezi Alex

The study aimed at establishing the relationship between employee competences, supplier relationship management and procurement performance of Public hospitals in Western and Central Uganda and was guided by the specific objectives: to establish the relationship between employee competences and procurement performance, to establish the relationship between supplier relationship management and procurement performance and to establish the combined relationship between employee competences, supplier relationship management and procurement performance of public hospitals in Western and Central Uganda. The study adopted a cross sectional research design and a quantitative research approach. The population was 34 Public Hospitals from which a sample of employees was selected which formed respondents. The study used simple random sampling to select hospitals and purposive sampling to select employees. A self-administered questionnaire was used to collect data. The findings revealed; a significant substantial positive correlation between employee competences and procurement performance ($r=0.687^{**}$, $P<.01$), a significant moderate positive correlation between supplier relationship management and procurement performance ($r=0.439^{**}$, $P<.01$) and that the combination of employee competences and supplier relationship management has a substantial statistically significant correlation ($r=0.716^{**}$, $p<.01$) with procurement performance. The study concludes that employee competences is a key driver to improved procurement performance, it also concludes that supplier relationship management is another key driver of procurement performance and it finally concludes that the combination of employee competences and supplier relationship management determines procurement performance more than the individual separate variables. The study recommends that policy makers, the management and other stakeholders of Public hospitals in Western and Central Uganda; should improve the skills, abilities and knowledge of their employees through training and organizing continuous professional development workshops and refresher courses; they should also improve their supplier relationship management through ensuring effective information sharing, building trust and being committed and they should simultaneously invest in enhancing both supplier relationship management and employee competences since a combination of the two variables has a stronger association with procurement performance than the individual separate variables.

5.1.13 Budget Processes and Budget Performance of Mbarara District Local Government

Orikiriza Illuminate, Agume Anthony

The study was about budget processes and budget performance of Mbarara district local government. The study sought to analyse the relationship between budget processes and budget performance in Mbarara district local government. Specifically, the study aimed at examining the relationship between budget formulation and budget performance in MDLG, assess the relationship between budget approval and budget performance in MDLG, analyse the relationship between Budget Implementation and budget performance in MDLG and assess the relationship between budget oversight and budget performance in MDLG. The study adopted a cross-sectional survey and correlation research designs. The study population comprised of 251 employees from 12 local governments in Mbarara district. The sample size comprised of 152 respondents selected using purposive sampling technique. Data was collected using a questionnaire survey method by administering Likert-type structured questionnaires whose validity and reliability were tested before data collection. The collected data was analyzed using SPSS software where correlation and regression statistics were generated. The Pearson correlation results revealed that budget performance at Mbarara district local government is positively and significantly related with budget formulation ($r = .425^*$; $p < 0.05$), budget approval ($r = .425^*$; $p < 0.05$), budget implementation ($r = .605^*$; $p < 0.05$) and budget oversight ($r = .449^{**}$; $p < 0.05$). In addition, the regression results indicate that all the predictor variables under budget processes significantly predict budget performance. The study concludes that all the budget processes play a significant role in Mbarara district and can significantly predict an increase in budget performance if they are all effectively followed by budget committees both at the lower level local governments such as sub counties and town councils and higher local governments just such as Mbarara district local government. The study recommends local governments in Mbarara district to establish an independent committees responsible for conducting budget formulation, approval, implementation and oversight without the interference from elected politicians. Mbarara district as a higher local government needs to provide capacity building to lower local governments in order to ensure that budgets are properly formulated, approved and executed in a responsible manner to achieve the targeted level of budget performance. Mbarara district local government needs to give more independence and resources to the internal audit office to effectively perform its oversight role without external interference.

5.1.14 Corporate Governance and Profitability of Saccos in Ibanda District

Turyahebwa Oliver, John Kule Baguma

The purpose of the study was to examine the relationship between corporate governance and profitability of SACCOS in Ibanda District. It was guided by the three objectives which were to establish the relationship between Separation of ownership from control and profitability of SACCOS in Ibanda District, to determine the connection between board structure and profitability of SACCOS in Ibanda District, to establish the connection between audit committees and profitability of (SACCOS) in Ibanda District. The study used cross-sectional design and a study population was extracted from 44 SACCOS operating according to Ibanda District Commercial report, 2020. The procedure for determining sample size used Yamane's formula to determine sample size of 40 SACCOS. The data were collected using self-administered questionnaires. The correlation coefficient analysis revealed a positive strong significant relationship between separation of ownership from control and profitability of SACCOS in Ibanda District, there was also a positive strong significant relationship between

board structure and profitability of SACCOs in Ibanda District and there was a positive strong significant relationship between audit committees and profitability of SACCOs in Ibanda District. Furthermore, the results in model summary indicate that separation of ownership from control, board structure and audit committee explain 58.6% (Adjusted R Square=.586) of the variations in the profitability of SACCOs in Ibanda district. This also means that the remaining 41.4% is explained by other variables not considered in this study like geographical, political factors. Therefore, it can be recommended that, the management of SACCOs should ensure that there is clear separation of ownership from control and this will improve the profitability of Savings and Credit Cooperatives (SACCOs) in Ibanda District. The SACCO board should be separate from management but all the two managerial levels should agree to a common decision and this common decision should be shared among the employees and this will increase the profitability of the SACCO. There is need to improve the board structure in terms of improving the board size that matches with the SACCO size, the board should be composed of well-qualified members with good working experience. The audit committee should be suitable for the auditing purpose. This is because a well-constituted committee that can produce independent reports, the committee that has well-qualified members and well-knowledgeable committee will improve the performance of the SACCO, thus improving its profitability.

5.1.15 Contract Management, Human Capital and Success of Construction Projects in Isingiro District

Hilary Kabazaire, Geoffrey Bwireh

The study aimed at establishing the relationship between contract management, human capital, and construction project success in Isingiro district. The specific objectives were to establish the relationship between contract management and Success of construction Projects, to establish the relationship between human capital and construction project success and to establish the combined relationship between contract management, human capital, and construction project success. The study adopted a cross-sectional design, using quantitative approach. The population was 33 Government Construction Projects in Isingiro district. All the 33 Construction Projects were considered by census approach. 115 participants were purposively included in the study. A self-administered questionnaire was used to collect the data. The study findings revealed that: there is a statistically significant moderate positive correlation between contract management and construction project success ($r=0.518^{**}$, $P<.01$), there is a statistically significant substantial positive correlation between human capital and construction project success ($r=0.789^{**}$, $P<.01$) and a combination of contract management and human capital also has a substantial statistically significant correlation ($r=0.729^{**}$, $p<.01$) with Construction project success. The study concludes; contract management is a key driver of success of construction projects, human capital is another key driver to improved construction project success and human capital is a better predictor of construction project success than contract management. The study recommends that policy makers, management, contractors and other stakeholders' Isingiro district: should improve their contract management through ensuring effective contract planning and risk management, they should improve the knowledge and abilities among project managers, contractors and other district employees working on construction projects by offering more training and staff development opportunities and finally they should invest more in human capital development since it has a stronger association with success of construction projects than contract management.

5.1.16 Promotion Mix Strategies and Consumer Brand Preference of Coca-Cola Brand of Century Bottling Company Limited in Mbarara Municipality

Ahabwenki Brian, Frank Ahimbisibwe

This study aimed at establishing the relationship of promotion mix strategies and consumer brand preference of Coca-Cola Brand of Century Bottling Company Ltd in Mbarara municipality in Mbarara district. Promotional mix strategies were looked at in terms of three dimensions sales promotions, advertising and public relations. Thus, the specific objectives were derived from these dimensions; that is, to examine the relationship between each of the above dimensions and consumer brand preference of Coca-Cola Brand of Century Bottling Company Ltd in Mbarara municipality. Cross-sectional survey research design was used to gather quantitative data from a sample of 200 respondents consisting of 186 consumers and 14 dealers of CBC soft drink brands operating in 6 divisions of Kakoba, Kamukuzi, Kakiika, Nyakayojo, Biharwe and Nyamitanga in Mbarara Municipality at one point in time. Data was collected using questionnaires analyzed using SPSSv20.0. Inferential statistics were used to measure the relationship between dimensions of promotional mix strategies and brand preference.

The study findings revealed that all three promotional mix strategies; sales promotion, advertising and public relations enhance consumer brand preference for the Coca-Cola Brand as they increase consumer awareness, reduces price sensitivity and increases consumer brand loyalty especially if the product is new to the consumer and endorsed by celebrities. The correlation analyses revealed that advertising ($r=.740^{**}$, $p<0.05$) and sales promotions ($r=.688^{**}$, $p<0.05$) were more positively and significantly related to consumer brand preference than public relations ($r=.451^*$, $p<0.05$). However, the regression analyses indicate that promotional mix strategies can have a greater significant influence on brand preference if used altogether at once rather than using one strategy at a time.

The study concluded that Coca-Cola Brand is the least preferred brand in Mbarara municipality amongst all Coca-Cola brands and brand preference differs amongst people of different background characteristics due to differences in access to sales promotions, adverts and public relations by the consumers. A combination of more than one promotional mix strategies has a more significant influence on consumer brand preference than when the organization uses only one strategy. The study recommended CBC Ltd to strengthen its promotional mix strategies for the Coca-Cola Brand by using cash prizes on consumers of Coca-Cola and to rebrand the Coca-Cola Brand by removing excess gas in the Coca-Cola Brand, frequent product differentiations for the Coca-Cola Brand, reduced price of the Coca-Cola Brand and employ more skilled sales staff to market the Coca-Cola Brand in order to increase consumer brand preference for the Coca-Cola Brand.

5.1.17 Employee Competence, Contract Management and Public Procurement Performance of Local Government Entities in Western Uganda

Agatha Kirabo, Wilbroad Aryatwijuka

This study was undertaken to establish the relationship between employee competence, contract management and public procurement performance in Local Government Entities in Western Uganda. It was prompted by the continued poor performance of public procurement

in Uganda and is guided by three (3) research objectives namely; to establish the relationship between employee competence and public procurement performance of Local Government Entities, to establish the relationship between contract management and public procurement performance of Local Government Entities and to establish the relationship between employee competence, contract management and public procurement performance of Local Government Entities.

The study adopted a cross-sectional research design and a quantitative approach was used to collect information that can be quantified with self administered questionnaires as the data collection instrument. The study used Krejcie and Morgan (1970) Tables to arrive at a sample of 42 Entities. The correlation coefficient analysis revealed positive significant relationships between employee competence and public procurement performance of Local Government Entities, there was also a significant relationship between contract management and public procurement performance of Local Government Entities. The results of the model summary indicate that employee competence and contract management explain 51.4% (Adjusted R square = .514) of the variations in public procurement performance in Local Governments. This means 48.4% of the variations are explained by variables not explained in this study. Therefore, based on the findings, discussion and conclusion, it can be recommended that, there is need to improve the competences of the employees through equipping them with better skills on how to handle the work, improve their knowledge through sponsoring them for further studies and also train them so that their attitude towards work and accepting feedback is improved, this will result into improved public procurement performance. There is also need to improve on the contract management through improving contract execution, contract monitoring, contract relationship and dispute resolution by having close supervision and ensuring that all the procedures and guidelines are followed so as to improve on public procurement performance.

5.1.18 Cost Control Techniques And Profitability Of Dairy Processing Firms In Greater Mbarara

Halima Hussein, John Baguma Kule

This study is about cost control techniques and profitability of dairy processing firms in Greater Mbarara. The study was mainly conducted to find out the relationship between budgetary control and profitability of dairy processing firms in Greater Mbarara, establish the association between standard costing and profitability of dairy processing firms in Greater Mbarara, find out the relationship between downsizing and profitability of dairy processing firms in Greater Mbarara and establish the link between outsourcing and profitability of dairy processing firms in Greater Mbarara. The study used a cross-sectional survey design to collect and analyze data from dairy processing firms in Greater Mbarara. The study population included twenty-one (21) dairy processing firms comprising of six (6) large scale processors and fifteen (15) small scale processors. Using Krejcie and Morgan tables, the sample size included nineteen (19) dairy processing firms out of which 5 are large scale and 14 are small scale firms. Data was collected by use of a self-administered questionnaire administered to 38 key informants including 19 accountants and 19 managers. Data quality control was ensured by testing for validity and reliability of the questionnaire where both the Content Validity Index (CVI=0.902) and Cronbach's alpha ($\alpha=0.748$) were above the recommended threshold of 0.70. The collected data was analyzed by generating descriptive and inferential statistics with the aid of SPSS software. From the analysis, the study findings revealed that three (3) cost control techniques; budgetary control, standard costing and

outsourcing were all positively and significantly related with profitability of dairy processing firms while a positive but insignificant relationship was observed between downsizing and profitability of dairy processing firms in Greater Mbarara.

The study concluded that there is a positive significant relationship between cost control techniques and profitability of dairy processing firms. Cost control techniques play a significant positive role in dairy processing firms in Greater Mbarara and have the ability to significantly improve profitability of the firm if the right techniques are used. The study recommends dairy processing firms in Greater Mbarara to establish budgets and set standards relating to expected costs for each department and ensure continuous comparison of actual with budgeted/standard results to identify variances and take appropriate action. Dairy processing firms in Greater Mbarara are also recommended to avoid permanent reduction/lay-off of their labor force since this would result to loss of the most important resource-human capital without which the firm operations cannot effectively run. Instead, Dairy processing firms in Greater Mbarara need to embrace outsourcing strategy as a cost control technique in order to improve profitability.

5.1.19 Marketing Stimuli, Consumer Characteristics and Uptake of General Insurance Policies in Mbarara City

Tumwesiga Patrick, Tumwebembeire Naster

General insurance has been considered as the next revolution in addressing risks and vulnerability in low-income countries and one of the revolutionary tools expected to break the vicious circle of poverty and reliable protection to the poor. This study is about marketing stimuli, consumer characteristics and uptake of general insurance policies in Mbarara City. The study aimed at establishing the relationship between marketing stimuli and uptake of general insurance policies, the relationship between socioeconomic factors and uptake of general insurance policies and the relationship between sociocultural factors and uptake of general insurance policies. The researcher used a cross-sectional research design to collect and analyze data from a sample size of 375 motorists in Mbarara city since this a suitable population for general insurance policies like motor third party insurance, motor comprehensive insurance and other policies like fire, burglary, goods in transit and professional indemnity. The study employed simple random sampling technique during the process of data collection and this included all motorists such as bus drivers, taxi drivers, mini-bus drivers and truck drivers in different parking sites around the city. The study used a questionnaire survey method where a close-ended questionnaire was administered to collect data. The collected data was analyzed using Statistical Package for Social Scientists (SPSS) software where descriptive, correlation and regression analyses were performed. The study findings revealed that there is a positive significant relationship between marketing stimuli factors and uptake of general insurance policies in Mbarara city. The study findings also revealed that there is a positive significant relationship between both socioeconomic status and sociocultural factors and uptake of general insurance policies in Mbarara city. Basically, the study revealed that the most significant predictors of general insurance uptake are price of insurance policy, promotional strategies used, consumer level of income and education, consumer's occupation, attitudes, beliefs and lifestyles. The study concludes that both marketing stimuli factors (price, promotion) and consumer characteristics (level of

education, income, occupation, and beliefs) are significant predictors of uptake of general insurance policies in Mbarara city. This recommends general insurance companies to promote insurance services through extensive proportional campaigns in order to increase uptake of general insurance policies. The study recommends insurance companies to reduce the insurance premiums in order to make it easy for customers to pay the premiums in time. Insurance companies should extensively sensitize the public about general insurance and target their marketing strategies towards people with high socioeconomic status.

5.1.20 Capital Structure, Financial Risk Management and the Financial Performance of Manufacturing Firms in Mbarara District

Kambale Sowedi, Kamukama Nickson

The study sought to investigate the relationship between capital structure, financial risk management and the financial performance of manufacturing firms in Mbarara district. The study objectives were; to establish the relationship between capital structure and the financial performance of manufacturing firms in Mbarara district, to establish the relationship between financial risk management and the financial performance of manufacturing firms in Mbarara district and to examine the effectiveness of risk management systems used by manufacturing firms in Mbarara district. The study was guided by the Tradeoff Theory by Modigliani and Merton Miller (1958) which seeks to establish an optimal mix of equity and debt so as to minimize the weighted average cost of capital. The study adopted a cross-sectional research design. A sample of 86 manufacturing firms from a population of 110 was considered for data collection using primary sources. Primary data was collected using a questionnaire then processed & analyzed using Statistical Package for the Social Sciences (SPSS Version 20). From the study findings, the study found a positive significant relationship between capital structure and financial performance of manufacturing firms ($r = .488^{**}$, $p < .01$). This meant that any positive change in capital structure was associated with a positive change in financial performance. The study also found a positive significant relationship between financial risk management and financial performance of manufacturing firms ($r = .420^{**}$, $p < .01$). This meant that any positive change in financial risk management was associated with a positive change in financial performance. The study also found low implementation of risk management systems by manufacturing firms in Mbarara District which showed a gap in the effectiveness in risk management systems. This is evidenced by a low mean ranging between 1.81 - 2.60 & standard deviations above 1. In line with the first objective and research findings, it can also be recommended that finance managers manage the proportion of debt in their firms by matching risk and returns; this is because the firms studied were highly leveraged. The study recommends the risk management should be adopted by firms with the emphasis on risk identification, risk analysis, risk monitoring and risk mitigation; this is because risk management influences financial performance by enhancing funds management and reduction of unnecessary costs. The study also recommends that manufacturing firms should adopt risk management systems, become consistent in their application and make it an organization-wide practice.

5.1.21 Tax Education, Taxpayer Perception and Income Tax Filing Compliance among Small Taxpayers in Mbarara City

Mwesigye Boaz, Nsambu Kijjambu Frederick

This study is about establishing the relationship between tax education, taxpayer perception and income tax filing compliance among small taxpayers in Mbarara city. The study is driven by the fact that despite URA's efforts to improve tax compliance, income tax filing compliance is still low among small taxpayers in Uganda in general and Mbarara city in particular. A cross-sectional study design was used to collect data from 33,979 small taxpayers in Mbarara city out of which 31,324 were individual taxpayers while 2,655 were non-individual taxpayers. The sample size included 380 respondents out of which 350 were individual taxpayers while 30 were non-individual taxpayers. Systematic random sampling was used to select respondents from each of the six divisions of Mbarara city. A questionnaire method was employed in data collection where self-administered 5-point Likert type questionnaire with a Content Validity Index (CVI) of .91 and Cronbach's alpha (α) of .86 was used in data collection. From the descriptive statistics, there was average level of taxpayer awareness, belief and compliance towards income tax filing among small taxpayers in Mbarara city. The correlation analysis revealed that tax education was positively and significantly related to taxpayer perception ($r=.715^{**}$, $p<0.05$) and income tax filing compliance ($r=.631$, $p<0.05$). Likewise, a positive and significant relationship was found between taxpayer perception and income tax filing compliance ($r=.711^{**}$, $p<0.05$). The regression analysis revealed that taxpayer perception had a significant partial mediating effect ($\beta_{md}=.366$, $p<0.05$) on the relationship between tax education and income tax filing compliance among small taxpayers in Mbarara city. Based on the findings, the study concludes that there is significant positive relationship between tax education, taxpayer perception and income tax filing compliance which implies that tax education plays a significant role in improving income tax filing compliance via an improvement in taxpayers' positive perception. With regard to the average levels of awareness, belief and compliance levels in respect to income tax filing, there is need for a coordinated approach between the government and URA to increasingly sensitize small taxpayers about income tax filing by distributing free tax manuals to every business in order to raise awareness and create positive perceptions among small taxpayers in Mbarara city about income tax filing. Basic tax education should also be included as a compulsory course unit into the school curriculum to boost general tax knowledge and enhance income tax filing compliance.

5.1.22 Motivation and Employee Performance in Hotels in Masaka City

Nasser Sembajja, Adrian Mwesigye

The study aimed at establishing the relationship between motivation and employee performance in hotels in Masaka City. The study adopted a cross sectional research design and a quantitative research approach to establish the relationship between the study variables. The study population was 210 hotel employees from which 192 were selected. The study used simple random sampling to select the hotel employees so as to give them equal chances of participation in the study. The study findings established a positive significant moderate correlation ($r=0.538^{**}$, $P<.01$) between intrinsic motivation and employee performance in

hotels in Masaka City. The study findings also established a significant substantial positive correlation ($r=0.764^{**}$, $p<.01$) between extrinsic motivation and employee performance in hotels in Masaka City. Finally, the study findings revealed a substantial positive correlation ($r=0.768^{**}$, $p<.01$) between intrinsic, extrinsic motivation and employee performance in hotels in Masaka City; and all the combined variables (intrinsic and extrinsic motivation explain 56.6% variation in employee performance). The study concludes that extrinsic motivation contributes better to employee performance in hotels in Masaka City than intrinsic motivation. However, combination of the two (intrinsic and extrinsic motivation) improves employee performance slightly more. The study recommends that owners, managers and shareholders of Hotels in Masaka City should give their employees improved salaries and wages, improve on working conditions and environment, and provide fringe benefits so as to enhance their performance, should increase recognition of their employees, allow employees to own their work, give employees a sense of achievement and create more promotional opportunities for their employees to enhance their performance. The study finally recommends that hotel owners, managers and shareholders in Masaka City should simultaneously invest in enhancing both extrinsic and intrinsic motivation since a combination of the two variables has a stronger association with employee performance than the individual separate variables.

5.1.23 The effect of Pharmaceutical Promotion on Compliance with Community-Acquired Pneumonia Prescribing Guidelines among General Practitioners in Mbarara City Hospitals

Linus Atugonza, Sarah Nabachwa

Despite the availability of treatment guidelines, up to 42% of the prescriptions are incompliant with the Uganda clinical guidelines, and up to 84% of the outpatients do not receive all their prescribed doses. In the presence of pharmaceutical promotion, the question of whether or not they encourage compliance with treatment guidelines in community-acquired Pneumonia remains unanswered. This study aimed to uncover the effect of pharmaceutical promotion strategies on compliance with CAP prescribing guidelines among general practitioners (GPs) in Mbarara city hospitals. The study adopted a phenomenological research design. The sample size was determined after reaching the saturation point of 15 participants when no new information was coming through. The voices collected via interviews were audio recordings, transcribed and analysed using content analysis. A paragraph was used as a unit of analysis. From the results, Amoxicillin-Clavulanate was the most preferred drug as the first-line medicine in outpatient children with CAP. In contrast, Azithromycin was the most preferred first-line medicine in outpatient adults with CAP. Results show that public relations affected compliance with CAP prescribing guideline by 86.7%; direct marketing by 26.7%; sales promotion by 20% and personal selling by 13.3%. This implies that public relations greatly encouraged compliance with CAP prescribing guidelines. Results on compliance reveal generic prescribing at 46.7%, the selection from the essential medicines list at 46.7% and the use of National Treatment Guidelines at 66.7%, which is below the optimal level of 100%. On average, the actual compliance level of GPs in Mbarara city hospitals is 53.4%, which is below the expected optimal level of 100%. The reason why compliance with CAP prescribing guidelines is still below the optimal level is because GPs were more influenced by pharmaceutical promotion into brand prescribing. Therefore, pharmaceutical companies should organise more CMEs while notifying GPs when

it is still early enough to encourage them to attend. These CMEs will widen GPs' knowledge and encourage more compliance with CAP prescribing Guidelines.

5.1.24 Procurement Planning, Staff Competences and Service Delivery in Local Government Procurement and Disposal Entities in Western Uganda

Alinaitwe Rajab, AryatwijukaWilbroad

The study aimed at examining the relationship between procurement planning, staff competences and service delivery in Local Government Procurement and Disposal Entities (PDEs) in western Uganda. The study adopted a cross sectional research design where the population of study was 34 LG PDEs in western Uganda from which a sample of 31 LG PDEs participated. The LG PDEs in western Uganda were selected using simple random sampling and the study findings were collected using questionnaires and presented in frequency tables. The study findings revealed a statistically significant moderate positive correlation between procurement planning and service delivery ($r=0.462^{**}$, $P<.01$), study results also revealed a statistically significant moderate positive correlation between staff competences and service delivery ($r=0.570^{**}$, $P<.01$). Finally, the study results also revealed that a combination of procurement planning and staff competence have a substantial statistically significant correlation ($r= 0.708^{**}$, $p<.01$) with service delivery and all the combined variables explain 50.0% variation in service delivery. The study concludes that procurement planning is an average driver of service delivery and so is staff competence. However, a combination of the two substantially affects service delivery. The study recommended that policy makers, local government administrations, donors, the central government, civil society and other stakeholders of LG PDEs in western Uganda should improve their procurement packaging, procurement methods to use and procurement scheduling so as to improve on their current service delivery levels as per the study findings. This can be done through organization, following the PPDA Act and timely planning. The study also recommended that policy makers, local government administrations, donors, the central government, civil society and other stakeholders of LG PDEs in western Uganda should improve the skills, abilities and knowledge of their staff through training and organizing continuous professional development workshops and refresher courses in order to better service delivery. The study finally recommends that policy makers, local government administrations, donors, the central government, civil society and other stakeholders of LG PDEs in western Uganda should simultaneously invest in improving on both procurement planning and enhancing staff competence for their employees since a combination of the two variables has a stronger association with service delivery than the individual separate variables.

6.0 FACULTY OF INTERDISCIPLINARY STUDIES

6.1 MASTER OF ARTS IN CONFLICT ANALYSIS & INCLUSIVE DEVELOPMENT

6.1.1 Forced Displacement and Women's Economic Livelihoods: A Case of Women in Rwamwanja Refugee Settlement, Western Uganda

Hedwig Arineitwe, Cleophas Karooma Kansiime, Primrose Nakazibwe

This study focused on “Forced displacement and women’s economic livelihoods: a case of women in Rwamwanja Refugee Settlement, Western Uganda.” The objectives of the study were; to find out the livelihood programs available and adopted by women in Rwamwanja Refugee Settlement, to explore challenges refugee women face to earn a living in Rwamwanja Refugee Settlement and to identify the livelihood coping mechanisms of displaced women in Rwamwanja Refugee Settlement.

The study used quantitative and qualitative methods of data collection and analysis where information was obtained using questionnaires and interviews from a sample size of 105 respondents that included 73 refugee women, 31 key informants and the camp commandant. The study respondents were selected using simple random and purposive sampling techniques respectively, the major research findings presented narratively interpreted and discussed accordingly.

The study findings revealed that the livelihood programs adopted by displaced refugee women in Rwamwanja Refugee Settlement are farming (crop growing and animal rearing), hands-on activities such as briquettes making, operation of sewing machines and liquid soap making, village savings schemes and retail trading (Micro and small business) programs. The study findings further revealed that refugee women face different challenges in their efforts to earn a living, Challenges such as; hatred from host communities, shortage of resources especially land, Gender Based Violence (GBV), language barrier, poor housing and sanitation, embezzlement of funds, and psychological trauma. These challenges complicate the livelihood efforts of refugee women. The results revealed that the displaced women in Rwamwanja have livelihood coping mechanisms such as living within the boundaries of refugee land and requesting for land increment from OPM, seeking for psychosocial support by GBV victims, involvement in decision making and embracing a number of trainings.

The study concluded that forced displacement complicates the economic livelihoods of women in Rwamwanja Refugee Settlement. The study recommended increased funding to international agencies that operate in refugee settlements to streamline their operations in their efforts to support refugees’ livelihood undertakings such as capital to begin small-scale retail businesses within and outside refugee settlements. The study also recommended that relatively peaceful countries such as Rwanda where refugees fled civil war and conflicts should work hand in hand with the government of Uganda and UNHCR to recall back their

citizen's home as this can help to reduce on the big numbers in Rwamwanja Refugee Settlement and create more economic opportunities for refugee women.

6.2 MASTER OF ARTS IN DEVELOPMENT STUDIES

6.2.1 Service Quality and Customer Satisfaction among MTN Uganda Subscribers: A Case Study of Mbarara Municipality

Kazibwe Muhammed, Bariyo Rogers, Roberts Muriisa

The study aimed at establishing the relationship between the indicators service quality and customer satisfaction with MTN services in Mbarara Municipality. The study was guided by the following specific objectives: To establish the relationship between tangibles in MTN service centres, reliability of MTN services and responsiveness of MTN employees to customer needs and customer satisfaction with MTN services in Mbarara Municipality. The conceptual framework used in the study was adopted from the service quality conceptual model (SERVQUAL) developed by Parasuraman et al. (1985). Microsoft Excel LTSC PP 2018 was used to input data from the structured questionnaires and Statistical Package for Social Sciences (SPSS) software was used to analyse the data where by the Pearson correlation coefficient analysis was used to establish the relationships between the study variables. The study adopted cross sectional study design and the population was 335,204 customers. The researcher used the Cochran, WG (1977) formula to arrive at the sample size of 384 customers. The study used simple random sampling to select MTN customers. The study found out: a significant low positive correlation ($r=0.320^{**}$, $p\text{-value} \leq .01$) between tangibles and customer satisfaction with MTN services in Mbarara municipality, a significant strong positive correlation ($r=0.635^{**}$, $p\text{-value} \leq .01$) between reliability and customer satisfaction with MTN services in Mbarara municipality and a moderate positive correlation ($r=0.478^{**}$, $p\text{-value} \leq .01$) between responsiveness and customer satisfaction with MTN services in Mbarara municipality. This study showed that tangibles, responsiveness and reliability as elements of service quality are necessary and vital variables to predict customer satisfaction within the telecommunication sector in Mbarara municipality. The researcher recommends that policy makers, managers and other stakeholders in MTN; should improve their tangibles by putting more physical facilities, improving appearance of their personnel and ensuring innovations in the physical representations of their service, they should also improve the reliability of their services by ensuring transactional accuracy, ensuring that they offer the right service and honoring their promises and finally they should improve their responsiveness by enhancing their readiness to provide services and ensuring promptness in service delivery.

6.2.2 The Self-Reliance Livelihood Programs and the Socio-Economic Empowerment of Refugees in Nakivale Refugee Settlement

Mbiine Ambrose, Tom Ogwang, Ahimbisibwe Frank

The study was about the self-reliance livelihood programs and the refugee socio-economic

empowerment in Nakivale refugee settlement. The study was based on three objectives; to establish the types of social and economic empowerment livelihood programs in Nakivale refugee settlement, to examine the contributions of self-reliance livelihood programs on the refugee social and economic empowerment in Nakivale refugee settlement and to identify the challenges facing the self-reliance livelihood programs in refugee empowerment. The study adopted the case study research design and employed quota and purposive sampling techniques to select a sample size of 40 respondents.

The study revealed Socio-economic empowerment livelihood programs in Nakivale refugee settlement and these include Agriculture which is made up of [crop growing, piggery, goat rearing and bee keeping], Vocational training and skilling [tailoring, mechanics, hairdressing, briquette making], Cultural galas which enhance unity and identity amongst the refugees.

The study also revealed the contributions of self-reliance livelihood programs and these include psychological well-being in which refugee have income sources and cater for their families, livelihood programs have led to increase the source of food, improvement in health as beneficiaries are able to improve on their nutrition due to the variety of food, reduction in poverty was also reported as a contribution of livelihood programs as refugees have income sources.

The study also revealed some challenges affecting self-reliance livelihood programs and these include Dependency syndrome among the refugees, Limited funding and government support, Prolonged drought, struggles in adapting to the agriculture for some nationalities especially those without the background in agriculture such as Somalis and Eritreans which hinders the progress of self-reliance.

7.0 FACULTY OF COMPUTING & INFORMATICS

7.1 MASTER OF SCIENCE IN INFORMATION SYSTEMS

7.1.1 A Medicine Distribution And Stock Management (MDSM) framework for public health care facilities in Uganda: Case study Bwizibwera Health Centre IV.

Nankabirwa Juliet, Fred Kaggwa, Lukyamuzi Edward

Medicines are essential to the healthcare system's efficiency. However, the supply and distribution of medications from the point of origin to the point of consumption in public HCs in Uganda are ineffective. This has made it extremely difficult for healthcare facilities to effectively plan, measure, and estimate their medical supply requirements for any particular period, and as a result, this has led to delays causing regular stock-outs of essential medicines. Using a case study design and Design Science methodology, this research study aimed at improving the information flow of medicines stocks by building a framework for the distribution and stock management of medicines in public healthcare facilities in Uganda. Results of the developed framework revealed that HealthCareCentres through the stock

management and monitoring systems of the Medicine Distribution and Stock Management framework can track amounts of medicines ordered, received, dispersed, expired, and balances at hand with timely updates that help in determining the running out medicines stock, a factor that is essential in enhancing the flow of information for the medicine distribution and stock management in public healthcare facilities in Uganda.

7.1.2 A mobile model for determining the likelihood of Polycystic Ovarian Syndrome in Women in Mbarara District: Case study of Neo Care Clinic and Fertility Center

Kasubo Joweria Salim, Deborah Natumanya

Detecting polycystic ovarian syndrome in women is currently being done by gynecologic scans, blood tests, and or glucose tests however the tests are very expensive and hard to access for women in rural and hard-to-reach areas since the tests can only be carried out in specific gynecologist clinics and hospitals. The aim of this study was to provide means that ease the prediction of the likelihood of polycystic ovarian syndrome and created awareness in women with the help of a smartphone. Design science methodology was used in the design of the model for the prediction of the polycystic ovarian syndrome. The model design was under the five phases of design science which included problem awareness, a solution to the problem, artifact development, artifact evaluation, and lastly conclusion. The model predicts the likelihood of polycystic ovarian syndrome in women with a focus on the presence of the following parameters; long duration of menstrual periods, unstable menstrual cycle, hairy body, acne, and a deep voice. The model was implemented and given to women of age 24 to 49 years in rural health centers for usage.

7.1.3 Assessing the maintainability of Application Programming Interfaces in the Eclipse Framework

Enock Mabberi, Simon Kawuma

Framework interfaces provide a remarkable opportunity to software developers to quickly build good quality software applications. Building code from scratch is really hectic and time consuming, therefore in order to ease and quicken the process of application development, most mid-level and senior application developers opt to use code packages provided within the frameworks. There exists a number of frameworks such as Net-beans, Android Studio, Laravel, Vue, Eclipse and among others that provide these code packages.

Eclipse framework is one of the most used frameworks in the software development world. It provides code packages in form of non-APIs and APIs which are sometimes called internal interfaces and public interfaces respectively. Public interfaces are regarded as stable and their usage is widely encouraged by the framework developers while the non-APIs, also called internal interfaces are regarded as unstable and discouraged by the framework developers. Much as the non-APIs are strongly discouraged by the framework providers, their usage is still mind blowing. Research studies have continued to show certain non-APIs continue to remain stable as framework evolve. They showed no incompatibility issues in the previous application versions yet they continue to be unsupported and not documented by the

framework developers. From such observation, this research seeks to study the stable non-APIs to recommend them for promotion to the APIs. This is because the eclipse framework developers have not found a substantial baseline information for their promotion into public APIs.

Furthermore, this notion instigates conflicting confidence amongst the users of the Eclipse framework and also in relation to other frameworks. In this study therefore, we seek to study the eclipse internal interfaces using SonarQube with the aim of providing the results that will serve as baseline data for promotion of candidate stable internal interfaces to the APIs.

7.1.4 A Framework for Bridging the knowledge gap amongst Women of Reproductive age about Malnutrition of Children under 5 Years of age in Uganda

Johnan Naturinda

There is a malnutrition knowledge gap among women of reproductive age which has led to inappropriate infant and young child complementary feeding practices and medical conditions related to a lack of maternal knowledge. Limited awareness about malnutrition among a large percentage of the women in Uganda is a critical risk factor for a cute malnutrition among children of five years and below. The existing frameworks have significant gaps in addressing the issue of malnutrition knowledge gap among women of reproductive age. The main objective of this research was to establish ways how to prevent malnutrition in children by developing a framework to bridge the knowledge gap among women of reproductive age about malnutrition of children under 5 years of age.

An iterative methodology was used to achieve objective 1 where existing malnutrition records at Holy Innocents children's Hospital were used and also data from 25 women of reproductive age were collected using a quantitative data collection method. The Unified Modeling language (UML) was used which culminated in the development of a malnutrition knowledge gap framework comprising women of reproductive age and healthcare facilities. UTAUT model was used to test the acceptability and usability of the developed framework via a web application that was developed based on the developed framework.

Results showed that the developed framework enhanced the malnutrition information flow and sensitized women on how to prevent malnutrition in children below 5 years of age with Acceptability and usability levels of 96% and 95%. This implies that the developed framework has the potential of increasing malnutrition awareness hence bridging the knowledge gap among women of reproductive age about malnutrition of children under 5 years of age.

This research concludes that poor child nutrition and maternal nutrition is as a result of lack of knowledge amongst women of reproductive age about complementary feeding practices, malnutrition care and prevention, complementary food for the treatment of malnutrition, hygiene (WASH) practices and Micro-nutrient powders and foods. The developed framework can enhance the nutrition information flow and sensitize women on how to prevent malnutrition in children below 5 years of age.

Due to time constraints, limited funds, and the limitations of some of the available frameworks, this research concentrated on women of reproductive age only for malnutrition in children of 5 years and below. In the future, children, and grandmothers can be included among the participants and also other ages of malnourished children can be included. This

research also only tested the acceptability and usability of the developed framework among the selected women, in the future, the impact of the intervention can be evaluated. However, due to the limited time, the impact evaluation was not part of the scope of this research since it would need the application to be used for at least six months.

7.1.5 A Dietary Model for Pregnant Women in Uganda: A Case of Kamukira Health Centre IV, Kabale District

Ninsiima Clare, Wasswa William

Nutrition is a critical part of health and development (WHO-Nutrition, 2022). Stronger immune systems, safer pregnancies and deliveries, a decreased risk of non-communicable diseases (including diabetes and cardiovascular disease), and longer life spans are all associated with better nutrition. At Kamukira Health Centre IV, Kabale District, proper nutrition during pregnancy is crucial for both the mother and the unborn child. However, many pregnant women in this area face dietary challenges due to limited access to nutritious food information.

To address this issue, several models have been developed for example Utilization of a diet optimization model in ensuring adequate intake among pregnant women, Optimal dietary patterns designed from local foods to achieve maternal nutritional goals, Cost of the Diet: a method and software to calculate the lowest cost of meeting recommended intakes of energy nutrients from local foods etc. However these models have limitations including how to access timely and relevant information about balanced diet for pregnant women hence the need for development of a dietary model to meet timely and relevant information intervention to ensure that pregnant women improve on diet intake.

This research hence presents a dietary model for pregnant women which was designed using the Python programming language and Linear Programming (LP) technique. The model aimed to provide a balanced diet that meets the recommended daily allowances for nutrients during pregnancy.

The results of the model showed that it is possible to achieve a balanced diet with the available food items at Kamukira Health Centre IV, Kabale District Uganda. The model also demonstrated that the cost of the diet could be kept within a reasonable range, making it accessible to a large number of pregnant women.

This dietary model provides a practical solution to help improve the nutritional status of pregnant women at Kamukira Health Centre IV and promote healthy outcomes for both mother and child.

7.1.6 A Text Mining Model for analysing content credibility for Christian Faith-based Media institutions

Oyo Stuart Iginious, Deborah Natumanya

Faith-based media institutions are centers of disseminating information that is run by a

particular religion or operated under its guidelines. Content reliability and credibility has been one of the major challenges when disseminating information especially text to congregation. This study proposes a text mining model for analyzing the credibility of Christian faith-based

Media institutions, developed using Python's Natural Language Toolkit (NLTK) and tested using a confusion matrix. The model utilizes natural language processing techniques to automatically extract and analyze the content of online media sources. The Model considers various factors that affect the credibility of media, including the quality of content, authorship, and reliability of sources.

The model is trained using datasets of articles from various Christian media sources hosted on Kaggle, which are labeled as credible or not credible based on the consensus of a panel of experts and the doctrine basis of Christianity teachings. The model then applies machine learning algorithms to classify new articles or stories based on their credibility.

The results of the study show that the proposed model can accurately classify articles based on their credibility, achieving an accuracy rate of 85%. The confusion matrix shows that the model has a high precision and recall rate, indicating that it can identify credible and not credible articles effectively.

The model also identifies the most important factors that contribute to the credibility of media, including the use of reliable sources, adherence to journalistic standards, and the use of factual and verifiable information with adherence to Christian norms. The text mining model, developed using Python's NLTK and tested using a confusion matrix, has important implications for media consumers, who can use it to evaluate the credibility of Christian media sources more effectively. It can also be used by media institutions to improve the quality of their content and increase their credibility among readers. The researcher suggests that more elements such as incorporating more complex linguistic features, expansion of media types, and accounting for audience perceptions in future development and improvement of the model.

7.1.7 A digitalized Framework for enhancing performance in Dairy Cooperative Unions: A case study of Kiruhura District, NDAFCU

Nuwamanya Isaac, Kawuma Simon

The use of digital technologies has been recognized as one of the great challenges for businesses of the 21st century. This digitalization is characterized by the intensive use of information technologies in the different stages of the value chain of a sector. Digitalization of agriculture is transforming the agricultural sector economically, socially, and environmental sustainability.

A digital innovation process is the use of digital technologies to solve the existing business challenges, in dairy-cooperatives this process results to the provision of necessary data which helps in the decision-making process (Friedman, 2020)

Digital Dairy Cooperative Management Information System, a digital diagnosis tool for processing farmer supply payments, loans management, among several others will therefore be put into use to achieve the research objectives in 4 Dairy Cooperative societies in Kiruhura District. This tool (DDCMIS) was initially applied to one case of Ntungamo Dairy Farmers Cooperative Union- in Ntungamo (NDAFCU) since 2015 which acted a basis to have reliable data to measure its effectiveness in Dairy Production and Performance

The study adopted descriptive survey research design, with a population sample of 75 respondents, where a Digitalized Framework for Dairy Cooperatives was developed, implemented and adopted in 5 Dairy Cooperatives to enhance the performance.

These contributed to a better understanding of A digitalized Framework for enhancing performance in Dairy Cooperative Unions in the context of digitalization.

7.1.8 Towards a framework for Secure Sharing of Patients` Health Records in Uganda: Case of Kabale Regional Referral hospital

Nabimanya Daniel, Ssembatya Richard

Personal Health Record (PHR) is considered as an emerging patient-centric model of health information exchange, where people can share their health information to other people. Security of health records is of paramount importance because they are a sensitive issue. The growth in information and information technologies has resulted into a scenario whereby the health data of patients are affecting the privacy threats.

The purpose of this research was to develop a framework for secure sharing of patients' health records for improving the systems for health caregivers to securely share patients' health records at the Hospital level. Security is one of the most imperative requirements for the success of systems that deal with highly sensitive data, such as medical information. Protecting data in the health care industry is no easy feat. Healthcare providers at Kabale Regional Referral Hospital and their business associates must balance protecting patient privacy while delivering quality patient care.

Patients` health records must be protected, however at Kabale Regional Referral Hospital patients` Health records were not adequately protected due increased number of information leakages to different un trusted persons, this only leave the patients information at risk of being shared to un trusted persons or even get missing without a proper way of keeping and sharing this information. The most important concern refers to security even though medical data is usually subject to a very strict legislation aiming to prevent unauthorized use or disclosure.

The research objective was to design a framework that can improve patients and healthcare givers securely share their electronic health records using internet to facilitate online and devices to facilitate the offline modes. The research requirements conducting interviews and review of related literature in order to determine requirements for the framework by visiting a number of security standards and frameworks used in relation to patients' health records at the hospital level.

The researcher builds a concept of EHLAN that constitutes a network of federated servers located in various departments within KRRH. These federated servers host databases which store patient data. The federated servers are connected to a centralized database server that shall act as a data backup server and a central authentication server for patient data. The validation of the framework for secure sharing of health records was subjected to the team of experts to evaluate its usefulness, usability and usage, as far as enabling secure sharing of patients' health records is concerned.

7.1.9 An Algorithm for Predicting Coffee Prices Using Arima Model

Ahumuza Celia, Pius Ariho

In Uganda, coffee plays an important role in the economy and livelihoods of rural population. Stakeholders have continually faced a problem of price fluctuation in the coffee market. Price fluctuations affect decision making and improvement of coffee in the market. The government of Uganda and the Uganda Coffee Development Authority have tried to solve the problem of price fluctuations in different ways which include, introducing a coffee stabilization tax and encouraging coffee farmers to embrace value addition in order to attract the international market.

Further, several coffee prediction models have been developed to help improve the accuracy of price policy decision and forecasting, however, in Ugandan, price fluctuations continue to get worse requiring concerted efforts. In this study, an algorithm for predicting coffee prices was developed incorporating the Auto Regressive Integrated Moving Average Model (ARIMA). The Algorithm is to simplify the process of finding the optimal parameter values (p,d,q) for the ARIMA model.

Secondary data from the Uganda Coffee Development Authority (UCDA) monthly reports was used. The data involved monthly coffee prices of Arabica and Robusta coffee for the years 2014-2021. CRISP-DM methodology and Python programming language was used. An algorithm for predicting coffee prices was designed and Arabica and Robusta coffee prices for the years 2019,2020,2021,2022 were predicted. The study showed seasonality in the prices and this suggests future researchers working on the same area of study can try to predict using other ARIMA models with seasonality for example SARIMA.

Keywords: Price Fluctuations, Coffee Prices, ARIMA model, Algorithm, Predicting

7.1.10 Towards a Model for E-Banking adoption in Southwestern Uganda: A case of Stanbic Bank (Uganda) Limited

Akampurira Kenneth, Ssembatya Richard

The banking industry in South Western Uganda has embraced the use of a variety of technologies in order to cope with the ever changing technological era.

The increasing developments in information and communication technology has transformed the way banks deliver services to their customers using technologies such as automated teller machines, phones, and the Internet. Banks want their customers to migrate from the traditional brick-and-mortar banking to electronic banking, to ease their transaction processes. However, little research has been done on the adoption and use of these technologies and no model has been developed to-date.

The failure of e-banking adoption and use is attributed to factors such as: limited education of the customers, cultural values, security and privacy, among others.

The research objective was to support the bank by developing a model for the adoption and use of e-banking services in South Western Uganda. By using Stanbic bank (Uganda) Limited as a case, the researcher utilizes a mixture of documents and questionnaires as the data collection methods to determine the factors influencing the adoption and use of e-

banking services.

The sampling frame consisted of 25,690 bank customers and sample size was determined using Krejcie and Morgan (1970) model. Simple random sampling was employed to obtain the study participants.

The researcher reviewed the existing literature concerning the electronic banking systems, including the challenges that hinder bank customers from the adoption and use of e-banking.

The researcher builds on existing theories and concepts on the adoption of new information systems to design a model for e-banking adoption for South Western Uganda.

Pearson's correlation coefficient was used to determine the relationship between the given factors influencing adoption and use of e-banking services and the constructs perceived ease of use and perceived usefulness. Validation results from experts in the banking industry demonstrate that the designed model is applicable in the research settings.

This study contributes to the body of literature about electronic banking, and its results provide useful information for bank managers on how to deal with the challenges encountered. The study was performed with a time constraint and therefore has limitations.

Further study on the adoption and use of e-banking could consider including more variables in the extended TAM model and could consider using a more representative sample.

7.1.11 Radio Frequency Smart Signal Heads Model for Monitoring and Managing Road Traffic

Tayebwa Kazooba Joseph, Fred Kaggwa

Road traffic management is a critical issue in Uganda, impacting the safety and efficiency of road users. However, it frequently gets less attention than more urgent issues like violent crimes, racial conflicts, and protests. The Ministry of Works and Transport, along with the Uganda traffic police and other implementing organizations, are in charge of coordinating the road sector. Despite significant investments in the road sector, the country's road network still falls short of international standards, with a small percentage of roads paved. This inadequate infrastructure, coupled with weak regulatory agencies and poor road maintenance, contributes to traffic congestion and road accidents, negatively affecting the economy.

Although the government has implemented contemporary Information and Communications Technologies (ICTs), such as CCTV cameras and traffic signals, their effectiveness and implementation continue to provide significant obstacles, resulting in a high rate of accidents. Additionally, there is no system in place to keep track of traffic violations, which permits repeat infractions. The use of traffic radar guns and breathalyzer devices by the police has also faced challenges, including insufficient equipment and the ability of drivers to evade detection. The high incidence of road accidents in Uganda has significant socioeconomic implications, resulting in loss of life, permanent disability, and a strain on the country's resources.

This research aims to address these challenges by developing an automated road traffic model that enhances decision-making for penalizing poor road users. The model will utilize radio frequency smart signal heads and incorporate data analysis to improve traffic management and reduce accidents.

The study will be conducted in Kabarole, focusing on the Fort-Portal – Kampala Road,

which has experienced a high number of accidents. The findings of this research will contribute to the improvement of road traffic management in Uganda, leading to safer and more efficient transportation systems.

7.2 MASTER OF SCIENCE IN HEALTH INFORMATION TECHNOLOGY

7.2.1 Medication Adherence and Seizure Remission Prediction Model for Patients with Epilepsy at Mbarara Regional Referral Hospital

Oyesigye Owen, Ariho Pius

Epilepsy is a global burden and accounts for 50 million people worldwide with an estimated 5 million people diagnosed with epilepsy each year. The estimated proportion of the general population with active epilepsy at a given time is between 4 and 10 per 1000 people worldwide. In high-income countries, there are estimated to be 49 per 100000 people diagnosed with epilepsy each year and an estimate of 139 per 100000 people in low- and middle-income countries like Uganda among other sub-Saharan countries, indicating that close to 80% of people with epilepsy live in low- and middle-income countries. The risk of premature death in people with epilepsy is up to 1.6–9.3 times higher than for the general population and three quarters of people with epilepsy living in low-income countries do not get the treatment they need to live a seizure free life due to a number of factors. It is approximated that up to 70% of people living with epilepsy could live seizure-free if properly diagnosed and treated. This study therefore aimed at identifying the factors associated with epileptic seizure attack, examine patients drug adherence patterns using existing patients' records, and formulate a model and its algorithm to predict the likelihood of seizure reoccurrences.

The study was retrospective with data from patients' records at Mbarara Regional Referral Hospital. Data analysis was done to investigate patients' drug adherence and the rate of seizure remissions. The dependent variable was the number of seizure/fits attacks per month (seizure attacks per month) which was a count variable, and the best model for predicting and describing the number of seizure attacks was the Poisson regression model. STATA 13.0 was used to analyze the data.

The results indicate that there is a 21% reduction in the incidence rate ratio (IRR) of epileptic seizures as visits (or follow up periods) increase compared with patients who had no visits. According to the confidence interval, the reduction could be as much as 24% or as low as 18% (IRR=0.79; 95%CI [0.76-0.82]; $p<0.001$). The results further indicate that duration of fits among the patients increases the rate of epileptic seizures by 8% (IRR=1.08; 95%CI [1.07-1.09]; $p<0.001$). These results were used to develop a model which can be used to predict the likelihood of seizure reoccurrences among epileptic patients.

7.2.2 A Decision Support Based Model for Assessing Malnutrition among Children at Mbarara Regional Referral Hospital

Keneth Kamugisha, Wilson Tumuhimbise, Angella Musiimenta

The World Health Organization recommends the Community-based therapeutic care (CTC) programs in an effort to improve the nutritional status of malnourished however, available nutritional screening models and algorithms are unsuitable for use by community-based village health (VHT's) team in the assessment of malnutrition due to their complexity, non-user-friendly interfaces and they need extreme IT knowledge to use them. Thus, assessment of malnutrition at community level has been hindered which puts malnourished children at risk of severe malnutrition. The purpose of the study was to design a decision support-based model for assessing malnutrition among children and improve nutrition for children under 5 year.

This study designed and developed a decision-based support model which enables village health team members assess nutrition status among children in rural settings. The researcher reviewed literature about existing malnutrition prediction models and collected data from participants to derive requirements that were used to design and develop the model. The model takes in child's weight for body weight, bilateral edema, suckle status, visible signs of wasting and Medium Upper Arm Circumference (MUAC) as inputs to output predication results. A web-based system was used to test the model and results were compared to results obtained by other existing models. The model catered for all recommended parameters used to assess malnutrition among infants thereby improving accuracy of results. The major contribution of this research is that, the model is able to predict the level of malnutrition, provides recommendation depending on the prediction results. Thus, future work should focus on assessing the impact of the model in malnutrition assessment among communities.