

**MBARARA UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**DIRECTORATE OF RESEARCH AND GRADUATE  
TRAINING**

**POSTGRADUATE BOOK OF ABSTRACTS**

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## **FORWARD**

Welcome to the 27<sup>th</sup> Mbarara University of Science and Technology (MUST) Graduation Ceremony. We shall witness 24 Doctor of Philosophy and 153 Masters Graduands 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 and various Masters Programs of 2 years duration to 3 years in case of Clinical Programs and Doctor of Philosophy. Students spend time in training and education activities which include participation in courses, competence and skills training, seminars, conferences, placements including industrial training and working visits. All programs consist of conducting research resulting in dissertations/theses. The abstracts presented here have been extracted from the primary research carried out by today's graduands.

**Associate Professor Vincent Batwala**

**DIRECTOR**

## **1.0 POSTGRADUATE PROGRAMS**

### **Faculty of Business and Management Sciences**

1. Master of Business Administration

### **Faculty of Computing and Informatics**

1. Postgraduate Diploma in Business Informatics
2. Postgraduate Diploma in Health Information Technology
3. Postgraduate Diploma in Information Systems
4. Masters in Business Informatics
5. Master of Science in Health Information Technology
6. Master of Science in Information Systems

### **Faculty of Interdisciplinary Studies**

1. Master of Arts in Development Studies
2. Master of Arts in Local Governance and Planning
3. Master of Arts in Conflict Analysis and Inclusive Development
4. Postgraduate Diploma in Criminology
5. Postgraduate Diploma in Development Studies

### **Faculty of Medicine**

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

**Faculty of Science**

1. Master of Education in Curriculum, Instruction and Media Studies
2. Master of Education in Educational Administration and Planning
3. Master of Education in Educational Psychology
4. Master of Science in Biology
5. Master of Science in Chemistry
6. Master of Science in Mathematics
7. Master of Science in Physics

**Doctor of Philosophy**

In various disciplines.



## **2.0 DOCTOR OF PHILOSOPHY**

### **2.1 FACULTY OF BUSINESS AND MANAGEMENT SCIENCES**

#### **2.1.1 Credit Facilitation Decisions for Financial Performance: The Case of Agricultural Cooperatives' in Kamwenge and Sheema Districts in Uganda**

**Ahabyoona Faith Mugisha, Jude T. Lubega, Martha Kibukamusoke**

The study sought to establish the relationship between credit facilitation decisions and financial performance of agricultural cooperatives in Kamwenge and Sheema districts in Uganda. To achieve this purpose, the study was guided by four specific objectives namely: (i) To explain the relationship between credit capital sourcing decisions and financial performance of Agricultural Cooperatives in Kamwenge and Sheema Districts, Uganda; (ii) To examine the relationship between credit terms and screening decisions and financial performance of Agricultural Cooperatives in Kamwenge and Sheema Districts, Uganda; (iii) To examine the relationship between credit reporting decisions and financial performance of Agricultural Cooperatives in Kamwenge and Sheema Districts, Uganda; and (iv) To design and evaluate the effectiveness of a decision enhancement credit facilitation approach for agricultural cooperatives. The study contributed to bridging a literature gap on the relationship between credit facilitation decisions and financial performance in agricultural cooperatives utilizing the decision enhancement approach. The study adopted a design science paradigm within a pragmatic philosophy and utilized a convergent parallel mixed methods design. The study targeted a population of nineteen agricultural cooperatives and six were randomly sampled utilizing a multicase method with 116 respondents. Data was collected from randomly selected sample of managers and members of cooperatives from two districts. Quantitative data collected was analyzed using descriptive and inferential statistics. Qualitative data collected was analyzed using thematic content analysis. The correlational results revealed positive and statistically significant relationships between credit capital sourcing decisions and the financial performance of agricultural cooperatives. ( $r = 0.297^{**}$ ;  $p = 0.002$ ). There was a positive and significant relationship between credit terms and screening decisions and financial performance ( $r = 0.489^{**}$   $p = 0.000$ ). Nonetheless, a positive and significant relationship was revealed between credit reporting decisions and financial performance ( $r = 0.301^{**}$   $p = 0.002$ ). However, the regression results indicated that among credit facilitation variables, credit terms and screening (Coeff=0.784, p-value=0.000) had statistically significant positive effect on financial performance. The findings further showed that there was ill-structured decision-making in credit facilitation in agricultural cooperatives, which was explained by low financial performance amongst the agricultural cooperatives. The findings further showed that there was ill-structured decision-making in credit facilitation in agricultural cooperatives, which was explained by low financial performance amongst the agricultural cooperatives. These results guided the extraction of the decision enhancement-approach requirements, which emphasized the ability of the approach to enable optimal credit facilitation decision-making. The requirements facilitated the design of decision enhancement credit facilitation approach using a unified modeling language. The designed approach was implemented into a studio as a six-suited approach called the Decision Enhancement Credit Facilitation Approach (DECFA), using HTML5 and PHP/ MySQL accessible under [www.decfastudio.com](http://www.decfastudio.com). The DECFA was evaluated for usability, measured as ease of use,

usefulness and effectiveness addressing objective four. The evaluation results from randomly selected cooperative participants show that DECFA was easy to use, useful, and effectiveness. These results confirmed that the DECFA was usable. In conclusion, the study established that credit facilitation decision is related to financial performance of agricultural cooperatives. By enhancing credit facilitation decisions using the developed DECFA that was tested and found functional, financial performance should be able to improve likewise. The study recommends that cooperative stakeholders emphasize mechanisms like the DECFA especially in making credit terms and screening decisions if they are to foster improved financial performance.

**Keywords:** Uganda, Agricultural Cooperatives, Credit Facilitation Decisions, Financial Performance

### **2.1.2 Contractor Selection, Monitoring and Performance of Road Infrastructure Projects in Uganda**

**Aloyious Byaruhanga, Benon Basheka, Levi Kabagambe, Medard Twinamatsiko**

Uganda National Roads Authority became operational on 1 July 2008. Its mandate is to improve the management of national roads in Uganda in conjunction with other sector agencies provided for the Uganda Road Sector Framework. However, for over a decade trends show patterns of road infrastructure underperformance. There are reported delays, cost overrun and sub-standard road works. Thus, the study central thesis was to examine the effect of contractor selection, monitoring and PPDA mediation on performance of road infrastructure in Uganda. Specifically, the research objectives were to; examine the relationship between contractor selection and performance; assess the relationship between contractor monitoring and performance as well as assessing the mediating effect PPDA oversight on contractor selection, monitoring and performance of the road infrastructure projects in Uganda. The study adopted a correlational, descriptive and cross-sectional survey design. The study used quantitative and qualitative approaches. The parameters that affect the variable were extracted using exploratory factor analysis with a maximum likelihood extraction method. Data was entered using SPSS V21.0 and analysed with Structural Equation Modeling using AMOS V21.0 to test hypotheses. The regression results reveal a significant positive direct relationship between contractor selection and performance of roads infrastructure projects ( $r = 0.207, p=0.004$ ). Furthermore, there is a significant direct relationship between contractor monitoring and performance of roads ( $r = 0.485, p<0.05$ ); and a positive direct effect of the mediating oversight role of PPDA on performance of road ( $r=0.148, p=0.033$ ). In addition, there is significant regression mediating effect of PPDA on performance via contractor selection ( $r=0.041, p=0.026$ ). However, there is no significant regression mediating effect of PPDA oversight on performance via contractor monitoring ( $r=0.018, p=0.118$ ). Therefore, the study concludes that contractor selection and monitoring have a positive effect on performance and directly affects quality of road infrastructure projects. On the other hand, PPDA oversight mediating effect is more on performance via contractor selection than monitoring. The study recommends a pro-active collaboration between PPDA and UNRA to; [1] focus on contractors' capability rather than eligibility in selection; [2] incorporate the FIDIC contractor monitoring procedures in the PPDA Act; and [3] develop an information sharing mechanism to support decision-making and enhance transparency among agencies involved in road infrastructure development.

**Keywords:** Contractor Selection, Monitoring and Performance of Road Infrastructure Projects

### **2.1.3 Promotions, Information Asymmetry and Consumer Usage Behaviour of Traditional Medicine Users in Central Uganda**

**Nabachwa Sarah, Nixon Kamukama, Nsambu Kijjambu Frederick**

Usage of traditional medicine (TM) continues to grow globally (estimated at 15%-25% annually) despite several developments and advancements in conventional medicine. The increasing demand for TM is projected to attract a USD 5 trillion market by 2050. This alarming shift in paradigm is a little strange, since most TM currently available on the market is devoid of any scientific evidence of safety and efficacy. In fact, there is overwhelming research to show toxicity in TM, which may be related to contaminants such as pesticides, microbes, heavy metals and chemical toxins. Several scholars have labored to explain this phenomenon from various perspectives. However, literature on TM marketing, particularly on TM promotion, TM consumer attitudes and TM information asymmetries is rather scarce. Besides, several theoretical assertions that point to consumer attitudes and information asymmetry as conduits between TM promotions and usage behavior are still empirically lacking. This study therefore set out to establish the relationship between TM promotions, information asymmetry, consumer attitudes and consumer usage behavior of TM users. The study had seven objectives and a qualitative question that captured the TM users' perceptions of the TM promotion and its influence on usage behavior. The study employed a multi-theoretical approach that included; the ABC attitude model, the Signaling Theory and the Attribution Theory. A sequential explanatory (QUANT + qual) design was used on a study population of TM users in the cosmopolitan districts of Central Uganda. Using Cochran's formula for the infinite/unknown populations, a sample size of 369 was selected. Non-probabilistic sampling techniques were used with the help of the National Council for Traditional Healers and Herbalists Association (NACOTHA). A structured questionnaire anchored on a 5-point Likert scale was used for the quantitative survey and a semi-structured interview guide was used for qualitative data collection. Data were analyzed using SPSS statistics/20, SPSS AMOS/23 and Atlas-ti/7. The study tested 7 hypotheses (5 for direct and 2 for indirect relationships). From the bootstrap results, all the 5 direct relationships and their tested hypothesis were supported. ( $\beta=.607$ ,  $t\text{-value}=13.622$ ,  $p<.05$ ), ( $\beta=.796$ ,  $t\text{-value}=25.42$ ,  $p<.05$ ), ( $\beta=.638$ ,  $t\text{-value}=15.835$ ,  $p<.05$ ), ( $\beta=-.494$ ,  $t\text{-value}=-10.873$ ,  $p<.05$ ), ( $\beta=-.393$ ,  $t\text{-value}=-8.173$ ,  $p<.05$ ). The study also established that information asymmetry and consumer attitudes partially mediate the relationship between TM promotions and consumer usage behavior in Central Uganda. Henceforth, this study improves our understanding into new motivations for TM usage. Further, the study recommends a massive community sensitization and warnings on TM promotions, since the potential for information asymmetries in TM promotions is quite large. This study's findings should aid policymakers in their understanding of the influence of TM promotions on the majority Ugandans. This will further guide in the formulation of the appropriate laws and policies on TM promotions.

**Keywords:** Promotions, Information Asymmetry, Consumer Usage Behaviour, Traditional Medicine Users

#### **2.1.4 Time-based manufacturing practices and performance of small and medium factories in Uganda**

**Nickson Nagaaba, Ayebale Dan, Theresa Moyo**

Time-based manufacturing enables firms to improve their performance by reducing lead time and cost of conversion. The critical part of time-based manufacturing is to compete successfully in a rapidly changing environment. In this regard, the need to adopt time-based manufacturing practices ranging from lean, agile to leagile continues to be a pressing one. This assertion was tested using data from sample of 103 small and medium factories randomly selected from Kampala Capital City and Western region of Uganda. Quantitative data collected from factory managers were analysed using regression. In the analysis, the contributions of three practices of lean, agile and leagile manufacturing in improving factory performance were examined. However, the results revealed mixed findings regarding the benefit of adopting individual practice. For instance, the findings indicate that factories exhibiting higher level of agility are able to improve their performance. This implied that as factories strive to improve performance, emphasis is put on integrations of components and processes, collaborative strategies and customer sensitivity to quickly dispose products to the unpredictable market at a less cost. However, within the context of agile manufacturing practice, regression results further revealed that small and medium factories would perform better if they focus more on process and information sharing dimension of agile manufacturing. Surprisingly, the influence of lean and leagile manufacturing was not supported statistically. Overall, the influence of lean and leagile manufacturing revealed statistically insignificant influence perhaps due to the fact that these practices require substantial amount of resource for their successful implementation. However, within the context of leagile manufacturing practice, transshipment revealed a statistically significant effect on factory performance. This finding indicate that insignificance of lean and leagile manufacturing should not be generalized for all factories, probably as small and medium factories expand their scale of operation, they should pay attention to promoting lean and leagile manufacturing. Based on the findings, the study recommends that managers of small and medium factories need to understand the characteristics of their customers and vitalize their agile competencies to gain competitive advantage in ever-changing environment.

**Key words:** Time-based Manufacturing, Agile, Lean, Leagile and Performance

#### **2.1.5 Artisanal Gold Mining and the welfare of Miners in Buhweju and Mubende Districts in Uganda**

**Herbert Nabaasa, Epiphany Picho Odubuker, Willy Ngaka**

Artisanal Gold Mining (AGM) is an important economic activity that underpins the welfare of many people worldwide (ILO 2001). Despite the importance of AGM, the major focus in Sub-Saharan Africa has traditionally been on large-scale mining and the welfare of artisanal gold miners particularly the trends relating to their health, income and food security are less known or documented (Collier, 2010). In order to examine the relationship between Artisanal Gold Mining (AGM) and the Welfare of Miners in selected districts in Uganda, a descriptive cross-sectional

study design employing both qualitative and quantitative methods with the principles of epistemological pragmatism was used. (Stahl, 2003; Sol.H.G & Gonzalez R.A (2012), Wynn, 2001). 384 respondents were selected from artisans, AGM leaders and district technical officers. Data was collected using questionnaires and an interview guide.

The findings indicated a strong correlation between the variables of interest determined using odds ratio and 95% confidence intervals. Particularly, the nature of AGM, the AGM role and AGM business significantly affected the welfare of miners in terms of their income, health and food security. It was also established that the AGM was not properly executed as a business to improve the miners' welfare and as a result, their per capita income is well below the national figure and this is exacerbated by lack of mining rights coupled with limited decision making on AGM income.

The conclusion is that the nature of AGM; the AGM business; and the AGM roles significantly affect the welfare of miners in selected districts in Uganda in terms of their incomes, health and food security. It is thus recommended that AGM should be improved through proper regulation and formalization. AGM should be executed as a business through provision of mining rights to artisans while AGM incomes should be improved through proper registration and formalization. Finally, the involvement of children in AGM should be restricted; while the AGM roles should be harmonized to minimize income disparities and reduce wasteful and luxurious consumptive behaviors among the artisans.

**Keywords:** Artisanal gold mining, welfare of miners.

### **2.1.6 Human Resource Management Practices and Performance of Small-Scale Enterprises in Uganda**

**Mukiibi Benard, Willy Ngaka, Epiphany Picho Odubuker**

Human Resource Management (HRM) is a strategic approach to an effective management of people in organizations so as to help them gain competitive advantage and enhance performance outcomes. Whereas this is true in big organizations, there has been very little focus on small-scale enterprises, especially in Uganda. Focusing on five HRM practices namely, employee resourcing, rewards management, training, performance management and career management, the study critically examined whether identified five HRM practices inspire the performance of small-scale enterprises in Uganda. The study although anchored in resource based theoretical reasoning lens, also used three other important theories which included: Ability, Motivation and Opportunities (AMO) theory, Human Capital theory and Reinforcement theory to understand and analyze the influence of HRM practices on performance of small-scale enterprises. Drawing from two philosophical assumptions (positivism and interpretivism paradigms), performance of Small-Scale Enterprises (SSE) is real and is perceived differently from management perspective. As such, the researcher adopted a sequential triangulation approach mixed method of quantitative and qualitative to collect and analyze data. With the aid of a descriptive cross-sectional research design, the study used self-administered questionnaires to collect quantitative primary data from a random sample of 378 enterprises across the country. In-depth interviews were also used to collect qualitative information from key enterprise employees. Quantitative data was analyzed using SPSS while qualitative data was analyzed using NVIVO statistical computer packages. The regression model estimations revealed that among the five HRM

practices, employee training rewards management and employee resourcing revealed statistically significant effect on the performance of small-scale enterprises. The study findings supported the resource-based theoretical assertion that competitive advantage of a firm comes from human resource management practices as its key internal resources. However, there was no sufficient evidence to show that career management and performance management significantly influence small scale enterprise performance. The study concludes that the concerted efforts are needed towards promoting small scale enterprise performance outcomes by institutionalizing the key human resource management practices such as; employee training rewards management and employee resourcing to inherently boost the competitive advantage in Ugandan context. The study recommends that human resource managers of small-scale enterprises should increase their budgets to improve human resource management practices especially for employee training, resourcing and rewards management to enhance performance outcomes in competitive and dynamic environment.

**Keywords:** Human Resource Management Practices, employee training, rewards management, employee resourcing, Performance, Small-Scale Enterprises in Uganda

### **2.1.7 Change Management Practices and Performance of Selected Local Governments in Eastern Uganda**

**Wilfred Kokas Aupal, Willy Ngaka, Epiphany Picho Odubuker**

The creation of Local Governments in Uganda was envisaged to bring increased quantity and quality of services nearer to the communities; however, there is an ongoing debate on how this can be achieved as service delivery still remains a challenge. This study was undertaken to investigate the relationship between change management practices and the performance of selected local governments in Eastern Uganda. Change management practices (executive support, effective communication and employee involvement) constituted the independent variable, while performance of selected local governments (quantity of service and quality of service) represented the dependent variable. The study was guided by three research objectives and three research hypotheses. Pragmatic philosophy, cross-sectional research design was adopted using mixed approaches. Data was collected from 36 local governments, using 268 participants as unit of inquiry for quantitative data and 5 informants for qualitative. Quantitative data was analyzed using SPSS computer software version 22. Pearson product moment correlation and regression results were used to test the research hypotheses and the influence of the predictor on the outcome respectively. Qualitative data analysis was done using thematic content analysis. The findings revealed that executive support, effective communication and employee involvement ( $r = .464, P \leq .01$ ), ( $r = .757, P \leq .01$ ) and ( $r = .362, P \leq .05$ ) respectively have a strong positive relationship with performance of selected local governments in Eastern Uganda. The findings also revealed that variation in all the independent variables combined caused up to 56.7% variation in performance. The study concludes that effective communication is the key contributor to performance of local governments in Eastern Uganda. It is therefore recommended that stakeholders need to critically pay attention to change management practices especially effective communication so as to improve performance of Local Governments.

**Keywords:** Change management, Executive support, Effective communication, Employee involvement, Performance, Local Governments, Eastern Uganda

### **2.1.8 Financing advantage, Price discrimination, Transaction costs and Trade credit supply among Manufacturing Firms in Uganda**

**Joseph Baleke Yiga Lubega, Benon Basheka, Theresa Moyo, Frederick Nsambu Kijjambu.**

The purpose of this study was to examine the relationship between financing advantage, price discrimination and transaction cost factors on trade credit supply among manufacturing firms in Uganda and an understanding of how they are mediated by repayment behavior. The study objectives were to establish the relationship between financing advantage, price discrimination plus transaction costs and trade credit supply among manufacturing firms in Uganda. The study also examined the mediating effects of repayment behavior between financing advantage, price discrimination, transaction costs and trade credit supply among manufacturing firms in Uganda. The study adopted cross-sectional research design using both quantitative and qualitative approaches. The study involved a population of 118 manufacturing firms of which a sample 91 was selected and formed the unit of analysis. A total of 273 respondents were sampled and 226 returned the questionnaires. After data cleaning, quantitative data was analyzed using Statistical Package for Social Sciences (SPSS) v. 20 and Smart PLS. Bootstrapping method was used for mediation analysis and NVivo software was employed to analyze qualitative data. The analysis of the study was conducted using both regression analysis to establish linear effects and Structural equation model (SEM) to examine simultaneous and moderation effects in the model. Pearson correlation coefficient and regression analysis were run to establish the direction, strength, significance and associative causal relationship between the variables. The study findings revealed that financing advantage and transaction costs hold a relationship with trade credit supply activities. On the other hand, price discrimination has no association with trade credit supply in these firms in Uganda. Furthermore, it was also found out that repayment behavior plays a mediation role in the financing advantage-trade credit supply and transaction costs trade credit supply anticipated linkages. The study therefore recommends that manufacturing firms should put more emphasis on financing and transaction costs. Similarly, much as price discrimination does not predict changes in firm trade credit supply, firms should not disregard it in their planning process. Likewise, firms should give adequate consideration to client repayment behavior since it plays mediation part in the trade credit supply structure.

**Keywords:** Financing Advantage, Price Discrimination, Transaction Costs, Trade Credit Supply, Repayment Behaviour and Manufacturing Firms

## **2.2 FACULTY OF INTERDISCIPLINARY STUDIES**

### **2.2.1 Women's Land Rights and Household Food Security in Uganda; a Case of Bushenyi District**

**Prudence Kemigisha, Stella Kyohairwe**

The thesis assesses the conceptual linkages between women land rights and household food security in Uganda taking a case of Bushenyi district. The study employed the capability theory

of justice which was complemented by the empowerment theory to; analyze the factors that limit women from owning, accessing and controlling land in Bushenyi District, examine the implications of limited women's land rights on household food security and propose strategies for narrowing the gender gap in land rights for improved household food security.

A case study research design was adopted and data was collected from 147 respondents using stratified sampling procedure to get household heads, purposive sampling for key informants and snowball for focus group discussants. Data was triangulated and analyzed thematically. The study indicates that customary tenure is the most prevalent tenure system. Women access land through four modes which include; family land, market economy/purchase, donations, and inheritance though they face limitations ranging from informal/normative, contextual, and formal/statutory factors.

The study indicates that food insecurity exists in the district and with limited women's land rights; there is less investment on land due to insecure tenure security, reduced female time and labour share in food production, limited women's involvement in livestock farming and limited involvement in household food security decisions. The situation is worsened by women's low education levels, limited access to agricultural extension services, changes in weather patterns, crop pests and diseases, plus the heavy production and reproduction work load. The study recommends that women's capabilities to obtain and defend their land rights should be strengthened. There should be increased utilization of the existing land legal legislations, aid and services. There is thus need of commitment from the government to ensure an enabling social, legal, economic and political environment in order to narrow the gender gap in land access, ownership and control. An approach that addresses the gender gap in the agricultural sector would help to boost agricultural productivity and this would translate into household and national food security.

**Keywords:** Women Land Rights, Food Security, Households

### **2.2.2 Intra-Household Gender Relations in Accessing Agriculture Extension Services for improved Livelihood: The Case of the first beneficiary households of NAADS in Kabale District**

**Peace Mbabazi, Charles Tushabomwe-Kazooba, Godfrey Asimwe**

This study looks at the influence of intra-household gender relations in access to Agricultural Extension Services (AESs) for improved rural livelihoods as a pathway to long term poverty reduction in the four NAADS pioneer beneficiary Sub counties of Bubare, Bukiinda, Ikumba and Maziba in Kabale District. It analyses gender based relational differences prevailing between men and women in a household (HH) in the creation and recreation of livelihoods through AESs. We recognize that agricultural interventions anticipate improved livelihoods through a bottom-up approach that provides a leeway for the success of micro, meso and macro level strategies. The study used a mixed method approach with cross sectional and exploratory research designs. Data collection was through documentary review, Focus Group Discussions (FGDs), HH surveys, Key Informant (KI) interviews and observation checklist. A structured interview guide was



administered on 127 farmers using a HH as a unit of analysis and 11 KIs purposively selected from the four Sub-counties. This study argues that intra-HH gender relations among the Bakiga people of Kabale District are situated within a patriarchal setting which exhibit men's dominance over women's decisions in major spheres of life which affects equal access to AESs. The study reveals that although AESs have been in operation in the district for over a decade, their existence has not transformed rural livelihoods majorly due to unequal gender relations which are embedded in the Bakiga's patriarchal system. The study notes that the extension system is "gender blind" and agents/workers pay little attention to the gender relations which are skewed in favour of men even when women are the key actors in agriculture crop production and reproduction. HH and micro-level extension structures are also anchored onto the patriarchal power setting thus obscure how women and men access production resources in their HHs in pursuit of different livelihood streams.

A HH is a basic production and consumption unit and an entry point for development interventions yet it is governed by unequal power and authority. There is unequal distribution of resources and responsibilities among principle members which affects access to AESs and outcome on livelihoods. Whereas the security of a HH livelihood depends on rights of both men's and women's access to and control over resources, women are marginalized. The study argues that HH livelihood outcomes depend on rewards of co-operation as well ideologies of common or divided interest and that equal gender relations in access to AESs translates into positive livelihood outcomes. This study posits that information, inputs and credit facilities will not fully achieve their goals unless women and men are on equal footing, able to make rational livelihood decisions unhindered by gendered interactive barriers. The study seeks creative solutions to the spread of equitable technical advice to principle small holder producers and critical examination of the composition of AESs structure. AESs should thus, penetrate HHs, deconstruct the patriarchal system and empower women who are the principle actors in pursuit of improved livelihood.

**Keywords:** Household gender relations, Agriculture Extension Services, Livelihood, NAADS

### **2.2.3 Integrating Indigenous Agricultural Knowledge into Modern Agricultural Practices for Sustainable Rural Household Food Security in Uganda**

**Milton Rwangire, Roberts Muriisa Kabeba**

Food security is a major concern of the global development Agenda as reflected in Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs). Globally 2 billion people are food insecure and the situation is on a rise especially in developing countries. The Modern Agricultural Practices (MAP) being promoted has not solved the situation. The Indigenous Agricultural Knowledge (IAK) that has sustained food production, access and utilization in developing countries is not recognized in food security strategies. Uganda's food security situation is alarming; nearly half of Uganda's 7.3 million households are food insecure. More than 90% of the food produced in Uganda is by peasant farmers and depend on IAK, but there are no formal interventions that seek to encourage people to use it.

This study was carried out in Isingiro District, South Western Uganda in the 3 Sub Counties of Masha, Kabingo and Kabuyanda that were purposively selected. Food security is a major challenge facing the district and more than 95% of the people struggle to produce food through IAK. The implementation of Millennium Village Project in the district did not change the situation.

The study employed a case study research methodology, but priority given to qualitative methods. 102 respondents were interviewed that included; farmers, local leaders and key informants. Three Focus Group Discussions were held in each sub-county where data was collected from. The findings indicated that the district was experiencing both chronic and acute food insecurity. The main causes of food insecurity included poverty, extended dry seasons, lack of granaries and lack of government enforcement. The IAK practices used included terrain and soil selection, intercropping, weather forecasting, seed selection, sun drying, use of local pesticides and control of banana bacterial wilt. The MAP used included; spraying, planting of hybrid seeds, use of fertilizers and preservation of beans grains using lindane dust. Regarding integration of IAK and MAP, the study revealed that there was a conscious integration of both, but more IAK being used.

The study concludes that IAK was applied by most of the people and it was contributing greatly towards the four pillars of food security of availability, access, utilization and stability in the district. The study recommends that it should promote and one way of doing it is integrating it into MAP. Lastly, the study came up with a six step frame work that can be applied to integrate IAK into MAP to ensure sustainable food security at rural house hold level in Uganda.

**Keywords:** Indigenous Agriculture Knowledge, Food Security, Modern Agricultural Practices

#### **2.2.4 Oil Discovery and Land Compensation: Risks and Vulnerabilities to Women Livelihoods and Agency Response in Albertine Graben, Uganda**

**Specioza Twinamasiko, Frank Ahimbisibwe, Katja Werthmann**

The discovery of oil and gas resources in many developing countries, and the fear of the resource curse syndrome that is associated with oil exploitation have renewed the research interest into effective management of oil resources. This study set out to examine the impact of oil discovery and land compensation dispossession to women's livelihoods and their agency responses in the Albertine Graben in Uganda. Specifically, the study addressed four objectives; to examine land compensation processes during displacement and resettlement, to analyse the livelihoods status of women affected by land compensation dispossession and resettlement, to investigate the risks and vulnerabilities to women's livelihood associated with land compensation and, to explore women's agency responses to land dispossession and resettlement in the Albertine Graben.

The study adopted the qualitative research method using a phenomenological study approach in order to have in-depth understanding of the lived experiences of women during land compensation and dispossession. Purposive sampling was used to select women in six particular categories. Data collection methods included in-depth interviews, focus group discussions,

observation and documentary reviews. Inductive data methods of analysis were used. Triangulation and respondent validation strategies were applied to test data quality and reliability. Key study findings are: women livelihoods were negatively affected by land compensation because of the immediate outcome being loss of land. Women experienced livelihood risks and vulnerabilities differently determined by the form of compensation their households opted for. To a larger extent, women from polygamous marriages who belonged to the resettled households and, those who belonged to cash compensation but did not obtain alternative land, experienced severe livelihood risks and vulnerabilities. Women's participation in compensation process in all aspects was limited. Women actively applied agency responses either individually or collectively to mitigate the impact of land dispossession and, only women who were able to pick up positively are those that had stable marriages and families. A large number of women in Hoima district were severely affected than those in Buliisa because of the differences in land tenure systems, forms of compensation applied and the implementation process.

The study concludes that, for stability of society, compensation and dispossession of land can mainly be by resettlement compensation category since it works best for most women as it ensures the basic natural and physical capital necessities for immediate survival and unity of core family which is the pillar of a stable society. The study recommends a gender inclusive compensation policy that caters for both men and women and, the government to specifically deliberate support in form of tangible and intangible assets such as resettling women who are landless and providing homes to the homeless.

**Keywords:** Agency, compensation, Oil discovery, risks, vulnerabilities, women livelihoods

## **2.3 FACULTY OF MEDICINE**

### **2.3.1 Tuberculosis sputum smear completion and treatment success rate in the Teso region, rural eastern Uganda**

**Jonathan Izudi, Imelda. K. Tamwesigire, Francis Bajunirwe**

**Introduction:** Tuberculosis (TB), the leading infectious cause of death globally, has the highest-burden in sub-Saharan Africa (SSA) where TB programs show variable treatment success rates (TSR) and continental pooled TSR data are lacking especially for persons with bacteriologically confirmed pulmonary TB (BC-PTB). In the Teso sub-region of eastern Uganda, most districts show wide differences in TSR which has been attributed to inadequacies in sputum smear monitoring (SSM) but data to support this hypothesis are limited. The objectives of this study included: to systematically review and summarize TSR among adult persons with BC-PTB in SSA (Objective I); to determine factors associated with the completion of SSM among adult persons with BC-PTB in eastern Uganda (Objective II); to determine the effect of completing SSM on TSR among adult persons with BC-PTB in eastern Uganda (Objective III); and, to describe and compare factors shaping low and high TSR across districts in eastern Uganda (Objective IV).

**Methods:** In objective I, electronic databases namely, MEDLINE, EMBASE, Google Scholar, and Web of Science were searched, data were abstracted, and TSR was pooled with the DerSimonian-Laird random-effects model and presented in a forest plot with a 95% confidence interval (CI) and predictive interval (PI). Heterogeneity was assessed with Cochrane's Q-test and quantified with I-squared values. Objective II used a mixed-methods study design. Quantitative data were abstracted from TB unit registers while qualitative data were obtained through key informant interviews with healthcare workers and in-depth interviews with persons with BC-PTB and respective treatment supporters. Quantitative data were analyzed with modified Poisson regression analysis and reported as risk ratios (RR) with 95% CI. Qualitative data were transcribed verbatim and analyzed using a thematic content approach. Objective III used a quasi-experimental study design created using propensity score-matched (PSM) analysis. Completers and non-completers of SSM were matched in a 1:1 ratio. Logistic regression analysis was performed on matched and unmatched samples and the odds ratio (OR) with 95% CI reported. Objective IV used a qualitative study design. District TB and Leprosy Supervisors, District Laboratory focal persons, and health facility TB focal persons were interviewed as key informants. The data were analyzed using a thematic content approach.

**Results:** In objective I, 31 studies involving 18,194 participants were meta-analyzed. The pooled TSR was 76.2% (95% CI, 72.5-79.8%), with 95% PI of 50.0-90.0. The studies meta-analyzed were heterogeneous ( $I^2$  statistics = 96.9%) and findings are robust. TSR declined between 2008 and 2018 but without statistically significant time trend variation ( $p=0.444$ ). In objective II, of 817 persons with BC-PTB, 226 (27.7%) completed SSM. The factors independently associated with SSM completion included having a treatment supporter (adjusted risk ratio (ARR) 2.40, 95% CI, 1.23-4.70), and treatment at a district (ARR 1.61, 95% CI, 1.04-2.49) or regional referral hospital level (ARR 2.00, 95% CI 1.46-2.73), and every additional year since 2015 (ARR 1.29, 95% CI 1.17-1.43). The reasons for incomplete SSM included health systems, patient, treatment supporter, and healthcare provider factors. In objective III, of 817 participants, 185 SSM completers were matched to 185 SSM non-completers, balanced on all baseline covariates. In PSM analysis, SSM completion was associated with increased odds of cure (OR, 87.00; 95% CI, 12.12-624.59) but not TSR (OR, 1.67; 95% CI, 0.40-6.97). In objective IV, the facilitators of TSR included: data use for decision making and designing TB interventions, continuous quality improvement to address gaps in TB care, capacity building for health workers, and prioritizing the better management of people with TB. The barriers to TSR included: lack of motivated and dedicated TB focal persons, scarcity of funds for implementing TB activities, and poor implementation of the community-based directly observed therapy short-course strategy.

**Conclusions and recommendations:** The TSR in SSA is heterogeneous and suboptimal, necessitating country and context-specific interventions. In eastern Uganda, few persons with BC-PTB complete SSM so they should be encouraged to have treatment supporters and the lower-level health facilities should be targeted with interventions. Completion of SSM impacts on cure rate so persons with BC-PTB should be encouraged to complete SSM. The facilitators of and barriers to TSR should be the main focus for the district TB control programs in improving treatment outcomes.

### 2.3.2 Barriers and facilitators to the integration of mental health services into primary healthcare: a case study of Mbarara district, southwestern Uganda

Edith K. Wakida, Elialilia S. Okello, Zohray M. Talib

**Background:** Implementation Research is the scientific study of methods to promote the systematic uptake of clinical research findings into routine practice. The World Health Organization (WHO) has heavily invested in health promotion globally by developing policy recommendations to guide clinical practice. They issued recommendations to guide the process of integrating mental health services into primary health care (PHC). However, mental health at PHC level has not been realized in most countries including Uganda.

**Overall aim:** was to evaluate the uptake of mental health services into PHC and explore the PHC providers' ability to perform the integration. The following were the specific objectives: (i) To synthesize evidence on barriers and facilitators to integration of mental health services into PHC (global review), (ii) To explore context specific barriers and facilitators related to the integration of mental health services into PHC by PHC providers in Mbarara, Southwestern Uganda and establish possible strategies to address them, and (iii) To develop a systems policy educational intervention to improve the PHC providers' uptake of the Uganda Clinical Guidelines (UCG) in integrating mental health services into PHC and assess its feasibility and acceptability.

**Methods:** To address *Objective I*, a synthesis of global literature to document barriers and facilitators to integration of mental health services into PHC was done. *Objective II* was a cross-sectional exploration of the PHCPs perceptions about barriers and facilitators to integration of mental health services into PHC. In-depth interviews were used to collect data and thematic analysis approach was used to analyze the data. *Objective III* involved implementation of a one group before and after intervention; qualitative methods were utilized to assess PHC providers' perceptions about the feasibility and acceptability of the intervention.

**Results:** In *Objective I*: the common factors identified were around attitudes regarding program acceptability, appropriateness, and credibility; knowledge and skills; motivation to change; management/leadership; and financial resources. The perceived barriers identified in *Objective II*: included: Capability - inadequacy in knowledge about mental disorders; and that consulting the Uganda Clinical Guidelines (UCG) was burdensome. Opportunity - limited supply of hard copies of the UCG; guidelines not practical for local setting; and no sensitization about the UCG. Motivation –the PHC providers did not feel self-reliant; did not see the UCG at their health facilities; and no regulatory measures. While in *Objective III*: Key results showed that the PHCPs liked the summarized UCG and noted that they were time saving and *user friendly*; the Modified Registers were appreciated because modifications were made to the existing record; and they attributed the success of the intervention to the training and support supervision they received from *the mental health specialists*.

**Conclusion:** understanding the context in which the PHC providers operate (i.e., volume of patients seen, providing user-friendly/simplified clinical guidelines, support supervision); making provision in the patient registers for collecting mental health indicators; and empowering PHC providers at all levels to manage and treat mental health problems and only refer when it is

inevitable are important factors to promoting integration of mental health services into PHC. This research received funding from Makerere-Sida bilateral Research Cooperation.

**Keywords:** barriers and facilitators, integration of mental health services, Uganda Clinical Guidelines, systems policy educational intervention.

### **2.3.3 Chemical Characterization and Property-Based Structural Modification of Potential Anticancer Drug Leads from *Eichhornia crassipes***

**Andrew Glory Mtewa, Duncan Sesaazi, Kennedy Ngwira, Fanuel Lampiao**

**Background:** Plants such as *Eichhornia crassipes* require thorough exploration in cancer drug discovery. The aim of this study was to isolate, characterize and modify some promising compounds from both the leaves and roots of the plant in order to have analogs with more promising drug-like properties for oral drug development.

**Methods:** Compounds from the plant were identified and subjected to cytotoxicity assays on Breast cancer cell lines (MCF-7) and hepatocellular carcinoma cell lines (HepG2). ADMET properties were determined using in silico experiments. Analogs to selected compounds were synthesized and ligand-protein interactions of two analogs were evaluated.

**Results:** 23 compounds were isolated, 11 of them were elucidated for structures. Compounds 13-20 were isolated from the plant for the first time and compounds 22 and 23 could be novel from plants in general. The 6 analogs synthesized from compound 18 were also novel and two of them had improved properties for better oral bioavailability. Analogous compounds 24 (N-(4-fluorophenyl) isoquinolin-3-amine) and 25 (N-(4-(trifluoromethyl) phenyl) isoquinolin-3-amine) had acceptable activity, ADMET and PK properties and were binding to human MTHFS and VEGFR2 better than doxorubicin.

**Conclusion and recommendation:** Not all the active compounds from the plant have acceptable pharmacokinetic properties and logical modification of the structures is necessary to improve these properties as well as potency. More studies beyond the extract form of the plant are warranted to fully understand the mode of action of various compounds. **Funding:** The World Bank through the PHARMBIOTRAC, MUST, Mbarara, Uganda; and the Wellcome Trust through the Center for Anti-infective Research, University of Dundee, Scotland

**Keywords:** *Lipophilicity, Molecular docking, Buchwald-Hartwig animation, Ligand Efficiency, Pharmacokinetics, Inhibition constant, Active transport, Oral drugs, NMR spectroscopic techniques*

### **2.3.4 Antibacterial effect and safety of extracts from *Echinopskebericho* Mesfin TUBER Serawit Deyno Chorito, Paul E. Alele, Joel Bazira, Eyasu Makonnen**

**Background:** *Echinopskebericho* Mesfin is traditionally used for the treatment of various infectious and non-infectious diseases. This study investigated safety and antibacterial activity of extracts of *E. kebericho*. The most active antibacterial compound against methicillin resistant *S.*

aureus (MRSA) was isolated. The combinatory effect of the isolated compound and the essential oil (EO) with standard antibacterial drugs were evaluated.

**Methods:** Systematic review was done to produce evidence on efficacy of EOs against topical infections. Chromatographic and spectroscopic methods were respectively used to isolate and identify most active compound. Acute and repeated-dose toxicity studies of decoction and EO were conducted respectively in rats and mice. Minimum inhibitory concentration (MIC) against selected bacteria was determined using broth microdilution. Checkerboard and isobole analyses were used to determine interactive effects.

**Results:** From systematic review, EOs showed significantly lowered level of new MRSA emergence and good efficacy against topical fungal infections and acne. Single oral dose of *E. kebericho* M. decoction and EO showed no mortality up to 5000mg/kg and 2000mg/kg respectively, and no significant treatment-related abnormalities were observed in repeated dose administration. MIC of EO against selected bacteria ranged from 78.125 µg/ml – 625 µg/ml. Ethyl acetate fraction compared with other fractions showed better activity against methicillin resistant *S. aureus* (MRSA) (MIC = 39.075 µg/ml). The isolated compound was identified to be dehydrocostus lactone and showed MIC of 19.53µg/ml against MRSA. An equal (1: 1) or nearly equal (2:3) ratios of dehydrocostus lactone to gentamicin or ciprofloxacin showed synergistic effect.

**Conclusion:** *E. kebericho* M. decoction and EO are well tolerated in rat and mice. Dehydrocostus lactone is the most active antibacterial constituent of the plant ethanol extract which could be a potential antibacterial lead for optimization. It has a synergistic effect against MRSA when combined with ciprofloxacin or gentamicin. The EOs could be viable option for topical infections if supported with further studies. **Funding:** World Bank through Pharm-Biotechnology and Traditional Medicine Centre (PHARMBIOTRAC), African Center of Excellence II

**Keywords:** Safety, herbal medicine, antimicrobial resistance, resazurin assay, minimum inhibitory concentration, combined effect.

## 2.4 FACULTY OF SCIENCE

### 2.4.1 Modeling Peculiar Plasma Structures in Accretion Discs around Magnetized Neutron Stars

**Habumugisha Isaac, Edward Jurua, Solomon B. Tessema, Simon. K. Anguma**

Accretion discs occur around strong and weakly magnetized stars in a variety of astronomical objects. The interaction between a magnetized, rotating star and a surrounding accretion disc has been of great interest and is known to cause changes in spin. The changes in spin are a result of torque reversal and are a very interesting phenomenon that can explain the variations in spin frequencies of some astronomical objects. In this thesis, a self-consistent rigorous theoretical

model was developing for the steady-state of an axisymmetric thin quasi-Keplerian accretion disc with an internal dynamo surrounding a magnetized star. A complete structure (temperature, pressure, surface density, optical depth and magnetic field) for a strongly and weakly magnetized neutron star was obtained having assumed a full quasi-Keplerian disc with the azimuthal velocity deviating from the Keplerian fashion by a factor  $\xi$  ( $0 < \xi < 2$ ). In this approach, fluid equations were vertically integrated and the radial component of the momentum equation was used to obtain the radial pressure gradient equation for a thin quasi-Keplerian accretion disc. The results showed that at large radial distance, the accretion disc behaves in a Keplerian fashion. But, close to the neutron star, pressure gradient force (PGF) largely modified the disc structure, resulting into sudden dynamical changes in the accretion disc. The resulting PGF torque couples with viscous torque to provide a spin-down torque (when  $\xi < 1$ ) and a spin-up torque (when  $\xi > 1$ ). The quasi-Keplerian disc model was extended to a millisecond pulsar (MSP) by dividing the disc into three regions: inner, middle and outer regions. By assuming that the disc matter flows in a quasi-Keplerian motion, analytical equations for a complete structure of a quasi-Keplerian thin accretion disc and PGF were derived. Interestingly, the results obtained revealed that PGF results into episodic torque reversals. Finally, a linear stability analysis was done by developing the time-dependent fluid equations. The analysis of the solutions showed that the flow was found to be unstable whenever  $\xi > 1$ . **Sponsor:** East African Astronomical Research Network (Funded by SIDA through ISP)

Supervisors:

**Keywords:** Accretion discs, Neutron Stars, Pulsar, quasi-Keplerian, Torque reversal.

## 2.4.2 Gas Giant Planet Formation via Pebble Accretion

**Nelson Ndugu, Edward Jurua, Bertram Bitsch, Alessandro Morbidelli**

With the ever increasing statistics of exoplanets, it is now possible to test planet formation models. Within the planet formation models, the most accepted model is the core accretion paradigm. In this model, a bottom top process is followed with accretion of either km-sized particles (planetesimals) or cm-sized particles (pebbles). In the pebble-based core accretion planet formation models, the core growth is faster than in its planetesimal-based counterpart. Following the pebble-based core accretion paradigm, the core initially accretes pebbles until it reaches the pebble isolation mass, where it stops accreting pebbles and instead accretes gas. In addition, the core interacts with the host disc and undergoes orbital migration. Using the pebble-based core accretion paradigm, we performed simulations of gas giant planet growth by varying the important initial conditions of planet formation and compared the emerged planet population to debiased exoplanet statistics. We found that in order to match the gap structures, observed in protoplanetary discs via ALMA, 2000 Earth masses in pebbles is needed, which would only be available for the most metal rich stars. In addition, planet formation in discs with these large amounts of pebbles result in mostly forming gas giants and only very few super-Earths, contradicting observations. This leads to the conclusions that: (i) the observed massive discs are exceptions, (ii) not all gaps in observed discs are caused by planets and (iii) we miss some important ingredients in planet formation related to gas accretion and/or planet migration. Furthermore, we found that taking gas accretion from the horseshoe region



Into account allows an earlier gap opening that results in less inward migration of growing planets. Furthermore, this effect increases the planetary mass compared to simulations that do not take the effect of gas accretion from the horseshoe region into account. In addition we find that with the dynamical corotation torque, which arises from the migration of the planet itself, merged to the effect of gas accretion from the horseshoe region, inward migration of the planet is significantly slow. Taking these effects into account could allow the formation of cold Jupiters (a >1 au) closer to the water ice line region compared to previous simulations that did not take these effects into account. In addition, we found that the different disc models are important in explaining the giant exoplanets by comparing the location and the influence of ice lines, supposedly the birth place of planets in many models. Our model found that hot, warm and cold giant exoplanets have preferential starting position in their natal discs, approximately corresponding to the  $H_2O$ ,  $CO_2$  and  $CO$  snow regions, respectively. **Sponsor:** MUST-ISP (Funded by SIDA through ISP)

### **2.4.3 Searching for Coronal Mass Ejections on M stars: A potential Threat to Terrestrial Planet Habitability**

**Priscilla Muheki, Edward Jurua, Eike W Guenther, Tom Mutabazi**

Flares and Coronal Mass Ejections (CMEs) are very energetic events in which energetic radiation and particles are ejected within a short time. These events can strongly affect planets that orbit stars on which these phenomena occur. This is particularly relevant for planets of M-stars, because this type of stars stays active for a long time during their evolution and yet potentially habitable planets orbit at a short distance (< 0.4 AU). Exoplanet habitability depends on many factors and most are still poorly understood. One such factor is space weather due to stellar CMEs. Unfortunately, detections of CMEs on M stars have been sparse. Previous studies have modeled the occurrence frequency of CMEs on M stars by scaling up solar relations. However, because the topology and strength of the magnetic fields on M stars is different from that of the Sun, it is not obvious that this approach works well. In order to learn more about flares and CMEs and their relation on M-stars, the active M-stars AD Leo which is viewed nearly pole-on and EV Lac viewed equator-on were monitored spectroscopically at high resolution. More than 2000 and 700 high-resolution spectra for AD Leo and EV Lac respectively were obtained. Using these data, the behaviour of the spectral lines  $H\alpha$ ,  $H\beta$ , and He I 5876 was studied in detail and asymmetric features that might be Doppler signatures of CMEs investigated. On AD Leo, 22 flares were detected and the largest flare emitted  $8.32 \times 10^{31}$  erg in  $H\beta$  and  $2.12 \times 10^{32}$  erg in  $H\alpha$ . An average flare rate of  $\sim 0.092$  flares per hour was obtained. Although the spectral lines in the largest event and other events showed a significant blue asymmetry, the velocities associated with them were far below the escape velocity of AD Leo. For EV Lac, 27 flares were found during the 127 hours of spectroscopic monitoring corresponding to a flare rate of 0.21 flares per hour. The flares had energies between  $3.8 \times 10^{31}$  erg and  $1.4 \times 10^{32}$  erg in  $H\alpha$ . The analysis of the spectra showed that not only the flux of the Balmer lines and the He I  $D_3$  line increased during the flares but also the He II 4876 line appeared during the impulsive phase of some flares. In three particularly large flares a continuum source with a temperature between 6 900 and 23 000 K was detected.

EV Lac was also monitored photometrically by TESS. From the TESS observations, 49 flares were detected during the 457 hours of observation with energies between  $6.3 \times 10^{31}$  and  $1.1 \times 10^{33}$  erg. The statistical analysis showed that the ratio of the energy emitted in H $\alpha$  to the continuum flux in the TESS-band is  $10.408 \pm 0.001$ . No clear CME event was found in the flares indicating that these must be very rare in active M-stars. However, in one relatively weak event, an asymmetry in H $\alpha$  of  $\sim 220 \text{ km s}^{-1}$  was found and interpreted as the signature of an erupting filament. Using the microphysics code cloudy C17.0, the size of the emitting region and physical parameters of the flares were modeled. The loop heights of the flares were found to be compact  $\leq 0.4 R_{star}$  but could extend to  $2 R_{star}$ . The obtained electron densities are in the range  $10^{11} - 10^{12} \text{ cm}^{-3}$ , and hydrogen column densities in the range of  $10^{18} \text{ cm}^{-2}$ . The flares covered a total area of  $\sim 10^{19} \text{ cm}^{-2}$ . Although these M dwarfs show a relatively high level of flare activity, we did not detect any CME. It is thus not appropriate to use the same flare-to-CME relation for M dwarfs as for the Sun. In this scenario, the impacts of space weather, and its potential detrimental effects, would be partially, if not completely, alleviated relative to current expectations.  
**Sponsor:** MUST-ISP (Funded by SIDA through ISP)

#### **2.4.4 Irregular Plasma Densities and Scintillations at Low Latitudes: The Case of Satellites and Ground-based Stations**

**Sharon Aol, Jurua Edward, Buchert Stephan**

Ionospheric irregularities are a common phenomenon in the ionosphere, especially at low latitudes. Their presence in the ionosphere may cause disruptions in radio signals, referred to as scintillations. Scintillations are a threat to radio signal tracking and this in turn leads to degradation in position, navigation, and timing solution accuracy. The scintillations due to ionospheric irregularities can be measured using ground-based detectors. However, in spatial scope, ground-based observations are sparse and the use of space-based measurements for scintillation monitoring is a good alternative. This thesis focused on examining ionospheric irregularities using electron density measured by the European Space Agency (ESA) Swarm satellites at a rate of 16 Hz, for the years from 2014 to 2018, when the data were available. The Swarm observations were compared with scintillation events recorded by ground-based instruments to demonstrate the ability of the in-situ measurements to study the origin of scintillations. In particular, a direct comparison of space-based Swarm observations of ionospheric irregularities and ground-based amplitude scintillation recorded over single stations was done. A statistical comparison between the two phenomena over the low latitude region was also carried out. The amplitude scintillation strength, characterized by the S4 index, was also estimated from the 16-Hz electron density data using the well-known phase screen model for weak scattering. The results obtained show that there was a good agreement between ground-based observations of scintillations and the level of disturbance of electron density for most Swarm passes. The estimated scintillation index was on average lower for Swarm B than for A and C and less in accordance with the observed range. Irregularities at an altitude of about 450 km contribute strongly to scintillations in the L-band, while irregularities at about 510 km altitude contribute significantly less. The findings indicate that fluctuations of Swarm in situ electron density observed meridionally along magnetic field lines passing over or near a ground site may be used to indicate the risk that ionospheric radio wave scintillations occur at a specific

site. The Swarm A and C electron density estimates provide a suitable statistical proxy for L-band scintillations. **Sponsor:** MUST-ISP (Funded by SIDA through ISP)

#### **2.4.5 Modeling the Total Electron Content and vertical E×B drifts over the African low latitude region**

**Valence Habyarimana, Patrick Mungufeni, John Bosco Habarulema**

Meteorological processes, such as tides, influence ionospheric variability through vertical coupling. Using data from Communication/Navigation Outage Forecasting System (C/NOFS) satellite from 2008–2015 a Neural Network (NN) vertical E×B drift model over the African region was developed, with inclusion of a proxy of tides as one of the inputs together with other physical and geophysical inputs. Two models, with and without tidal proxy input were developed for both East and West African sectors. To derive the tidal proxy, the 60-day running means per year were first calculated and subtracted from the actual vertical E×B drift measurements to obtain a set of residuals. The purpose of the subtraction was to remove long-term trends in vertical E×B drift that could potentially alias into tides. A Fast Fourier Transform (FFT) was then performed on the residuals per day to obtain amplitudes and phases which were used as tidal proxy representation in vertical E×B drift modeling. The developed model with tides' proxy input showed an improvement of 22.2% and 16.7% based on the Root mean square error (RMSE) over the East (38.8 °E) and West (9.2 °W) African sectors respectively. In most cases, the developed models were able to capture the diurnal patterns of vertical E×B drift including the expected Pre-reversal enhancement (PRE). The performance of the two models during geomagnetically quiet days and storm periods was comparable but not similar. The vertical E×B drift model developed over the East African sector was used in addition to inputs representing diurnal, seasonal, solar activity and geomagnetic activity variations to develop Total Electron Content (TEC) model over Mbarara, MBAR (0.6 °S, 30.74°E; 10.22°S geomagnetic) using Global Navigation Satellite System (GNSS) data from 2001–2015 based on NN technique. The TEC model was validated using independent dataset that was selected from different solar activity periods. Inclusion of vertical E×B drift as an input led to an overall average improvement of 6.4% in TEC modeling. The maximum improvement attained based on Mean absolute error (MAE) was around 13% during the high solar activity period. The correlation coefficient (R) values for models without and with vertical E×B drift input were 0.954 and 0.958 respectively. These results show that availability of ionospheric vertical drift data has the potential of improving future TEC modeling in low latitude regions. The Disturbance polar number 2 (DP2) currents were estimated using EEJ(Dis) which is a proxy index for the variations in electric field. During the main phase of the geomagnetic storms, EEJ(Dis) fluctuated significantly. This was attributed to the influence of additional currents within the magnetosphere during storm times. **Sponsor:** African development Bank – Higher Education for Science and Technology (AfDB-HEST)

#### **2.4.6 Jackfruit (*Artocarpus Heterophyllus*) Varieties, Nutritional Content and Utilization In Uganda**

**Justine Nakintu, Julius Bunny Lejju, Christian Albrecht, Eunice A. Olet, Morgan Andama**

This study presents the first investigation on population genetics of jackfruit varieties grown in Uganda contributing to the pool of the already investigated crops of Uganda. Jackfruit (*Artocarpus heterophyllus* Lam.) has been cultivated in some parts of Uganda for its fruits but little is documented about its diversity, varieties, distribution, usage, consumer preference, and nutritional status of genotypes available in the country. Besides, it is facing two antagonistic human selection pressures of tree cutting as well as selective planting that threaten the genetic diversity of the crop. Therefore, the current study was conducted to determine the ethno-varieties of jackfruit, their distribution, morphological and molecular diversity, nutritional status in relation to soil physical-chemical composition as well as the consumer preference for ethno-varieties. This research study was carried out using socio-economic and bio-physical research approaches. The socio-economic data were collected using pre-tested semi-structured questionnaires on a total of 449 respondents (205 traders, 144 farmers and 100 consumers). The bio-physical approaches involved field morphological descriptor analysis of 249 jackfruit trees, molecular and nutritional laboratory experiments. The molecular genetic diversity analysis was done on 200 samples; 197 collected in Uganda and three out groups from Asia using 10 Simple Sequence Repeat Markers (SSR). This study found out that jackfruit is mainly grown in the Central and Eastern political regions which include the Lake Victoria Crescent and Mbale Farmland (LVCMF) as well as the Southern and Eastern Lake Kyoga Basin (SELKB) agro-ecological zones. Four jackfruit varieties (Kanaanansi, Namata, Namusaayi and Serebera – Luganda local names) were identified based on fruit texture and pulp/flake colour. Twelve (12) utilization categories of jackfruit were registered, of which consumption as human food was the most outstanding (Use equitability value, UE = 1). The sweet taste, big sized and brightly coloured pulp (red/orange and yellow) and low latex of Namusaayi and Kanaanansi, positively influenced consumers' fruit choices of these varieties and consequently, their willingness to purchase them as compared to the others. Within Uganda, morphological ( $H' = 1.03$ ,  $h_2 > 60\%$ ) and molecular ( $H_e = 0.79$ ,  $I = 1.71$ ) analyses revealed high diversity among the jackfruit varieties grown in Uganda. The close relationship of morphological traits of jackfruit samples from the Central region shared with those from Eastern and Western political regions depicted the Central region as the epicenter of jackfruit germplasm in Uganda, which was also confirmed by molecular analysis. The study found genetic linkages between the Ugandan and Asian jackfruit varieties since one Ugandan cluster was significantly similar to out groups of Asian origin ( $F_{ST} = 0.064$ ,  $p = 0.134$ ). The mineral, vitamins, proximate and phyto-nutritional components of jackfruit showed both variety and locality variations. Jackfruit samples from the Western region were nutritionally richer than samples from Eastern and Central ( $p < 0.001$ ). Among the determined varieties, Namata was nutritionally the most balanced variety with the highest amount of K (254.88 mg/100 g), total carbohydrates (333.0 mg/100 g), reducing sugars (233.9 mg/100 g) and tannins (8.0 mg/100 g) showing nutritional superiority despite being inferior on the market. The nutritional properties of jackfruit analyzed had coefficients of variation greater than 20 % and the minerals (K, Mg, Fe and Zn) registered significant positive correlations with the soil physicochemical parameters ( $r > 0.14$ ,  $p < 0.05$ ). Higher jackfruit genetic diversity was recorded in the Southwestern Grass Farmlands (SWGf) agro-ecological

zone than LVCMF and SELKB zones. In addition, the genetic diversity of the firm variety ( $H_e = 0.77$ ,  $I = 1.75$ ) was higher than that of the soft variety ( $H_e = 0.74$ ,  $I = 1.57$ ), portraying the existence of genetic bottle necks created as farmers substitute the soft variety with consumer-friendly varieties of Namusaayi and Kanaanansi. Similarly, farmers in the agro-ecological zones of Lake Victoria Crescent and Mbale Farmlands and Southern and Eastern Lake Kyoga Basin might be selecting jackfruits with consumer superior qualities hence lowering the crop's genetic diversity for the nutritionally important varieties in these zones, a special conservation concern of the jackfruit germplasm.

**Keywords:** Artocarpus heterophyllus, consumer preference, distribution, ethno-varieties, local usage, morphological and genetic diversity

#### **2.4.7 Tungiasis predisposing factors, prevalence and evaluation of methanolic plant extracts for potential Tungapenetrans control in Busoga sub region, Eastern Uganda**

**Amatre Gerald, Prof Julius J. Lejju, Morgan Andama**

Tungiasis, an inflammatory skin disease caused by infection with the female ectoparasitic sand flea (*Tunga penetrans*), is a Neglected Tropical Disease (NTD) usually associated with poverty and poor hygiene. Tungiasis is endemic in many parts of Africa, the Caribbean and South America. In Uganda, it is endemic in many parts of the country, but most cases are reported in Busoga sub-region in Eastern Uganda. Tungiasis causes disfigurement and hinders engagement in productive economic activities. The aim of the study was to explain susceptibility of individuals to sand flea infection in Busoga sub-region based key predisposing factors and evaluate extracts from locally available plants for possible control against sand fleas. Off-host fleas were trapped from residences of infected persons; their composition described, and factors associated with flea abundance were examined. Area preference method was used to assess the repellency of sand fleas by the plant extracts. Insecticidal property was assessed by topical application of the extracts on sand fleas in laboratory. Regression analysis was done to assess the association of household characteristics with flea abundance. Chi-square ( $\chi^2$ ) statistics was used to test differences in infection across demographic divides at 95% confidence level. Analysis of Variance (ANOVA) was used to compare repellency of sand fleas by extracts. Three flea species were identified, with the commonest being cat fleas (*Ctenocephalides felis*) (50%), followed by sand flea (*Tunga penetrans*) (46%) and rat fleas (*Xenopsylla Cheopis*) (4%) respectively. Flea abundance significantly correlated with occupation of household heads, floor, and wall surface types. Male persons in all age categories were more infected by tungiasis than females. The methanolic plant extracts from *Mentha viridis*, *Ocimum basilicum* L., *Rosmarinus officinalis* L., *Mondia whitei* (Hook. f.), *Eucalyptus grandis* W.Hill, *Cymbopogon citratus* (DC.) Stapf were effective in repelling and killing *T. penetrans* in laboratory setting. The highest repellency ( $IR=0.2$ ) was observed in *Mondia whitei* (Hook. f.) and *Eucalyptus grandis* W.Hill while the least repellency ( $IR=0.96$ ) was recorded in *Cymbopogon citratus* (DC.) Stapf extract. Therefore, home improvement campaigns should be continued to control Tungiasis in Busoga and these plants be exploited further to control sand fleas.

**Keywords:** Busoga, Methanolic Extracts, Predisposing Factors, Tungiasis.

#### **2.4.8 Freshwater molluscs of Congo River Basin: evolution, biogeography and biodiversity** **Wembo Ndeo Oscar, Christian Albrecht, Grace Kagoro, Alidor Kankonda B**

The Congo River Basin (CRB) - a vast region in equatorial Middle Africa that lies between the Gulf of Guinea and the African Great lakes contains unprecedented biodiversity. But, even after more than a century of aquatic (hydrobiological) research in the world, knowledge is still scanty in this part of Africa. In order to address pertinent knowledge gaps, this thesis was initiated with the aim of investigating biogeographically and evolutionary patterns of freshwater molluscs' biodiversity of the CRB, a global hotspot of aquatic biodiversity. Three general objectives were targeted, (1) freshwater mollusc of Congo River Basin: biodiversity, threats and conservation assessment of selected taxa, (2) the mollusc fauna of the Lukuga-Lualaba systems: tracing the origin of the enigmatic thalassoid molluscs of Lake Tanganyika, and (3) evaluating rapids and falls as sources for adaptive radiations and biogeographical barriers for riverine molluscs. The combination of ecological, distributional, phylogenetic and population genetics data sets allowed addressing adequate specific questions for each of the specific objectives using case studies.

Habitat status and human pressure trends were studied for a riverine snail taxon of the family Pachychilidae, the genus *Potadoma*, in the Central Congo River region. The results showed the presence of four *Potadoma* species out of six species formerly described for the region. The scarcity of specimens and the ongoing changes of the habitats were explained by the anthropogenic pressure due to deforestation, mining and untreated wastewaters on the freshwater ecosystems, particularly in the river Aruwimi where all stations described as dominated by rocks and stones substrates by the latter authors were found dominated by a bank of sand. The alarming outcomes of the IUCN assessment for *Potadoma* species and the consumption and trade business made with *Potadoma* species reiterate the call for urgent conservation activities.

Tracing the origin of thalassoid (=marine-like) endemic gastropods of Lake Tanganyika revealed that such species also occur living in the Lukuga river as far down as 95 km from the lake. Based on mitochondrial DNA sequences, these populations are partially genetically distinct from Lake Tanganyika's populations. Furthermore, our results indicate that the evolution of the unique species assemblage of Lake Tanganyika involved adjacent riverine systems (Malagarasi, Lukuga, Lualaba...). These systems should be studied more intensively in the future. Finally, in order to show what explains better mollusc community compositions, our survey at the Wagenia Falls on the Congo river revealed no direct influence of a barrier such as falls or rapids on snail community composition but of substrate type (e.g. rock, stones, sand, detritus...). Downstream-directed dispersal explained the highest fraction of variation in mollusc communities. Thus, environmental factors, the indirect cataract effect, and downstream-directed spatial proxies acted together to model mollusc community composition.

Based on the current results there is an immense need for more intense field research efforts on freshwater systems and molluscs in particular. At the same time, strategies for sustainable use and management and long-term conservation of freshwater resources and biodiversity are of urgent importance.

**Keywords:** Congo River Basin, freshwater molluscs, biodiversity, biogeography, evolution, conservation.

## **3.0 MASTERS PROGRAMS**

### **3.1 FACULTY OF MEDICINE**

#### **3.1.1 MASTER OF MEDICINE IN ANESTHESIA**

##### **3.1.1 Seven day outcome of resuscitated post cardiac arrest patients at Mbarara Regional Referral Hospital**

**Alum Rachel Aguma, Ttendo Stephen, Joseph Kyobe Kiwanuka**

**Background:** Cardiac arrests can occur in any location within the hospital and are associated with high morbidity and mortality even when resuscitation is attempted. Common etiologies of CAs, factors associated with survival, survival rates and neurologic outcomes have been postulated but none of these is known for MRRH. In an attempt to describe the situation at MRRH, we conducted a longitudinal study to provide data on the seven day outcome of resuscitated cardiac arrest patients at MRRH.

**Methods:** We conducted a seven day prospective cohort study with from 29<sup>th</sup> May to 2<sup>nd</sup> December 2019 of in-patients who had an index cardiac arrest in theatre, ICU, the pediatric or emergency ward. Data was collected using questionnaires administered by interviewing the leader of the resuscitation team. Survivors were followed up for up to seven days post cardiac arrest or until, death, discharge or loss to follow up; whichever occurred first. Data collected comprised patient demographics, factors associated with CA survival as well as neurologic outcome of survivors at seven days.

**Results:** Majority of the 74 participants were male (66.2%), aged 12-49years (48.65%). Most cardiac arrests recorded occurred in the ICU. Seven day survival was 14.86% with a survival to discharge rate of 5.41%. Hypoxia in 63.01% and hypotension in 46.58% were the commonest causes of CA reported. The factors significantly associated with seven day survival were location of index arrest, duration of CPR and post arrest hypotension, Compared to the emergency ward, the HRs for ICU, theatre and pediatric ward were 0.34;  $p=0.01$ , 0.06;  $p<0.01$  and 0.24,  $p=0.04$  respectively. The HR for CPR duration greater than 20 minutes was 3.02,  $p<0.01$  and 2.27,  $p=0.02$  for duration between 10- 20 minutes when compared to CPR lasting less than 10 minutes. Post arrest, normotension was associated with decreased mortality with a HR of 0.26.  $p=0.02$ . Majority of the survivor at day seven post CA had a CPC score of 1-2.

**Conclusion:** Seven day survival of resuscitated CA patients at MRRH is 14.86% with good neurologic outcome; CPC score 1-2. Index CA on the pediatric ward, in ICU or the operating theatre, CPR lasting less than 10 minutes and absence of post arrest hypotension were significantly associated with seven day survival

#### **3.1.2 MASTER OF MEDICINE IN DERMATOLOGY**

##### **3.1.2.1 Prevalence, etiology and clinical presentation of annular skin lesions among Patients attending the skin clinic at Mbarara Regional Referral Hospital**

**Masanta Evans Bosire, Mugisha Peter Sebishimbo, Mirembe Stephen Kizito, Mulyowa Grace Kitunzi**

**Background:** Diabetes mellitus is now one of the commonest non-communicable diseases in the sub-Saharan countries. Patients with diabetes are prone to develop skin conditions because of the metabolic derangements, complication of the disease or the treatment used. Despite many patients suffering from these skin conditions, little information is available on their prevalence and frequencies. This is because in most cases they are either under diagnosed or ignored.

**Aim:** To determine the prevalence and clinical manifestations of skin disorders among patients with type 2 diabetes attending MRRH.

**Methods:** A cross-sectional hospital-based study was done at MRRH diabetic clinic where consecutive sampling was done until we achieved the desired sample size. A questionnaire was administered to establish the demographics as well as duration of Diabetes Mellitus and the treatment. History taking and physical examination were done to identify the skin conditions present. Data was analysed using Stata Version 12.0 software. Statistical analysis was done using student “t” test and chi-square test to test for relationship between skin disease and sex, age and duration with diabetes.

**Results:** Of the 421 patients, 161 had skin disorders giving an overall prevalence of 38.2%. The males were more affected than females (F: M=1:1.4). The mean age was 57.4 ( $\pm$ 9.84) years and the most affected age group was 46-60yrs. There was no statistically significant difference between patients with and those without skin disorders in reference to age, gender and duration with DM. Majority of the patients presented with either itchiness as their symptom (45.3%) or no symptoms at all (39.8%). The commonest skin conditions encountered were: Pruritus (31.58%), fungal infections (23.98%) followed by xerosis (19.88%). Of all the patients with skin disorders only 7.8% had consulted a dermatologist for treatment.

**Conclusion:** Skin disorders are very common and have different variants among patients with DM in our set up. It is necessary to actively screen patients with DM for the skin diseases and start them on appropriate treatment. The association of skin disease and quality of life in DM needs to be explored.

### **3.1.2.2 Prevalence, clinical presentation and factors associated with seborrheic dermatitis among patients attending skin clinic at Mbarara Regional referral Hospital**

**Said Hassan Mohamed, MugishaPeter Sebishimbo, Mulyowa Grace Kitunzi**

**Background:** Seborrheic dermatitis (also known as Dandruff) is one of the scalp conditions. Dandruff It is a condition of public health concern and reported to affect almost 50% of the world population.

**Aim:** To determine the prevalence, clinical presentations and factors associated with seborrheic dermatitis among patients attending the outpatient department of dermatology in Mbarara Regional Referral Hospital



**Materials and Methods:** This was a cross sectional study conducted at MRRH skin western Uganda. Patients were consecutively recruited until the sample size of 1,035 was obtained. Patients were assessed with clinical presentation and associated factors. Data analysis was done using Stata 14.0. Descriptive statistics, bivariate and multivariate logistic regression were used.

**Results:** Of the 1,035 patients enrolled, the prevalence of seborrheic dermatitis was 21%. Most patients presented with itching (20.9%) and scaling (20.5%). A majority of patients presented on scalp (20.5%) and periauricular areas (18.5%). Patients who had aged <24 years were less likely to have SD compared to patients that were older than them [225-29 years, AOR = 2.1, (95%CI: 1.43-3.16, P<0.01; 30 years+, AOR = 1.7, (95%CI: 1.16-2.46, P= 0.01)]. Likewise, patients who were students were more likely to have SD compared to their counterparts [Housewife, AOR= 0.5, 95%CI: 0.30-0.93, P =0.03; Self-employed; AOR= 0.6, 95%CI: 0.43-0.89, P =0.01; Business; AOR= 0.5, 95%CI: 0.26-0.93, P =0.03]. Patients who had stress were likely to have SD compared to patients that did not have stress AOR = 2.7, (95%CI: 1.28-5.87, P= 0.01). Likewise, HIV positive patients were more likely to have SD compared to the HIV negative (AOR= 4.5, 95%CI: 2.05-10.04, P <0.001). Further still, patients who had epilepsy were more likely to be associated with SD compared to those that did not have it. In other words epileptic patients were 1.1 times more likely to suffer from SD compared to non-epileptic patients (AOR =7.4, 95%CI:1.74-31.64, P= 0.01).

**Conclusion:** There a relatively high prevalence of seborrheic dermatitis, mostly among patients who were diagnosed with age, occupation, HIV, stress and epilepsy. Thus, the study recommends a need to sensitize the most at risk persons.

### **3.1.2.3 Prevalence, etiology and clinical presentation of annular skin lesions among Patients attending the skin clinic at Mbarara Regional Referral Hospital**

**Uwase Sada, Mulyowa Grace Kitunzi, Mugisha Peter Sebishimbo, Mirembe Stephen Kizito**

**Background:** Annular lesions are common in daily clinical practice, but can cause diagnostic challenges due to their diverse etiologies and clinical presentation; leading to inappropriate management. Few studies have been conducted in Uganda on prevalence, etiology and clinical presentation of annular skin lesions.

**Objectives:** To determine prevalence, etiology and clinical presentation of annular skin lesions among patients attending dermatology clinic at Mbarara Regional Referral Hospital in Uganda.

**Methods:** A cross-sectional study of 658 patients attending the dermatology clinic at Mbarara Regional Referral Hospital was conducted over a period of 6 months. Physical examination was done and 124 patients were clinically diagnosed with annular lesions. Skin biopsy was subjected to histology using H&E and PAS (9.7%)

**Results:** Of 658 patients enrolled, annular lesions were found among 124 patients (18.8%). Female: Male ratio was 2.2:1 and the age group 18-29 years was the most affected (50.8%). Psoriasis (33.1%) was the commonest etiology of annular skin lesions in adults, followed by

Pityriasisrosea (25.8%) and Lichen planus (21%); while Tinea corporis accounted for 9.7% of all annular lesions. These presented with well-defined margins (91.9%), and raised centre (82.2%). The predominant distributions were extensor surface of the upper limbs (75.8%), back (77.4%) and extensor surface of the lower limbs (77.4%).

**Conclusion:** Annular lesions are common in daily clinical dermatological practice; with a prevalence of 18.8% at MRRH skin clinic. The commonest etiologies are Psoriasis, Pityriasisrosea and Lichen planus in adult population. The predominant clinical presentations are well-defined margins and raised centre and the predominant distributions are extensor surfaces of the upper limbs, back and extensor surfaces of the lower limbs.

### 3.1.3 MASTER OF MEDICINE IN EAR, NOSE & THROAT

#### 3.1.3.1 Proportion and factors associated with Globus Pharyngeus among adult patients with throat symptoms attending the ENT clinic at Mbarara Regional Referral Hospital

**Abdifatah Hassan Mohamed, Nakku Doreen, Jamila Nabukenya**

**Background:** Globus pharyngeus is a state of persistent or intermittent sensation of a lump, or constant throat clearing. Approximately 46% of healthy persons suffer globus pharyngeus symptoms, and has been shown to account for up to 4% of new referrals to otolaryngologists. However, there's limited published data on the global prevalence and psychological status of patients with globus pharyngeus. Therefore, this study aims to document the proportion of globus pharyngeus, its associated factors and psychological status of adult patients.

**Methods;** this was a cross-sectional study conducted at the ENT clinic at MRRH over a 3 months period. We recruited 48 participants with globus pharyngeus and 54 with other throat symptoms. Data was collected using a structured questionnaire containing information on sociodemographic details, modified Kuppuswamy scale was used to assess the socioeconomic status, and the RSI tool was used to diagnose LPR, while the GHQ12 was used to assess the psychological status.

**Results:** Of the 102 participants, 58 (56.9%) were female and 44 (43.1%) male with a median age of 41.5 years (IQR 28-53). The proportion of globus pharyngeus was 47.1% of adult patients with throat symptoms attending the ENT clinic during the study period. Out of the 102 participants, 42 (41.2%) had LPR while 68 (66.7%) had psychological distress. LPR was significantly associated with globus pharyngeus with  $p=0.004$ , while higher degree of psychological distress was seen among participants with globus compared to those without globus.

**Conclusion:** Globus pharyngeus is associated with laryngopharyngeal reflux and psychological distress is evident among these patients.

### 3.1.4 MASTER OF MEDICINE IN GENERAL SURGERY

#### 3.1.4.1 Indications and factors associated with short term treatment outcomes of tube Thoracostomy among patients presenting at Mbarara Regional Referral Hospital

**Ekoroi John Robert, Alfred Omo**

**Introduction:** Fluid collection in the pleural space following pleural and pulmonary disease and trauma remain a major problem in developing countries. Tube thoracostomy (TT) is a widely used procedure with a remarkable success rate in the treatment of intra-pleural pathologies. However, few data are available on the specific indications and treatment outcomes of tube thoracostomies performed in less resourced centers.

**Methods:** Data collected from the study participants was entered into EpiData and exported to STATA 15 for analysis. Descriptive data was presented in form of tables, pie charts and graphs. Categorical data was analysed using chi-square to determine the relationship between the dependent variables and outcome variables in multivariate analysis (RR; 95% Confidence interval and P value) were used to determine factors associated with outcomes of TT and level of significance was set at p value of less than 0.05.

**Results:** Sixty (60) participants were enrolled in the study with a majority 37 (61.7%) being male with a median age of 42.5 (IQR 26-52.5) and HIV infection was found in 15 (25%) cases. Non-traumatic conditions (pleural effusion and empyema thoracic) accounted for a majority 37(61.7%) of the indications for TT. Most (41.7%) pleural effusions occurred in patients who had pulmonary Tuberculosis. Full lung expansion following TT occurred in only 46.7% of cases. Complications occurred in 53.3% and technical errors accounted for 42 (70%) of the complications with tube dislodgement being the commonest complication occurring in 21(35.0%) cases. In multivariate analysis, chest physiotherapy (risk ratio [RR] 4.07; 95% CI 1.175–6.38, p value 0.039), indications of TT (RR 1.3; 95% CI 1.208–2.543, p value 0.021) and chest tube size (RR 1.5; 95% CI 1.136–2.327, p value 0.042) were associated with full lung expansion.

**Conclusion and recommendations:** Chest tube insertion remains a basic life-saving procedure for both trauma and non-traumatic cases. The majority of indications for chest tube insertion in our setting are non-traumatic medical conditions. Complications rates of TT are high in our setting. The safety of the procedure can be improved by adequate training of residents on the insertion procedure, while proper selection of cases will reduce failure rate and unnecessary morbidity.

**Keywords:** Chest tube; tube thoracostomy; short term treatment outcomes, complications; pneumothorax; haemothorax; pleural effusion; empyema thoracis.

### **3.1.4.2 Correlation between Morphological Patterns and Histological Types of Esophageal Cancer among Patients at Mbarara Regional Referral Hospital**

**Khalid Issack Hassan, Alfred Omo, Samson Okello, Atwine Raymond**

**Background:** The challenge faced by doctors and patients in obtaining an early definitive diagnosis, an essential component for initiating any form of treatment for esophageal cancer is enormous. Several studies have contributed towards a preliminary diagnosis of esophageal cancer by showing a correlation of tumor locations and histological types, subsequent studies demonstrated the existence of regional or community variations of esophageal tumor locations and histological types, other variations of tumor morphology and histological types, making this correlation inconsistent to rely on globally.

**Aim:** We analyzed the morphological patterns and histological types of esophageal cancer among patients presenting at MRRH, assessed for correlation between the two for purposes of establishing any additional tumor characteristics to strengthen the preliminary diagnosis.

**Methodology:** A cross-sectional hospital-based study of morphological patterns and histological types of esophageal cancer at Mbarara Regional Referral Hospital between October 2019-June 2020. Morphological patterns were captured at upper GI endoscopy procedure time, while histological types were recorded from histopathology reports of endoscopic biopsies taken at the same setting. Data were entered into EpiData and exported to STATA for analysis.

**Results:** A total of 130 patients were enrolled between October 2019-June 2020, 95 participants were used in the final analysis for esophageal cancer since the histology turned positive for malignancy. The male to female ratio was 2.63:1. The mean age was 60.3 years with an SD of 14.06. The predominant morphological pattern was ‘protruding fungative’ 50.53%, ulcerative 29.47%, and others comprised of 21.20%. Squamous cell carcinoma (73.68.0%) was the most common histopathological type. The most frequent tumor locations were the lower third esophagus (48.42%) and GE junction tumors (27.37%) while the middle and upper third were 14.74% and 9.47% respectively. Morphological patterns did not show a significant association with histological types.

**Conclusions:** Our study has shown that the predominant morphological pattern and histological types of esophageal cancer presenting at MRRH were ‘protruding fungative lesions and SCC respectively. This initial study shows that protruding fungative morphology and squamous cell carcinoma predominantly occupied the lower third esophagus.

### **3.1.4.3 Indications, patterns and short-term outcome of intestinal stomas at Mbarara Regional Referral Hospital**

**Izimba Daniel, Mutiibwa David, Carlos Carbrera Dreque**

**Introduction:** Intestinal stomas are performed to decompress or divert intestinal contents. Data on their indications, patterns and outcomes varies widely from region to region. The objective of

this study was to describe the indications, patterns, and short-term outcomes of patients with intestinal stomas at Mbarara Regional Referral Hospital.

**Methods:** 52 participants who had intestinal stomas formed at MRRH between January and August 2020 were followed up prospectively for a period of 30 days from the time of stoma creation. Details including age, sex, and education level, smoking history, comorbidities, emergency or elective surgery were documented. The type, indication, and short-term outcome were also recorded by trained research assistants and the principal investigator.

**Results:** The mean age of participants was 27.8 years (SD  $\pm$  25.8 years), the male: female ratio was 4.2:1. Most stomas were placed for non-traumatic gut perforation (19.23%) and double barrel was the most commonly constructed stoma (25%). The proportion of complications was 28.8% and the most common complication was skin excoriation (33.3%). The majority (66.6%) of complications occurred within 2 weeks of stoma formation. Non traumatic gut perforation was the commonest indication for intestinal stoma and double barrel colostomy was the most commonly performed intestinal stoma. The incidence of complications was favorably comparable with other studies and skin excoriation was the commonest complication. Improving stoma nursing care by availing stoma appliances and training stoma nurses may reduce the occurrence of complications. The study received funding from the First Mile program of MGH.

#### **3.1.4.4 Aetiology, Clinical Presentations and Short-Term Treatment Outcome of Extrahepatic Obstructive Jaundice at Mbarara Regional Referral Hospital**

**Odongo Charles Newton, Carlos Manuel Cabrera Dreque, David Mutibwa, Situma Martin**

**Background:** The fundamental problem met while handling patients with prolonged extrahepatic biliary obstruction is the accurate diagnosis which becomes difficult at times because the clinical features and biochemical investigation may be atypical. Many times, hepatocellular damage and mechanical obstruction coexist making the diagnosis much more difficult. Systematic data are limited on the etiology and prognosis of patients with obstructive jaundice. The objective of the study was to determine the etiology, clinical presentations, and short-term treatment outcome of patients presenting with Extrahepatic Obstructive Jaundice at Mbarara Regional Referral Hospital.

**Methods:** The observational prospective cohort study of patients who presented with extrahepatic obstructive jaundice at Mbarara Regional Referral Hospital was performed. The study period was from September 2019 to May 2020. The study was approved by institutional ethics committee. Informed consent and assent was taken from all the study participants. Data were collected both from study participants and patients files. A pretested, structured questionnaire was used to collect data. The data was entered in EpiData then analyzed using state 15.0 versions.

**Result:** Seventy-two cases were recruited into the study. None was lost to follow-up. Pancreatic cancer was the commonest aetiology, 20 (27.78%), followed by cholangiocarcinoma, 13 (18.06%). 5 (6.94%) were duodenal cancers, and 4 (5.56%) patients had gall bladder cancer.

Choledocholithiasis was the commonest benign cause, 10 (13.89%) followed by Biliary Atresia, 7 (9.72%). The commonest clinical presentation of patients were Right Upper Quadrant Tenderness 67 (93.1%), Abdominal Pain 65 (90.3%) and Clay Colored Urine 55 (76.3%). Loss of Appetite, Body itching, Clay colored stool, abdominal distension, Scratch marks and Courvoisier's sign were more common in malignancy with a P value < 0.05 at 95% CI. Cholecystectomy 11 (25.58%) and cholecystojejunostomy + JJ 8 (18.6%) were the commonest procedures performed. Mortality rate was 29.17% in the study, of which malignancy carried the highest mortality 20 (95.24%).

**Conclusion:** The commonest cause of Extrahepatic Obstructive Jaundice in adults in this study was cancer head of pancreas. The commonest clinical presentations of patients were Right Upper Quadrant Tenderness, Abdominal Pain and Clay Colored stool. Cholecystectomy and cholecystojejunostomy + JJ were the commonest procedures performed. Mortality rate was 29.17%.

### **3.1.4.5 Patterns and short-term outcome of children with major congenital anterior abdominal wall defects at Mbarara Regional Referral Hospital**

**Jamal Abade Mohamed, Martin Situma, Felix Oyania**

**Background:** Congenital anomalies account for 10% of World neonatal deaths, with neonates in low- and middle-income countries (LMICs) being unevenly affected. Major congenital abdominal wall defects (CAWD) may account for up to 21% of emergency neonatal interventions in the LMIC setting. There is limited data on the pattern of CAWD in Mbarara Regional Referral Hospital (MRRH). Therefore, this study aimed at describing the patterns and short-term outcomes of gastroschisis and omphalocele MRRH.

**Methodology:** A case series was conducted at MRRH for ten months. Children born with CAWD during the study period were consecutively recruited into the study. Data were entered, cleaned, and analyzed using Stata version 15. Descriptive statistics were performed where continuous variables were summarized using median and interquartile ranges, while categorical variables were summarized using frequencies and proportions. Time to mortality was assessed using Kaplan–Meier survival analysis.

**Results:** A total of 54 newborns were recruited into the study, of which 40 (70.04%) had Gastroschisis and 14(25.93%) had omphalocele. The median age of the infants was 9 days with an interquartile range of 4 to 21days.

Of the 54 newborns, 30(69.2%) were male within the age group of 1-10 days. Mortality was higher in babies with complex gastroschisis (22) than simple gastroschisis(10). Not administering antibiotics and low birth weight were the factors associated with mortality among infants diagnosed with gastroschisis and omphalocele in the neonatal period.

**Conclusion:** The most common observed defect was gastroschisis, Mortality was generally high among children presenting with gastroschisis. Complex gastroschisis has a poorer prognosis than simple gastroschisis over 30 days follow up period. Non-use of antibiotics before referral to a health facility and low birth weight were the factors associated with mortality among infants diagnosed with gastroschisis and omphalocele in the neonatal period.

### **3.1.5 MASTER OF MEDICINE IN INTERNAL MEDICINE**

#### **3.1.5.1 Clinical Characteristics and Predictors of good Treatment Response in adults with aggressive Non-Hodgkin Lymphoma at Mbarara Regional Referral Hospital (MRRH)**

**Obwoya Paul Stephen, Sekitene Semei, Nuwagira Edwin**

**Background:** The incidence of Non-Hodgkin lymphoma is increasing, related mortality and morbidity in Sub Saharan Africa is high, data on clinical characteristics and predictors of good response to treatment is scanty and unknown in Uganda. The aim of this study is to determine the clinical characteristics and predictors of good treatment response (complete response and partial remission) in adults with aggressive NHL at MRRH.

**Methods:** We retrospectively reviewed charts of adult patients with aggressive NHL at MRRH treated with CHOP in the period from January 2013 to March 2020. Baseline socio-demographic, clinical characteristics and treatment response at 6 months was collected. Data was analyzed using STATA version 13; descriptive statistics was used to describe clinical characteristics. To determine the predictors of good treatment response we ran a competing risk model using the adjusted multivariate cause-specific proportional hazard model with death and lost to follow up as the competing risk. Approval from MUST research and ethics committee (REC) was obtained.

**Results:** We enrolled 120 adult participants, > 18 years of age. At baseline, the median age was 45 IQR (26-63.5), 70 (58.3%) of the patients had an ECOG performance status  $\geq 2$ , 85(70.8%) had advanced disease (stage III and IV) and 86(71.6 %) had B-symptoms. Bulky disease was present in 45(37.5%) participants. Extra nodal disease was present in 62(51.6%). During the retrospective follow up period, 33 participants died, 16 got lost to follow up and 71 participants were evaluated for response. Of the participants evaluated for response 72% had good response to treatment in 6 months. Positive HIV status aHR 3.49(95% C.I 1.56, 7.82) p=0.002), absence of bulky disease aHR 4.6, (95% C.I 1.30, 16.29) p=0.018), normal serum LDH aHR 2.93 (95% C.I, 1.36, 6.30) p=0.006), absence of bone marrow involvement aHR 7.59, (95% C.I 1.36, 46.32) p=0.021), remained independent significant predictors of good treatment response at multivariate analysis.

**Conclusion:** In aggressive NHL adult patients at MRRH who attained good treatment response absence of bone marrow involvement, normal serum LDH, absence of bulky disease and positive HIV status predicted good treatment response. Future studies to describe factors predictive of NHL good treatment response with emphasis on the HIV positive population is recommended.

#### **3.1.5.2 Incidence and predictors of acute kidney injury among HIV-positive patients presenting with sepsis to the medical emergency ward of Mbarara Regional Referral hospital**

**Davis Kimweri, Julian Ategeka, Faustine Ceasor, Winnie Muyindike, Edwin Nuwagira, Rose Muhindo**

**Background:** Acute kidney injury (AKI) is a frequently encountered clinical condition in critically ill patients and is associated with increased morbidity and mortality. In our resource-limited setting (RLS), the most common cause of AKI is sepsis and volume depletion which account for up to 62% of the AKI cases in HIV-positive patients.

**Objective:** The major goal of this study was to determine the incidence and predictors of AKI among HIV-infected patients admitted with sepsis at a tertiary hospital in Uganda.

**Methods:** In a prospective cohort study, we enrolled adult patients presenting with sepsis at Mbarara Regional Referral Hospital (MRRH) in southwestern Uganda between March and July 2020. Sepsis was determined using the qSOFA criteria. Patients presenting with CKD or AKI were excluded. Sociodemographic characteristics, physical examination findings, and baseline laboratory values were recorded in a data collection tool. The serum creatinine and urea were done at admission (0-hour) and at the 48-hour mark to determine the presence of AKI. We performed crude and multivariate binomial regression to establish the factors that predicted developing AKI in the first 48 hours of admission. Variables with a  $p < 0.01$  in the adjusted analysis were considered as significant predictors of AKI.

**Results:** Out of 384 patients screened, 73 (19%) met our inclusion criteria. Their median age was 38 (IQR 29–46) years and 44 (60.3%) were male. The median CD4 T-cell count was 67 (IQR 35–200) cells, median MUAC was 23 (IQR 21–27) cm and 54 (74.0%) participants were on a regimen containing Tenofovir Disoproxil Fumarate (TDF). The incidence of AKI in 48 hours was 19.2% and in the adjusted analysis, thrombocytopenia (Platelet count  $< 150$ ) (adjusted risk ratio 8.21; 95% CI: 2.0 – 33.8,  $p = 0.004$ ) was an independent predictor of AKI.

**Conclusion:** There is a high incidence of AKI among HIV-positive patients admitted with sepsis in Uganda. Thrombocytopenia at admission is a significant risk factor for developing AKI. The association of thrombocytopenia in sepsis and AKI needs to be investigated.

Keywords: AKI, Sepsis, HIV, Uganda, Sub-Saharan Africa

### 3.1.6 MASTER OF MEDICINE IN OBSTETRICS & GYNECOLOGY

#### 3.1.6.1 Prevalence and factors associated with contraceptive use among female medical students aged 18-25 years at Mbarara University of Science and Technology

**Zainab Osman Ahmed<sup>1</sup>, Muhumuza Joy, Kanyesigye Hamson**

**Background:** Contraceptive use among young university students is a sensitive issue that has resulted into various social and reproductive health challenges including unplanned pregnancy, sexually transmitted infections, and complications of unsafe abortions following unplanned pregnancies. This study sought to investigate the prevalence and factors associated with contraceptive use among female university medical students at Mbarara University of Science and Technology.



**Objective:** To determine the prevalence, common contraceptive methods, and factors associated with contraceptive use among female medical undergraduate students aged 18-25 years at Mbarara University of Science and Technology.

**Methods:** A cross-sectional study was conducted among female medical students at Mbarara University of Science and Technology from February to March 2020. A self-administered structured questionnaire was used to collect data.

**Results:** A total of 330 females responded to the survey. Mean age was  $22 \pm 1.6$  years. Majority were of Anglican faith (42.2 %). The contraceptive prevalence was 28.8 %. Male condoms was the commonest method used (79 %). Being in a sexual relationship (aOR: 6.45; CI: 3.43-12.13) and Anglican faith (aOR: 3.07; CI: 1.07-8.79) were independently associated with contraceptive use.

**Conclusions and recommendation:** The prevalence of contraceptive use among female medical university students of Mbarara University of Science and Technology is low. The most common contraceptive method used is male condom. Female medical students having sexual partners are more likely to use a modern contraceptive method. We recommend that the University management should strive to enhance awareness of contraceptive use among female University students since the prevalence is low.

### **3.1.6.2 Non-Proteinuric Preeclampsia: Prevalence, Factors Associated and End-organ Dysfunction at Mbarara Regional Referral Hospital in Southwestern Uganda**

**Asiphas Owaraganise, Wasswa GM Ssalongo, Henry Mark Lugobe**

**Background:** Formerly, preeclampsia was diagnosed if high blood pressure and proteinuria were present in a gravid woman at or past 20 gestation weeks. Although it is possible to have preeclampsia but never have proteinuria, the literature on how common, factors associated with non-proteinuria preeclampsia and whether the frequency of end-organ dysfunction among women with non-proteinuria differs from those with proteinuria pre-eclampsia is scant.

**Objectives:** To determine the prevalence of, factors associated with non-proteinuric preeclampsia and compare the frequency of end-organ dysfunction between women with non-proteinuric and proteinuric preeclampsia.

**Methods:** Between November 2019 and May 2020, women with pre-eclampsia were consecutively enrolled in a cross-sectional study at Mbarara Regional Referral Hospital. We interviewed all pregnant women  $\geq 20$  gestation weeks presenting with hypertension  $\geq 140/90$  mmHg and recorded their socio-demographic, medical, and obstetric characteristics. We excluded women with chronic hypertension and pregnancy hypertension. We measured bedside proteinuria on clean-catch urine, complete blood count, and renal function and liver enzyme tests. Pre-eclampsia was defined as hypertension plus any feature of severity including  $< 100,000$  platelets/ul, creatinine  $> 1.1$  g/dl, and liver transaminases  $\geq$  twice upper normal limit with or without proteinuria. We computed the proportion of total participants with non-proteinuric pre-eclampsia at  $\leq +2$  urine dipstick cut-off, determined the factors associated with non-proteinuric preeclampsia using logistic regression; and used Chi-square test to compare the frequency of end-organ dysfunction between non-proteinuric preeclampsia and proteinuric groups.

**Results:** We enrolled 134 of the screened 136 participants. Their mean age was 26.9 (SD±7.1) years and 51.5% were primigravid. The prevalence of non-proteinuric preeclampsia was 24.6% (95% CI: 17.9-32.7). Primigravidity (aOR 2.70 95%CI:1.09-6.72, p=0.032) was the factor independently associated with non-proteinuric pre-eclampsia. There was a non-significant difference in the frequency of end-organ dysfunction in women with non-proteinuric and proteinuric pre-eclampsia, p=0.309.

**Conclusion:** Non-proteinuric preeclampsia is common, especially among primigravidae. End-organ dysfunction occurs similarly in women with non-proteinuric and proteinuric preeclampsia. Obstetrics care providers should emphasize laboratory testing, beyond proteinuria, among all women with hypertensive disorders of pregnancy to optimally diagnose and manage non-proteinuric preeclampsia.

### **3.1.6.3 Gross and histological placental abnormalities and their association with Intrauterine Fetal Death at Mbarara Regional Referral Hospital**

**Muhindo Mweru, Joseph Ngonzi, Atwine Raymond**

**Background:** Placental abnormalities have been found to be associated with intra uterine fetal death (IUFD). However, little is known about these abnormalities and their association with IUFD in Uganda.

**Objective:** This study set out to determine the gross and histological abnormalities of placenta and their association with intra uterine fetal death at Mbarara Regional Referral Hospital (MRRH).

**Methods:** A hospital-based unmatched case-control study was conducted at the maternity ward of MRRH. Mothers with IUFD (cases) were consecutively enrolled in the study. Controls were mothers with alive fetus. Participants' demographics and placental characteristics were entered into Microsoft Excel version 13 and exported to Stata-14 for analysis. We used descriptive statistics to describe gross and histological abnormalities of the placenta. Logistic regression was used to compare placental abnormalities dichotomized by IUFD status. Statistical significance was set at p<0.05.

**Results:** we enrolled 48 cases and 97 controls. The demographic findings did not differ among cases and controls. The commonest gross placental abnormalities in mothers with IUFD were abnormal cord insertion (70.8%) and abnormal placenta weight (79.2%). The commonest histological placental abnormalities were thrombi (22.9%) and chorioamnionitis (20.8%). Thrombi is associated with IUFD in mothers admitted at MRRH (aOR: 3.7, CI: 1.06-12.087, p=0.041). Having placental diameter more than 20 cm was protective (aOR: 0.3, CI: 0.11-0.88, p=0.027).

**Conclusions:** Abnormal placental weight and abnormal insertion of the cord were the most common gross placental abnormalities, while thrombi and chorioamnionitis were the most common histological placental abnormalities among mothers with IUFD at MRRH. Thrombus was associated with IUFD, while placental diameter greater than 20 cm was protective.

We recommend gross and histological placental examination following delivery of stillbirths.

### **3.1.6.4 Maternal factors associated with early onset neonatal sepsis among term babies delivered by caesarean section at Mbarara Regional Referral Hospital, Uganda**

**Maisaba M James, Kayondo Musa, Muhumuza Joy, Kyoyagala Stella**

**Background:** Neonatal sepsis contributes significantly to morbidity and mortality of neonates especially within 72 hours of life. Delays in diagnosis and treatment of early onset neonatal sepsis result into higher neonatal mortality and morbidity. Maternal factors associated with early onset neonatal sepsis among term babies delivered by caesarean section are unknown in low-income setting despite increasing cesarean deliveries.

**Objectives:** To determine maternal factors associated with early onset neonatal sepsis among term babies delivered by caesarian section at Mbarara Regional Referral Hospital.

**Methods:** The study was an unmatched case control conducted among term babies delivered by caesarean section at Mbarara Regional Referral Hospital. Cases were mother-baby pair with a diagnosis of early onset neonatal sepsis made by the clinical team on pediatric ward and controls were mother-baby pair without early onset neonatal sepsis using WHO Young Infant Integrated Management of Childhood Illnesses algorithm (WHO& UNICEF 2010).

Participants were recruited over 3months period between December 2019-March 2020. Cases were consecutively recruited while controls were recruited by simple random sampling in a ratio of 1:2. Data was directly entered into Redcap database and then analyzed using Stata 15. For identification of maternal socio-demographic, obstetric, and medical factors associated with early onset neonatal sepsis, we used bivariate and stepwise backward logistic regression model to analyze factors independently associated with early onset neonatal sepsis.

**Results:** A total of mother-baby pairs including 52 cases and 104 controls were enrolled and analyzed. The mean age for mothers was 26. 7years (+/-SD).Being referred (AOR:6.21, p=0.004), decision to delivery time of more than an hour for emergency caesarian section (AOR:16.44, p=0.001), ante-partum hemorrhage (AOR:7.97,p=0.012),prime-gravidity (AOR:4.81,p=0.035),more than 3 vaginal examinations after rapture of membranes (AOR:4.25,p=0.005) were independently associated with early neonatal sepsis.

**Conclusions:** Prime-gravidity, antepartum hemorrhage, more than 3 vaginal examinations after rupture of membranes, decision to delivery time of more than an hour for emergency caesarian section and being referred are associated with early onset neonatal sepsis among term babies delivered by caesarean section at Mbarara Regional Referral Hospital.

**Recommendation:** Clinical care teams should screen for early onset neonatal sepsis among term babies born to prime-parous women, those referred in or had antepartum hemorrhage, more than 3 vaginal examinations after rupture of membranes, and above an hour duration of decision to delivery for emergency caesarean section. This research was funded by the First Mile Program.

### **3.1.6.5 Predictors of Preterm Neonatal Mortality at Mbarara Regional Referral Hospital**

**Leevan Tibaijuka, Godfrey R. Mugenyi, Stephen M. Bawakanya**

**Background:** Preterm neonatal mortality contributes significantly to high neonatal mortality, globally. In Uganda, preterm neonates make up 31% of all neonatal deaths. Previous studies have shown variability in mortality rates by healthcare setting and various predictors that influence the risk of neonatal mortality in different populations. Understanding the predictors of preterm neonatal mortality in our low-resource setting would guide the development of interventions to improve outcomes for preterm neonates.

**Objective:** To describe the neonatal mortality and its predictors among preterm neonates delivered at Mbarara Regional Referral Hospital.

**Method:** We prospectively enrolled 289 live preterm neonates delivered at MRRH between October 2019 and January 2020. The neonates were followed up until death or 28 days which ever occurred first. We used Kaplan Meier survival analysis to describe the preterm neonatal mortality. Kaplan Meier curves and Cox proportional hazards regression to assess predictors of neonatal mortality at 28 days.

**Results:** The overall neonatal mortality was 20.6 % (95% C.I: 16.3-25.7). Vaginal breech delivery (adjusted hazard ratio (aHR): 3.53; 95% CI: 1.67-8.76), very preterm births (aHR: 4.21; 95% CI: 1.42-12.54), and suffering respiratory distress syndrome (aHR: 5.84; 95% CI: 2.06-16.58) increased the risk of preterm neonatal mortality. Corticosteroid administration to delivery interval between 24-48 hours (aHR: 0.62; 95% CI: 0.02-0.94) and kangaroo mother care (aHR: 0.11; 95% CI: 0.06-0.19) reduced the risk of preterm neonatal mortality.

**Conclusions:** Preterm neonatal mortality incidence is high. The leading cause of death was respiratory distress syndrome. The predictors for preterm neonatal mortality include vaginal breech delivery, being born very preterm and suffering respiratory distress syndrome. However, receiving antenatal corticosteroid between 24-48 hours pre-delivery and kangaroo mother care are protective. These findings suggest that interventions designed around mode of delivery, antenatal corticosteroid use, and kangaroo mother care could improve outcomes among preterm neonates in this setting. Funding: The First Mile Program.

### **3.1.6.6 Prevalence and factors associated with Pelvic Organ Prolapse among women attending Gynecological Outpatient Clinic at Mbarara Regional Referral Hospital**

**Tugume Rodgers, Kayondo Musa, Masembe Sezalio**

**Background:** Pelvic organ prolapse (POP) is a preventable social and public health problem that negatively affects the quality of life of women especially in advanced stages of the disease. Majority of women suffering from advanced POP have limited access to surgical care due to high cost and limited number of pelvic floor surgeons.

**Objectives:** We determined the prevalence of Pelvic Organ Prolapse, clinical stage at presentation and associated factors among women attending gynecological clinic at Mbarara Regional Referral Hospital (MRRH).

**Methods:** A cross sectional study was conducted in the gynecological outpatient clinic of MRRH, southwestern Uganda from 20th September 2019 to 21st January 2020. 338 women aged 18 – 90 years were systematically sampled and recruited into the study. Interviewer guided questionnaire was administered to collect socio demographic, obstetric, gynecological and

medical factors. The Pelvic Organ Prolapse-Quantification system was used to stage the POP. The prevalence was calculated as a proportion of patients with POP. Univariate and multiple logistic regression analyses were done to determine factors associated with POP.

**Results:** We enrolled 338 participants. Mean age was 38 years (SD  $\pm$  14). Ninety three of 338 (27.5%); 95th - Confidence Interval (CI): 23.0 –32.5) had POP. POP stages were: 11/93 (11.8%), stage I, 59/93 (63.4 %) stage II; 15/93 (16.1 %) stage III and 8/93 (8.9 %) stage IV. Grand-multiparity (adjusted Odds Ratio (aOR) was 17.1 CI: 1.1 – 66.6), Heaviest birth weight of babies delivered of more than 3.5kg (aOR 3.7 CI: 1.1 – 12.6), Perineal tears (aOR 6.5 CI: 2.1 – 20.2), Peasant farmer (aOR 6.9 CI: 1.6 – 29.9) and History of duration of labour in the first delivery  $>$  24 hours (aOR 5.7 CI: 1.2 – 29) were significantly associated with pelvic organ prolapse.

**Conclusion:** Prevalence of Pelvic Organ Prolapse is high at Mbarara Regional Referral Hospital. Majority of patients have stage II POP. Grandmultiparity, heaviest birth weight among babies delivered  $\geq$  3.5kg, being a peasant farmer, perineal tears and duration of labour in the first delivery of more than 24 hours are factors associated with POP. We recommend routine screening and early management of POP to reduce this social and public health problem

### **3.1.6.7 Prevalence, factors associated and accuracy of Clinical Diagnosis of Oligohydramnios attended to at Mbarara Regional Referral Hospital**

**Twesigomwe Godfrey, Yarine Leodnell Fajaardo Tornes, Abesiga Lenard**

**Background:** Oligohydramnios is associated with poor perinatal outcomes especially where there is scarcity of sonography services. Its timely diagnosis and appropriate interventions improve both maternal and perinatal outcomes including low APGAR score after 5 minutes and still births.

**Objective:** We determined the prevalence, factors associated, and accuracy of clinical diagnosis of oligohydramnios at Mbarara Regional Referral Hospital.

**Methods:** We consecutively enrolled term pregnant women into a cross sectional study at Mbarara Regional Referral Hospital from December 2019 to February 2020. We clinically defined oligohydramnios as two or more of the following: fundal length shorter than gestational age by  $\geq$ 3cm, easily palpable fetal parts, and a feeling of fetal impaction in the uterus. We also used AFI  $\leq$ 5cm to diagnose oligohydramnios. We determined the proportion of oligohydramnios. We performed univariate and multiple regression to determine factors associated with oligohydramnios. We determined sensitivity, specificity, positive predictive value and negative predictive value.

**Results:** We enrolled and analyzed data of 426 participants. The mean age was 26.5 years (SD  $\pm$ 5.3). The prevalence of oligohydramnios was 9.4% (CI: 6.8 – 12.6). History of malaria (aOR: 4.62, CI: 1.50 - 14.20,  $p=0.010$ ), prime gravidity (aOR: 2.57, CI:1.28 – 5.15,  $p= 0.008$ ), and gestational age  $\geq$  40 weeks (aOR: 3.19, CI:1.53 – 6.68,  $p=0.002$ ) are the factors independently associated with oligohydramnios. The Positive Predictive Value of clinical diagnosis of

oligohydramnios is 56.4% (CI: 42.3 - 69.7) and its Negative Predictive Value is 97.6% (CI: 95.4 - 98.9).

**Conclusion:** The prevalence of oligohydramnios at Mbarara Regional Referral Hospital is high. The factors associated with oligohydramnios at Mbarara Regional Referral Hospital are history of malaria, gestation age  $\geq 40$  weeks and prime gravidity. Clinical diagnosis of oligohydramnios can be used to accurately exclude oligohydramnios.

### **3.1.6.8 Predictors for complete expulsion of products of conception among women with first trimester incomplete abortion using Sublingual Misoprostol at Mbarara Regional Referral Hospital**

**Okello James, Julius Mugisha, Sezalio Masembe**

Globally, abortion still contributes about 7.9% to maternal death. Twenty five percent of pregnancies in developing countries end up in abortion, majority (66.7%) of which is incomplete abortion. While medical management of incomplete abortion using misoprostol is a recommended option by WHO, there is limited information on its success and predictors for complete expulsion of products of conception during the first trimester in our setting

**Objective:** To determine the proportion and the predictors for complete expulsion of products of conception among women with first trimester incomplete abortion using sublingual misoprostol at Mbarara Regional Referral Hospital.

**Methods:** We enrolled 132 women with first trimester incomplete abortion into a cohort and we did a 4hourly review for 24 hours on Gynecological ward of Mbarara regional referral hospital. Each patient received 400mcg of sublingual misoprostol 4 hourly up to a maximum of 3 doses. Complete expulsion of products of conception was clinically diagnosed and confirmed by ultra sound scan. We determined the proportion of women with complete expulsion of products of conception. Logistic regression was used to determine predictors for complete expulsion of products of conception. We used odds as a measure of association and level of significance was set at  $p < 0.05$ .

**Results:** The proportion of women with complete expulsion of products of conception was 60.6%. The predictors for complete expulsion of products of conception were gestational age(9-12weeks) OR.3.67(1.73-7.76) and p-value 0.001 and duration of vaginal bleeding more than 24 hours OR 2.64(1.28-5.45) and P-value 0.008.

**Conclusion:** The proportion of women with first trimester incomplete abortion who achieve complete expulsion of products of conception with sublingual misoprostol in 24 hours is high

The predictors for complete expulsion of products of conception in first trimester incomplete abortion are duration of vaginal bleeding more than 24hours at presentation and gestational age of between 9 to 12weeks.

### **3.1.7 MASTER OF MEDICINE IN OPHTHALMOLOGY**

#### **3.1.7.1 Ocular Pathology in Patients with Head Injury Attending Mbarara Regional Referral Hospital: A Cross-sectional Study**

**Kambale Mutanga David, Amos Twinamasiko, Derek Harborne**

**Background:** Ocular pathology is common among head injury patients because of the close proximity of the eyes and the brain. The range of ocular abnormalities includes soft tissue injuries of the eye and adnexa, neurophthalmic abnormalities and fractures of bones surrounding the eye. Early detection and management can improve on the outcome of some of these injuries.

**Objective:** To determine the prevalence and the factors associated with ocular pathology in patients with head injury within one-week post trauma during admission at the emergency ward of in Mbarara Regional Referral Hospital.

**Methods:** A cross sectional study was conducted among 169 adult patients diagnosed with head injury attending the emergency ward of Mbarara Regional Referral Hospital from December 2019 to May 2020. A consecutive sample was enrolled using the patient register. Data on demographics, cause of injury and severity of injury were collected using a questionnaire. Data were entered into Epi data and exported into Stata for analysis. Descriptive statistics, Chi square and logistic regression analyses were conducted.

**Results:** Of the 169 patients, 104 (61.5%) were found with ocular pathology, of which majority were young adult males who were motorcycle riders or drivers. Ecchymosis (35.5%), pupillary abnormalities (21.3%) and lid laceration (15.4%) were the commonest ocular pathology. Head injury patients who presented on the third day or later were more likely to have ocular manifestations (adjusted OR = 95%CI,  $p = 0.0021$ ).

**Conclusions:** There was a high prevalence of ocular pathology among head injury patients, including soft tissue injuries of the soft tissues of the eye and adnexa, neurophthalmic defects as well as fractures of the orbit. This calls for close involvement of the ophthalmic personnel in the management of head injury patients and raising awareness of health workers and the public about the importance of prevention of head and eye injuries on the roads. There is need for prospective studies to monitor the outcome of these injuries.

#### **3.1.7.2 Prevalence of Glaucoma and factors associated with Glaucoma Knowledge among patients attending Mbarara University and Referral Hospital Eye Centre**

**Nzangomba P, Twinamasiko A, Onyango J**

Glaucoma is recognized as a group of eye pathologies that affect the optic nerve, causing irreversible loss of vision. According to WHO, glaucoma is identified around the globe as the second leading cause of blindness.

**Aim:** To determine the prevalence of glaucoma and factors associated with glaucoma knowledge among patients attending Mbarara University Referral Hospital and Eye Centre (MURHEC), South Western Uganda.

**Methods:** Patients aged 40 years and above who attended MURHEC were screened for glaucoma and among them, those who were not known to have glaucoma were interviewed about the knowledge of glaucoma. Patient's demographic data, visual acuity, cup-disc ratio and intraocular pressure (IOP) were recorded. Patients with an IOP of 22 mm Hg or more and/or a vertical CDR of 0.6 or greater had gonioscopy and visual field test done. Anterior chamber angle was graded and any visual field defect if present was recorded. Knowledge on glaucoma was graded as well. Data was entered and analysed with Stata 13.0.

**Results:** A total of 756 patients participated in the study comprising females (55.4%) and males (44.6%). The mean age of the participants was 58.8 years. Overall prevalence glaucoma was 14.4%. Among participants with glaucoma (109), 36.7% were newly diagnosed during our study. Most of the patients had primary open-angle glaucoma (POAG) (84.4%); 12.8% had secondary open-angle glaucoma; 2.8% had secondary angle closure glaucoma caused by pupillary block. Of the 320 patients who were interviewed, 85.3 % were not aware of glaucoma, 9.4% were aware, 3.7% had some knowledge, 0.3% had fair knowledge and 1.2% patients had adequate knowledge. The factor associated with glaucoma knowledge was education.

**Conclusion:** Prevalence of glaucoma among patients seen at MURHEC is high (14.4%). POAG is the commonest type and this is similar to other studies. Adequate knowledge on glaucoma among patients attending MURHEC is low (1.2%). There was a significant relationship between glaucoma knowledge and education; a higher level of education was associated with a higher level of knowledge on glaucoma.

### **3.1.7.3 Diabetic retinopathy: awareness, attitude and practices among diabetic patients in southwestern Uganda: a baseline study**

**Teddy Kwaga, Tu Tran, Sam Ruvuma, John Onyango, Cova Bascaran Fanego, Marcia Zondervan, Simon Arunga**

**Background:** Diabetic Retinopathy (DR) is one of the complications of Diabetes Mellitus (DM). DR is now the leading cause of blindness among the working population. Early screening and treatment of DR is key in the prevention of this potentially blinding complication of DM. This study aimed to assess both the awareness on diabetic retinopathy among diabetic patients and their practice and attitude towards DR screening in Mbarara, Southwestern Uganda.

**Methods:** This was a hospital based cross-sectional study conducted at Mbarara Regional Referral Hospital. Three hundred eighty six patients eligible patients with DM participated in this study. The participants were interviewed about their awareness, attitudes and practices towards DR using a questionnaire. The participants were then classified as aware or not aware about DR. Data was analyzed using Chi-square test, bivariate logistic regression and multivariate logistic regression as appropriate. The proportion of those aware about DR, practices and attitude towards DR screening, and factors associated with awareness about DR were studied.



**Results:** We enrolled 386 patients, 335 (86.8%) were aware that Diabetes affects the eye, and of these 50 (14.9%) were aware about DR. Lack of awareness about DR was associated with having primary level education and below, and no history of diagnosis of DR since the diagnosis of DM ( $p=0.009$  for no education,  $p= 0.012$  for primary education,  $p <0.001$  for diagnosis of DR since the diagnosis of DM). Age, sex and duration of diagnosis of DM did not significantly affect the level of awareness of DR. Regarding practice for DR, only 80.3% reported having an eye examination at least once in the last one year. In the attitudes assessed, there were 85% of the patients who were willing to undergo eye screening, although 35% felt that eye clinics were not accessible and 46% believed that the available eye clinics were not able to treat them.

**Conclusions:** Lack of awareness about DR coupled with poor practices and attitude was found in this study. Therefore strategies to raise awareness about DR need to be put in place.

**Keywords:** Awareness, Attitudes, Practice, Diabetic Retinopathy, Uganda

### **3.1.7.4 Ocular conditions among mentally ill patients at Mbarara Regional Referral Hospital, southwestern Uganda**

**Lakoulo Nana Hortense, John Onyango, Godfrey Zari Rukundo**

**Background:** Treatment of mental illness using psychotropic medications has the potential to induce numerous unwanted ocular effects. These effects may be aggravated by exposure to certain risk factors such as cigarette smoking and alcohol consumption. There is limited data on ocular conditions among this vulnerable population in low income countries.

**Objective:** To determine the prevalence of ocular conditions and factors associated with visual impairment among patients with mental illness attending the mental health clinic at Mbarara Regional Referral Hospital, southwestern Uganda.

**Methods:** This was a descriptive hospital based cross-sectional study conducted for a period of 4 months at Mbarara Regional Referral Hospital among 236 patients aged 15 years and above. Blood pressure and blood sugar were measured and a detailed ocular examination was done including refraction to determine the prevalence and types of ocular conditions. Data were entered in EPI-INFO software version 7.2 and exported to Stata® version 15 for analysis. Statistical significance was set at 0.05.

**Results:** The prevalence of ocular conditions among patients with mental illness was 88.6%. The commonest ocular conditions were conjunctival pigmentation (40.7%), conjunctival growth (30.5%) and allergic conjunctivitis (25.4%). The ocular conditions with potential of visual impairment were refractive error (10.2%), glaucoma (9%), optic neuropathy (8.5%) and cataract (7.2%). Male gender, presence of cataract, refractive error and maculopathy were independently associated with visual impairment.

**Conclusion:** There is a high prevalence of ocular conditions among patients with mental illness in southwestern Uganda but most of these conditions are either treatable or avoidable. Funding: International Response to Improve Sight (IRIS); Virginia-USA.

**Keywords:** Mental illness, ocular conditions, psychotropic drugs, visual impairment

### **3.1.7.5 Causes of monocular blindness, associated factors and quality of life among patients attending Ruharo Eye Centre and Mbarara University and Referral Hospital Eye Centre, Uganda**

**Wiafe G, Arunga S, Onyango J**

**Background:** Monocular blindness (MB) is defined as a visual acuity of 3/60 and below in one eye. This is a common eye condition that affects all age groups and if not addressed may lead to loss of binocular vision. MB has not received much attention because a person with MB is considered as having normal vision. There is need for a better understanding of not only the causes of MB and its associated factors but also the quality of life (QoL) of affected patients. The study aimed at addressing this gap.

**Aim:** To identify the causes of monocular blindness associated factors and QoL of affected patients attending Mbarara University and Referral Hospital Eye Centre (MURHEC) and Ruharo Eye Centre (REC), Southwestern Uganda.

**Methods:** This facility-based unmatched case-control study was conducted at MURHEC and REC. The study targeted patients who presented with a visual acuity of less than 3/60 in the worse eye during the period of data collection. Patients with normal vision were also recruited in order to evaluate QoL. We collected socio-demographic, clinical and data on QoL from patients who consented. The patients were fully examined and ocular investigations were done. The causes of MB were expressed as proportions and shown on graphs. Factors associated with MB were established using logistic regression and presented as Odds Ratios. QoL was measured using WHO Health-Related and Vision-Related QoL tools. Mean QoL scores for both groups were compared.

**Results:** A total of 514 patients (257 pairs) were recruited in the study. Mean age of the cases was  $47.3 \pm 24.3$ . Male patients accounted for 51.8% and 66.2% lived in rural areas. The causes of MB were cataracts 35.8%, corneal pathologies 17.1%, ocular trauma 12.8%, glaucoma 8.2%, uveitis 7.8%, uncorrected aphakia 4.7%, diabetic retinopathy 3.9%, refractive errors 3.1%, retinoblastoma 2.0%, optic atrophy 1.2%, retinitis pigmentosa 1.2% and phthisis bulbi 0.78%. In multivariate analysis, statistically significant factors associated with monocular blindness were being a student (OR 3.6) and having no formal education (OR 12.6). The mean QoL scores of the cases were lower than controls across all domains.

**Conclusion:** Treatable or preventable causes including Cataract, corneal pathologies and ocular trauma were the main causes of monocular blindness. Factors associated with monocular blindness were being a student and having no formal education. Monocular blindness significantly affects QoL hence the need to improve cataract surgery coverage and awareness creation on common eye diseases.

### 3.1.8 MASTER OF MEDICINE IN PAEDIATRICS AND CHILD HEALTH

#### 3.1.8.1 Clinical profiles and 1-year survival of children with acute Lymphoblastic Leukemia at Mbarara Regional Referral Hospital Cancer Unit

Zalwango Stella, Twiine Barnabas, Kalubi Peter

**Background:** Acute Lymphoblastic Leukemia (ALL) is the commonest acute leukemia among children below 15 years of age. In developed world, 1-year overall survival among these children is higher at above 85% compared to those from developing countries. Although treatment for children with acute lymphoblastic leukemia has been ongoing at the Mbarara Regional Referral Hospital (MRRH) Cancer Unit for close to four years now, the clinical features and laboratory findings, initial response to induction chemotherapy, and overall survival of these children have not been systematically described, hence this study.

**Aims:** The study aims were to describe the baseline feature at diagnosis, outcomes of the induction chemotherapy (on day 29 from initiation of chemotherapy), establish the one-year overall survival as well as determine the predictors of 1 year survival in these children.

**Methods:** We retrospectively studied a cohort of children below 16 years of age with a confirmed diagnosis of acute lymphoblastic leukemia diagnosed between June 2016 and May 2020 at MRRH cancer unit. Data was collected by review of the medical records. Frequencies and proportions were used to describe the clinical features, categorical laboratory findings and end of induction remission outcomes. We also used measures of central tendency/variation for continuous variables depending on the distribution. One-year overall survival was estimated using Kaplan Meier curves. Cox proportional hazard model regression analysis at both bivariate and multivariable level was done to identify predictors of one-year overall survival.

**Results:** Between 1<sup>st</sup> June 2016 and 31<sup>st</sup> May 2020, a total of fifty one (51) children had been diagnosed with acute lymphoblastic leukemia at MRRH cancer Unit basing on bone marrow histopathology among 45(88.2%) of the children and flow cytometry among 6(11.8%). Out of the 51 children, the majority, 44 (86.3%) presented with fever and 34(66.7%) with weight loss. Among the physical findings, a majority, 44(86.3%) had pallor and 39(76.5%) lymphadenopathy. Fifteen (29.4%) children presented with WBC  $\geq 50 \times 10^9/L$ . All children with ALL had anemia (Hb < 11.0g/dl) at admission, of whom, 32 (62.7%) had severe anemia (Hb < 7.0g/dl). Forty eight (94.1%) of the children had thrombocytopenia ( $< 150.0 \times 10^9/L$ ) and of these, 32(62.7%) had severe thrombocytopenia ( $< 50 \times 10^9/L$ ). Only 20 (39.2%) children were assessed for metastases into the CNS and of these, 2(10.0%) were positive for CNS disease. Of the 51 children with ALL, only 33(64.7%) children completed induction chemotherapy and only 27(81.8%) out of these achieved full remission. Among 51 children with ALL, 63.6% (95%CI 49.8-77.5) were still surviving up to 1 year. Failure to achieve remission was associated with reduced 1-year overall survival (aHR: 0.43, 95%CI: 0.19-0.97, p-value=0.042).

**Conclusion:** Children presented with varied clinical features that can easily be confused with other infectious diseases thus a high index of suspicion is always needed in order to diagnose and initiate treatment early. Morphological remission rate was high in our setting. 1-year overall survival was low at MRRH cancer unit compared to developed countries.

### 3.1.9 MASTER OF PUBLIC HEALTH

#### 3.1.9.1 Factors associated with enrolment of pupils on a parent-led school feeding program in public primary schools in south western Uganda: a qualitative study

Nadith Ampumuza, Jerome Kabakyenga

**Background** Education is a fundamental human right and a basic building block of each and every community (World Bank, 2006). A school feeding program is very important to pupils in many significant ways which include physiological growth, improved classroom concentration, improved academic performance, learning and overall cognition and it also increases school enrolment. In Uganda only 33% of learners receive at least one meal at school ([Ministry of Finance, 2019](#)) and in Ntungamo district, it is only 3.4% of total pupils enrolled in public primary school. Inadequate nutrition has been identified as one of the causes of academic under achievement (Ahmed and Babu, 2018).

**Methods** The study used exploratory qualitative research methods; focus group discussions and key informant interviews were conducted to collect the data. A total of twelve focus group discussions and nine key informant interviews were conducted with different school stakeholders. Thematic content analysis was done to analyse the data. Codes were identified from the data and later similar codes were grouped together to form categories and later major themes were developed from these categories.

**Results** Four themes were identified from data; organisation of the school feeding program, facilitators of the program, barriers to the program and the views of participants on how to improve the program. The organisation of the program involved, serving pupils with maize porridge, contribution of money by parents, school gardening and school feeding was a collective effort. The main facilitators of the program were support from the church and well-wishers, presence of physical facilities at school and all the school stakeholders being knowledgeable about the importance of the program. The barriers to the program involved; parents not owning the program, free education mentality among the parents, schools not being flexible on what parents can contribute, and failure by many parents to afford the required contribution. Participants suggested that there should be continuous sensitisation of parents and communities, government and NGOs should support the school and that school should engage in large scale gardening to produce food for pupils.

**Conclusion** The study showed that the parent-led school feeding program had various facilitators and barriers and to strengthen the facilitators and reduce on the barriers, continuous sensitization of parents and the communities at large was the most required intervention.

### **3.1.9.2 Assessment of the level of reporting Adverse Drug Reactions and associated factors among healthcare professionals in community pharmacy practice in Kampala capital city, Uganda**

**Bewayo Victor, Mulogo Mugema Edgar**

**Background:** Adverse Drug Reaction (ADR) reporting is a very important component of the healthcare system. Reporting of ADRs is the duty of all healthcare professionals (HCPs). It ensures patient safety by ensuring that the pharmaceutical products on the market are safe for consumption by the masses. The study therefore aimed at establishing the level of ADR reporting among the HCPs in community pharmacy practice and the associated factors, in Kampala capital city.

**Objectives:** The objectives of the study are, to establish the proportion of community pharmacy staff that have reported an ADR in the past one year in Kampala and to identify the factors associated with ADR reporting among community pharmacy staff in Kampala City

**Methods:** Data was collected from HCPs using structured questionnaires. The pharmacies to visit were selected randomly. Face to face key informant interviews were conducted with selected technical staff from the National Pharmacovigilance Center. The primary outcome was, reporting of ADRs. Bivariate and multivariate analyses were completed. Data was cleaned and coded and all analyses were done using STATA 14.

**Results:** Data of 218 respondents was considered (5 key informants and 213 HCPs). Only 9.9% of the HCPs had reported an ADR in the previous year. Majority of respondents were, aged 30 years and below, females, nurses, had a diploma, less than 5 years of experience. The factors that significantly influenced ADR reporting include, profession, years of experience, knowledge and Training on ADRs. Not knowing how to report and lack of motivation were reported most among barriers towards reporting.

**Conclusion:** The level of ADR reporting was found to be low. There were several factors that were associated with low level of reporting, which include, knowledge on ADR reporting, profession, years of experience and attending trainings on ADRs.

### **3.1.9.3 Prevalence of Prediabetes and associated factors among community members in rural Isingiro district**

**Isaac Petit Ampeire, Edgar Mugema Mulogo**

**Background:** Prediabetes is a stage of intermediate raised blood glucose between normal glucose tolerance and Type 2 Diabetes mellitus. It is defined by glycemic plasma levels of 6.1mmol/l to 6.9mmol/l higher than normal but lower than Type 2 Diabetes Mellitus thresholds. Individuals with prediabetes have an increased risk of Type 2 Diabetes. The burden of Prediabetes in rural Uganda is scarcely documented. In the present study we assessed the prevalence of Prediabetes and associated factors in rural Isingiro district south western Uganda.

**Methods:** We conducted a community based cross sectional survey. We enrolled 370 participants aged between 18yrs and  $\leq 70$ yrs from Kabuyanda sub county Isingiro district. Multi stage sampling and Systematic random sampling was done to reach households. Lots were drawn among adults in a household and participant were randomly selected from the drawn lots. Data was collected using the WHO STEP wise protocol questionnaire. Primary outcome was Prediabetes (FBG=6.1mmol/l to 6.9mmol/l) Chi-square tests and logistic regression test models were performed for data analysis.

**Results:** The prevalence of Prediabetes was 9.19% 95% CI (6.23-12.14). Logistic regression analysis revealed Advancing age [P=0.046 AOR=5.771 95% CI=1.031-32.306], Moderate intensity work [P=0.012 AOR=2.637 95%CI=1.233-5.636], high level of consumption of diet categorized as protective [P=0.005, AOR=5.657 95%CI=1.679-19.054] and BMI [P=0.007, AOR=3.608 95% CI=1.414-9.206] were significantly associated with Prediabetes.

**Conclusion:** Prediabetes is prevalent among adult community members in rural Isingiro, south western Uganda. Advancing age and BMI are independent predictors of Prediabetes in this community. Moderate intensity work did not provide any protective advantage for Prediabetes. And diet we categorized as protective was not protective as such for Prediabetes. We recommend an in-depth study to determine the causal association between diet and Prediabetes in this area.

#### **3.1.9.4 Retention of HIV Infected Adolescents and Young Adults attending Antiretroviral Clinics in south-central Uganda: A Rural and Urban comparison**

**Kizza Dominic Kateregga, Francis Bajunirwe**

Background: HIV infected adolescents and young adults (AYA) face barriers to retention in care, which hinders adherence to antiretroviral treatment and virological suppression. The features of AYA who are more likely to be retained in care and other associated factors have not been sufficiently explored. Therefore, the purpose of this study was to determine overall retention rate, comparison of rural and urban retention as well as predictors of retention in care among AYA attending antiretroviral clinics in rural and urban settings in south-central Uganda.

**Methods:** A retrospective cohort study was conducted between January 2012 and January 2019 among AYA aged 10 to 24 years across six sites in south-central Uganda. Overall retention rate was plotted using Kaplan Meier survival curve stratified by rural versus urban location. The Cox Proportional Hazards regression model was used to determine the factors independently associated with retention. The results are presented using adjusted hazard ratio (aHR) along with the respective 95% confidence interval (CI).

**Results:** We retrieved records for 714 AYA and of these, 241 were from urban ART clinic and 473 from rural ART sites. The retention for AYA was 330 (46.22%) in rural setting versus 212(29.69%) in urban setting of the 714 participants. More AYA were retained in the rural ART

setting than their urban counterparts. A total of 542 (75.9%) participants were retained over total time at risk of 24.287 months. The incidence of retention was 22 per 1000 person months and the median time to loss to follow up was 24.7 months. Rural residence was independently associated with 42% higher likelihood of retention compared to urban residence (aHR, 1.42; 95% CI, 1.16-1.73). Other factors such as unemployment (aHR, 0.96; 95% CI, 0.78-1.18), age (aHR, 0.97; 95% CI, 0.94-1.01), belonging social support group (aHR, 0.76; 95% CI, 0.38-1.50), absence of a treatment supporter (aHR, 1.26; 95% CI, 0.67-2.38), and stable ART regimen (aHR, 1.12; 95% CI, 0.93-1.35) were not associated with retention of AYA.

**Conclusions:** There is low retention of AYA in urban settings. Interventions are needed to ensure the AYA at high risk for loss to follow up are retained.

### **3.1.9.5 HIV risk perception and behaviors among circumcised and uncircumcised adult males in Mbarara District**

**Kamukama Prosper, Fred Norman Bagenda**

**Background:** Male circumcision has since 2010 been implemented in Mbarara and Uganda at large to reduce the continued Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome epidemic among the general population. However, there is some concern that male circumcision may lead to low risk perception and more risky sexual behaviour. This study therefore investigated Human Immunodeficiency Virus risk perception and risk behaviors among circumcised and uncircumcised adult males in Mbarara District.

**Methods:** A household-based cross-sectional study design was conducted among an adult male population of diverse circumcision status. A total of 384 adult males were consecutively enrolled into the study. Questionnaires were used to obtain the data. Data were analyzed using STATA 15. Descriptive statistics followed by chi square tests and binary logistic regression were used.

**Results:** Adult males with high HIV risk perception were less likely to be circumcised (aOR = 0.3, 95%CI: 0.14-0.80,  $p < 0.05$ ) compared to male adults with no HIV risk perception. Male adults that reported engagement in transaction sex in the past 12 months were 3.8 times more likely to be circumcised (aOR = 3.8, 95%CI: 1.04-13.56,  $p < 0.05$ ). Male adults with 1-3 sexual partners were 4.9 times more likely to be circumcised (aOR = 4.9, 95%CI: 1.05-22.23,  $p < 0.05$ ) while those with 4 or more sexual partners were 5.5 times more likely to be circumcised (aOR = 5.5, 95%CI: 1.79-40.05,  $p < 0.01$ ) compared to those male adults who reported no sexual partner in the past 12 months.

**Conclusions:** Circumcised adult males showed a low indication of high HIV risk perception, more transactional sex and more multiple sexual partners compared to uncircumcised males.

### **3.1.9.6 Factors influencing adherence to vaccine management guidelines during immunization outreach sessions in rural settings in south western Uganda** **Atwiine Flavia, Eleanor Turyakira**

**Background:** In Uganda, outreaches were established to increase access to and use of immunization services for populations with limited access to facility-based services. However, several outbreaks of immunizable diseases like measles have been reported over time leaving a lot of unanswered questions with policy makers and other stakeholders. The aim of this study was to find out factors influencing adherence to vaccine management guidelines during immunization outreach sessions in rural settings in South Western Uganda.

**Methods:** An observational descriptive study using qualitative methods was conducted in 16 public health facilities in 4 purposively selected districts of Kasese, Mitooma, Rubirizi and Rwampara in South Western Uganda. Data was collected using in-depth semi-structured interviews, review of health facility records and observation methods... The demographic characteristics and observation checklists data were entered into Excel software and analyzed in relation to the World Health Organisation immunization practice recommendations. All interviews were transcribed, data coded, categories formed and triangulated with data from observation checklist and record reviews, Generation of themes was guided by the socio-ecologic framework to enable a better understanding of the practices of health care providers during immunization outreach sessions in relation to vaccine management guidelines, identify the gaps and factors influencing adherence.

**Results:** Overall, 51 individuals were interviewed including 4 ADHOs in charge of maternal and child health, 4 cold chain technicians, 15 Expanded Program on Immunization focal persons and 28 health care providers. The main themes identified in the data regarding gaps identified included insufficient monitoring and handling, poor documentation, poor refrigerator management, and poor transportation of vaccines while factors influencing adherence to vaccine management guidelines during outreach immunization sessions were knowledge, skills and motivation of health care providers; teamwork, funds, support supervision, staffing levels, and transport..

**Conclusions and recommendations:** Most gaps in vaccine management practices were identified at health care provider level but they were facilitated by the policy/ environment-level factors. Therefore specific strategies to address the identified factors influencing adherence to vaccine management would tremendously improve adherence to vaccine management guidelines.

### **3.1.9.7 Rotavirus vaccination coverage and its effect on diarrheal diseases among children aged 3 to 24 months living in Rwanyamahembe sub County, Mbarara District** **Stella Kabageni, Fred Bagenda**

**Introduction:** Rotavirus is a major cause of severe gastro-enteritis and one of the four common causes of moderate to severe diarrhea among children under 5 years of age in sub-Saharan Africa and Asia. Globally, rotavirus is still the leading cause of severe diarrhea in infants and young children and in Uganda accounts almost 40% of the diarrhea cases. Rotavirus vaccine was



therefore introduced in the Uganda National Immunization Schedule in June 2018 and is being administered to children as a 2 dose ROTARIX vaccine at 6 weeks and 10 weeks to avert this burden.

**Methods:** This was a community cross-sectional survey targeting 232 respondents in Rwanyamahembe Sub-county. The respondents comprised of mothers, fathers or guardians to Children aged 3 to 24 months living in Rwanyamahembe sub-county, Mbarara District. The completed data was entered into REDCap and analyzed using STATA 14. For the secondary data about diarrheal burden pre and post Rotavirus vaccination. Data for 2017 calendar year was used for the pre- Rotavirus vaccination while data for 2019 was used for the post Rotavirus vaccination period. The year 2018 was excluded to account for vaccine introduction and implementation.

**Results:** Generally, this study showed very high immunization coverage of 99.1% for dose 1, 95.6% dose 2 and 95.2% for complete Rotavirus vaccine immunization which was higher than both the WHO and Uganda's target. Maternal age was associated with uptake of Rotavirus vaccine ( $p=0.034$ ). There was also a 50% ( $p=0.003$ ) reduction in number of diarrheal hospitalizations observed 1 year post Rotavirus vaccination introduction compared to 1 year pre-vaccine introduction.

**Conclusion:** The successful integration of Rota virus vaccine in EPI programming is required for the significant reduction of acute diarrhea hospitalizations among children below 2 years. The very high Rotavirus vaccination coverage of 99.1% for dose 1, 95.6% dose 2 and 95.2% for completion is representative of successful implementation of the new Rotavirus vaccine. In addition there was a marked reduction in the acute diarrheal hospitalization cases which is likely to be attributed to the high vaccination coverage.

### **3.1.9.8 Acceptability of Early Infant Male Circumcision for future prevention of HIV/AIDS among Parents in Kayunga District: A Qualitative study**

**Hawah Nalukwago, Jerome Kabakyenga**

**Introduction:** Uganda provided safe male circumcision (SMC) to over 3 million adults and adolescent men between 2010 and 2016. Early Infant Male Circumcision (EIMC) has been identified as a key HIV prevention intervention for sustaining the prevention gains anticipated through adult and adolescent male circumcision across Sub Saharan Africa. There is a need to identify, assess and deal with concerns around EIMC acceptability in the different regions. The objective of the research was to assess the acceptability of EIMC as an HIV prevention intervention in Kayunga District, Uganda.

**Methods:** A qualitative approach was adopted, in which 8 gender specific focus group discussions were held with parents. Four In-depth interviews were held with grandparents and 7 key informants' interviews were held with religious leaders of different Christian faiths and health workers at the main circumcising centres in Kayunga district. Discussions and Interviews

were audio recorded, transcribed, translated, coded and analysed. Thematic content principles were adopted during analysis.

**Results:** The Findings showed that there were more parents seeking for infant circumcision at the SMC centres but unfortunately the centres had not started offering infant circumcision at a large scale. The common motivators for EIMC identified were; prevention of diseases especially HIV and other sexually transmitted diseases in future, hygiene of the child, and fast healing. Other motivators identified were; the experience of the person circumcising one's child and as a way to protect the child from ritual sacrifices. However not all participants were in agreement with EIMC, a number of participants who were against EIMC expressed strong concerns regarding the use of anaesthesia during infant circumcision and its effects on sexual performance of the child in future. Other hindering factors included fear of being branded Muslims, fear of causing family misunderstanding in case one partner disagrees, fear of complications like bleeding during the procedure, the current target age group for free male circumcision at the SMC service centres which does not include infant circumcision and high cost of EIMC offered privately.

**Conclusion:** The findings of this study suggest that EIMC is a potentially acceptable HIV prevention intervention in Kayunga District. It could be a cheap and sustainable approach to improve on the overall coverage of male circumcision in Uganda if it is provided at a larger scale alongside the current SMC programs.

### **3.1.10 MASTER OF MEDICINE IN PLASTIC AND RECONSTRUCTIVE SURGERY**

#### **3.1.10.1 Validation of a Lip Asymmetry Scale and Determination of Lip Asymmetry associated factors among Children following Primary Unilateral Cleft Lip Repair at Corsu Rehabilitation Hospital, Uganda**

**Lubega William, Andrew Hodges, Martin Tungotyo**

**Introduction:** Lip asymmetry is a major concern to unilateral cleft lip (UCL) patients. Thus, assessment of postsurgical lip asymmetry needs to be further explored as till date no universally accepted lip asymmetry assessment protocol exists and there are few African studies. The aim of this study is to evaluate lip asymmetry and associated factors among children following primary unilateral cleft lip repair at CoRSU Rehabilitation hospital, and also to validate a visual analog Unilateral Cleft Lip Asymmetry Scale (UCLAS) for labial assessment.

**Methods:** A cross sectional study of 80 participants, who had primary UCL repair and were at least 3 months post-operative, was done to determine frequency of lip asymmetry. Two raters

(cleft surgeons) used the visual analog UCLAS to evaluate standardized postoperative photos of the participants and determine presence of any asymmetry. Patient demographic and surgical information was collected and analyzed to determine factors associated with severe lip asymmetry. Intra- and inter-rater reliability and internal consistency of the UCLAS tool was estimated using Cohen's kappa statistics and Cronbach alpha level.

**Results:** All participants were noted to have some degree of lip asymmetry. 16.2 % had mild lip asymmetry, 66.3% had moderate lip asymmetry and 17.5% had severe lip asymmetry. Lip height discrepancy (long lip), followed by vermilion mucosa discrepancy (mucosa excess) were the most common lip component asymmetry. Patient factor associated with severe lip asymmetry was history of respiratory infections 14 days prior to surgery. Surgical factors associated with severe lip asymmetry were surgical technique, post-operative period < 6 months, cadre of primary surgeon and early complications within 72 hours post-surgery. The intra- and inter- rater reliability was found in the "fair to almost perfect agreement" (kappa value range 0.35- 1). Internal consistency of the tool was strong (Cronbach alpha levels 0.84-0.88).

**Conclusions:** There is a degree of lip asymmetry in all patients after primary UCL repair at CoRSU hospital and the frequency of severe lip asymmetry is 17.5%. History of respiratory infections prior to surgery and post-operative period < 6 months are independent predictors of severe lip asymmetry. The study has also proved that our visual analog UCLAS is a reliable tool for assessing UCL asymmetry. This study received funding from the Christ of the blind mission (CBM) Uganda

**Keywords:** Unilateral Cleft lip repair, Lip asymmetry, Unilateral Cleft Lip Asymmetry

### **3.1.10.2 Factors associated with the cosmetic and functional outcome following the Two- Staged Bracka Hypospadias Repair at CoRSU Rehabilitation Hospital, Uganda**

**Dorothy Bbaale, George Galiwango, Martin Tungotyo**

**Introduction:** There are over 300 techniques of hypospadias repair. The aims of surgery remain the same: to create a functional and aesthetically acceptable phallus. The Bracka hypospadias repair technique attempts to do this in two stages. The purpose of this study was to assess the factors associated with the cosmetic and functional outcomes following the Two- Staged Bracka hypospadias repair.

**Materials and Methods:** A cross-sectional study was conducted at CoRSU Rehabilitation Hospital, Uganda. The participants' socio-demographic characteristics, patient-related and surgical history followed by a detailed physical examination were documented using a pre-coded questionnaire and assessment tool and photographs. A blinded consultant plastic-surgeon assessed the cosmetic outcome using the HOPE score. Functional outcome was determined by the quality of urinary stream, presence of fistulae and degree of curvature while erect. These

results were collated to get an overall cosmetic and functional outcome. Bivariate and multivariate analysis was used to determine the associated factors.

**Results:** A total of 60 participants were enrolled. The mean age of the participants was 6.7 years. 22 (36.7%) of the patients had distal hypospadias and 19 (31.7%) patients each with mid-shaft and proximal hypospadias. The proportion of participants with a satisfactory cosmetic outcome according to the HOPE score was 8.3%, whilst the proportion with satisfactory functional outcome was 55.0%. When combined, the proportion with an overall satisfactory cosmetic and functional outcome was 58.3%. Amongst the associated factors, the type of community setting the patient came from was statistically significant (OR=7.0  $p=0.040$ ), and though statistically insignificant, the age at time of surgery (OR=2.5,  $p=0.288$ , OR=1.9  $p=0.494$ ), the relationship of the caretaker to the patient (OR=2.6  $p=0.269$ , OR=4.5  $p=0.207$ ), the duration of continuous bladder drainage (OR=7.6  $p=0.087$ ) and cadre of operating surgeon (OR=3.8,  $p=0.112$ ) had a strong association with the overall cosmetic and functional outcome.

**Conclusion:** The proportion of patients with an overall satisfactory cosmetic and functional outcome following the Two-Staged Bracka Hypospadias Repair in our study was 58.3%, which was low. The factors found to have a significant association with achieving a satisfactory overall cosmetic and functional outcome included coming from a rural community setting, having a mother as a primary caretaker, being operated between 6 months to 18 months, being operated by a consultant surgeon and having continuous bladder drainage for  $\geq 7$  days

### **3.1.10.3 Magnitude and factors associated with low pre-surgical Hemoglobin level among children under five years with cleft palate at CORSU Hospital**

**Francis Fortune Tegete, Martin Tungotyo, Cornelius Masambu**

**Background:** Low pre-surgical haemoglobin level leads to delay of definitive cleft palate repair among children with cleft palate. The delay of cleft palate repair results in a vicious cycle of cleft palate co-morbidities and compromise the surgical benefits on early cleft palate repair. We determined magnitude and factors associated with low pre-surgical haemoglobin levels among children with cleft palate at CoRSU- hospital.

**Material & Methods:** A cross sectional study design was carried out at CoRSU hospital between March 2020 and August 2020. The study participants' socio-demographic characteristics, findings of physical examination, cleft palate assessment, anthropometric measurements and laboratory investigations were documented and analysed. The proportion of children with low pre surgical haemoglobin level was determined using Chi-square test; morphological type and severity of pre surgical haemoglobin level were expressed as frequency and percentage. Bivariate and multivariate analyses were used to determine the associated factors.

**Results:** 66 children with cleft palate aged from 6 months to 59 months due for cleft palate repair were included in the study. The proportion of children with low pre-surgical haemoglobin level was 56.1%, microcytic hypochromic type was detected in (70.5%) of study participants. By severity 89.3% of study participants had low haemoglobin level. Factors associated with low pre-

surgical haemoglobin level included concurrent illness during the interview (OR=7.68 p=0.02), less than 10 times number of feeds per day (OR=7.22 p=0.03), underweight type of malnutrition (OR=34.5 p=0.04) and history of being postponed from cleft palate repair because of low Hb level (OR=16.10 p=0.07).

**Conclusion:** The proportion of children with low pre-surgical haemoglobin level among under-five children with cleft palate is however higher than that of the general population. Therefore, patients with Cleft palate **Research fund:** Smile train and mission restore require early assessment, intervention and adequate nutrition support before time due for surgery.

**Key words:** *Low pre-surgical haemoglobin level, Cleft Palate.*

### 3.1.11 MASTER OF MEDICINE IN EMERGENCY MEDICINE

#### 3.1.11.1 Correlation of triage category and Mortality rate in Acute Pesticide Poisoning presenting to Mbarara regional Referral Hospital Emergency Department

**Odakha Athieno Justine, Derek Harborne, Harry Chen**

**Background:** Although the global suicide deaths due to intentional pesticide poisoning disproportionately occur in low and middle income countries, there is a scarcity of reports on Emergency Department (ED) mortality and its predictors in these settings.

**Objectives:** Our goal was to determine the mortality rate among patients presenting with Acute Pesticide Poisoning (APP) at Mbarara Regional Referral Hospital (MRRH) ED, how it correlates with the initial triage category and the case fatality rate of the commonly ingested pesticides.

**Methods:** This was a prospective observational cohort study conducted at MRRH Emergency department. Patients presenting with acute pesticide poisoning were enrolled using data collection forms that collected their admission triage category, initial vital signs, demographics, initial assessment and management. They were followed up for 1 week recording their four-hour and one-week survival. We described continuous variables using medians and means and use chi<sup>2</sup> to compare categorical variables

**Results:** Out of the 65 enrolled, 63 (96.9%) patients were successfully followed up for 1 week. These were predominantly males 48 (74%) and farmers 27(42%) with a median age of 23 years (IQR 19-30). A total of 56 (86%) patients were suicide attempts and had ingested mostly Organophosphates 24 (36%), Amitraz 13(20%), Zinc Phosphide 8(12%) and Aluminum phosphate 5(8%). The median time from ingestion to presentation was 4 hours (IQR 2.5-24). More than half 35(53.9%) of the patients were in the red triage category. The four-hour and one-week mortality rates were 1.5% and 17.5% respectively. All the patients who died had a life span of 48 hours or less. We found a weak positive correlation between mortality and initial triage category that was not statistically significant. (Pearson's chi<sup>2</sup>=2.3364 p= 0.31). Aluminum phosphide had the highest case fatality rate (40%) followed by Organophosphates (18%) and Amitraz (15%)

**Conclusion:** APP patients presenting to MRRH ED are high priority with a higher risk of dying within the first 48 hours than in the first 4 hours. Initial triage category does not significantly correlate with mortality in APP. The pesticides used in APP are fairly new with no antidotes and yet have high case fatality rates. The mechanism of action of Aluminium phosphide needs to be investigated for timely interventions.

**Keywords:** Acute Pesticide Poisoning, Mortality, Triage

### **3.1.11.2 Assessment of Mbarara Regional Referral Hospital and Ishaka Adventist Hospital level of preparedness to manage all hazard disasters**

**Opejo Pius, Derek Harborne, Mugabi Francis**

**Background:** Uganda has experienced different types of disasters ranging from floods, landslide, earthquakes, mass casualties from road traffic accidents and disease epidemics such as Ebola and Congo Crimean Fever. Hospitals play a critical role in management of victims from such disasters while maintaining other routine healthcare services yet data on the level of disaster preparedness is lacking in these hospitals. This study set out to assess the level of hospital all hazard disaster preparedness in Mbarara Regional Referral Hospital and Ishaka Adventist Hospital in Western Uganda.

**Methods:** A descriptive cross sectional study was conducted in two major Hospitals in Western Uganda. Data was collected using structured questionnaires, interview guides and WHO all hazard Hospital Disaster preparedness checklist. Research assistants with minimum qualification of national certificate in the medical field, and additional data collection training were used, while the principle investigator administered the checklist and key informant interview guide. Data was then analyzed using STATA version 12 and presented graphically and as statements accordingly.

**Results:** Both hospitals were averagely prepared for all hazard disasters with MRRH scoring above 93% in communication and post disaster recovery components, while IAH scored highest in the component of safety and security (73%). On the other hand, MRRH scored lowest in the components of Triage and continuity of essential services at (50%), whereas IAH scored lowest in the components of continuity of essential services (33%) and command and control (43%). Overall, knowledge (P= 0.002), attitude (P= 0.028) and practices (P= 0.005) significantly influenced the level of disaster preparedness.

**Conclusion:** Both Hospitals are averagely prepared to manage all hazards disasters and major incidents although both lacked a complete and functional Hospital disaster plan.

**Keywords:** All hazard, Disaster, Preparedness, Uganda

### **3.1.11.3 Caseload and case-mix: a cross-sectional study of the variability in patient flow and acuity, and staffing trends at Mbarara Regional Referral Hospital Emergency Department**

**Bagonza Kenneth Daniel, Derek Harborne, Stephen Ttendo**

**Background:** Emergency Medicine (EM) is a relatively new specialty worldwide and more so in sub-Saharan Africa. In Uganda, the first accredited EM program was started at Mbarara University of Science and Technology (MUST) in 2017.

Emergency departments (EDs) provide frontline care to the acutely ill and injured and sometimes are the only source of care to the less privileged. The burden of acute illness is particularly overwhelming in sub-Saharan Africa compared to the rest of the world. This contrasted against inadequate resource allocation to EDs creates a recipe for disaster.

One of the main challenges of EDs worldwide is overcrowding that is due to; unscheduled variations in the number of patients visiting the department and unmeasured demand for services. This leads to poor modeling of capacity (Human, material and space) to meet this demand and hence overcrowding.

Mbarara Regional Referral Hospital Emergency Department (MRRH-ED) utilization records do not capture variations in patient attendance and severity of illness by time-of-day or day-of-the-week. This unmeasured fluctuation in number of patients with varying degrees of illness makes it difficult to appropriately allocate resources to address the demand. The aim of the study was to measure the temporal variation in Demand (Caseload and Case mix) and Capacity (Staffing) for purposes of forecasting future Demand.

**Procedure:** Prospective collection of Case mix, Caseload, Task-time, staffing, time (time of day and day of the week) data over a 6 month period.

**Results:** There was temporal variation in Caseload and Case mix and Capacity. Daily Caseload peaked between 9am-midday (25% of daily load) and was highest on Mondays (19% of the Weekly load). The weekends had the lowest caseload (12.5%) but with the highest acuity (58% High acuity presentations). Trauma/injury related complaints showed a two-fold increase outside office hours and a 10% rise on weekends. Demand increased over the weekends in contrast to reduced Capacity and more often than not, Demand exceeded Capacity.

**Keywords:** Temporal variation, Demand, Capacity, Caseload, Case mix, staffing, Uganda, Emergency Department

### **3.1.11.4 Does diagnosis or social economic status affect initiation of palliative care in the Emergency Department**

**Nalugya Linda Grace, Derek Harborne, Reid Anderson Eleanor**

**Background:** In the current modern world, large efforts are being put into place to integrate Palliative Care (PC) in the Emergency Department (ED) in order to align goals of care and improve quality of life. In Africa, the concept of initiating PC in the ED is new.

**Objectives:** To identify percentage of patients with PC needs in the ED and proportion initiated on PC within 7 days, and to determine if diagnosis and social economic status affect initiation into PC.

**Methods:** A prospective cohort study was done. From March 2020-June 2020, we used a PC screening tool to identify the patients with PC needs in the ED and recommended them for PC. Follow up was done on day 7 after enrolment to record whether the patient had been palliated or not. Using Stata, a chi-squared test was used to test for significance whether diagnosis or social economic class affected initiation of PC in the ED.

**Results:** 32 patients with PC needs were studied. 19 (59.37%) had received PC while 13 (40.63%) had noted initiation of PC varied by diagnosis, with cancer and stroke at over 75%, cardiac and renal disease at 57% and 50%, respectively and bed-bound patients at 25%. (Pearson  $\chi^2(4) = 3.9339$  Pr = 0.415). Social class was inversely correlated with PC initiation at 75%, 60% and 25% from lowest class to highest respectively (Pearson  $\chi^2(2) = 2.7725$  Pr = 0.250).

**Conclusion:** There are patients with PC needs in the ED. Cancer diagnosis and the lowest social economic group influenced PC initiation though not statistically significant in this sample size. We recommend adapting a PC screening tool to be used for all ED cases and establish PC referral pathways. Further studies are needed to explore other factors that hinder PC need in our setting.

### **3.1.11.5 Diagnostic Utility of Point of care Ultrasound compared to Chest Radiography in patients with Hypoxia at the Medical Emergency Department of Mbarara Regional Referral Hospital**

**Prisca Mary Kizito, Derek Harborne, Anthony Muyingo**

**Background:** Hypoxia is a common presentation in the emergency department (ED) worldwide. Timely identification of the causes like pneumonia, heart failure, pleural effusion etc. is challenging due to their similar presentation. Chest radiography (CR) as the most available diagnostic has poor accuracy yet the gold standard, Chest Computed Tomography scan is costly. Point of care ultrasound (PoCUS) is a cheap, robust, quick and safe bedside tool, but little is known of its accuracy and utility in resource limited EDs. The study aimed to assess diagnostic utility of PoCUS compared with CR in identifying the causes of hypoxia in the medical ED.

**Methods:** 49 adults presenting with hypoxia in the medical ED were evaluated. Lung, cardiac and inferior vena cava ultrasound was done and then chest radiographs obtained. Lung ultrasound (LUS) was compared with CR (first reference standard). Chest radiography and PoCUS were each compared to the physician diagnosis (second reference standard) for the similarity and difference in the actual findings.

**Results:** There were 31% more abnormalities identified by LUS than CR, significant in ADHF. Lung ultrasound findings were similar to CR in 86% of the participants with good reliability ( $\kappa=0.75$ ). There was no significant difference between the actual findings of LUS and CR ( $\chi^2=2$ , p 0.1). Using the second reference, 82% of total CR findings were similar with moderate



reliability ( $\kappa=0.5$ ) compared to 92% of total PoCUS findings with perfect reliability ( $\kappa=0.9$ ). Compared to PoCUS, CR findings significantly differed from the physician diagnosis per patient (CR:  $X^2= 8.5$ ,  $p 0.004$  vs. PoCUS:  $X^2= 0.85$ ,  $p 0.38$ ).

**Conclusion:** Overall, LUS identified significantly more lung abnormalities. In addition, PoCUS demonstrated more similarities with the physician diagnoses than chest radiography. We recommend PoCUS use in patients with hypoxia attending medical EDs in low resource settings. This study received funding support from Dr. Harry Chen.

**Keywords:** Point of care ultrasound (PoCUS), chest radiography (CR), hypoxia, physician diagnosis, Emergency Department (ED).

### **3.1.12 MASTER OF MEDICINE IN RADIOLOGY**

#### **3.1.12.1 Clinicoradiological Presentation and the Outcome of adult patients with Traumatic Brain Injury (GCS 9-13) at Mbarara Regional Referral Hospital, South Western Uganda**

**Kaneza Divine, Acan Moses, Kitya David**

**Aim:** To study clinicoradiological presentation and outcome of adult patients with TBI (GCS of 9-13), at discharge, at Mbarara Regional Referral Hospital, south Western Uganda.

**Methods:** 108 patients with head trauma aged 19 years and above, scored a GCS between 9-13 who attended surgical emergency of MRRH were interviewed (through their attendants) about socio-demographic data and medical history. Data on clinical presentation were recorded from their files. Head CT scan was performed for those patients and CT scan findings were documented. Data was entered using EPI info, exported to excel and analysed using Stata 13.0. Proportion and odds of positive CT scan per GCS, proportion of different patterns of BI per GCS were calculated and compared using Chi2 and logistic regression. Proportion of patients who needed or did not need surgical intervention, needed ICU admission, died and the length of their hospital stay were also calculated and compared.

**Results:** The majority 98 (90.7%) were male. The overall mean age of the patients was 33.7 (SD±12.8) years. Road traffic accidents 68 (63.0%) were the most common cause of with 43 (63.3%) due to motorcycles. 99 (91.7%) had positive CT scan findings of brain injury (BI). The proportion of CT scan findings per GCS score was not statistically different ( $P\geq 0.05$ ). The odds of positive CT scan of BI in GCS 9-12 were not different to GCS 13. Overall, brain contusions 73 (67.6%) were the most common finding. In addition to brain contusion, patients with GCS of 13 also had high proportions of cranial vault fractures 17 (50.0%) and sinus effusions 13 (35.3%) and subdural hematoma 8 (23.5%) About 21 (21.2%) of our participants needed surgery. 10 (9.3%) of our participants needed ICU admission. 5 (4.8%) of participants died and the length of the hospital stay were 1-7 days in 79 (73.2%) of our participants. There were no statistical difference per score in need for surgery, need for ICU, and length of hospital stay or death.

**Conclusion:** The proportion of positive CT scan findings in GCS 13 was not statistically different from the other GCS categories 9-12 in terms of odds ratio, risk ratios, risk difference and P-value. The proportions of various lesions seen on head CT scans were not statistically different. There was no significant difference in the need for surgery, for ICU care, length of hospital stay and death across GCS categories.

### **3.1.13 MASTER OF NURSING SCIENCE IN CRITICAL CARE NURSING**

#### **3.1.13.1 Impact of an educational intervention on nurses' knowledge and practice in early detection of Acute Kidney Injury at Mbarara Regional Referral Hospital**

**Were Phiona A Oluoch, Jane Kasozi Namagga**

**Purpose:** Early detection of AKI is dependent on nurses' knowledge and practice since they play a key role in management of patients. The aim was to examine the impact of an educational intervention on nurses' knowledge and practice in early detection of AKI.

**Methods:** Thirty nurses from both ICU and A/E Unit were administered questionnaires, a pre-test on AKI knowledge while twenty-five medical charts were checked for practice then an education intervention done. One month later a post- test was given to assess the gain in knowledge and practice in AKI.

**Results:** The mean pre-test knowledge score was 43.0% but increased to 68.3% in the post-test following the educational intervention. The change in score and practices performed were statistically significant ( $p < 0.0001$ ) indicating the educational intervention improved early detection of AKI

**Conclusion:** The results highlight the need for continuous education for nurses on AKI.

#### **3.1.13.2 Quick Sequential Organ Failure Assessment (qSOFA) in Prediction of outcomes in Patients with or Suspected Infection at Kampala International University Teaching Hospital, Bushenyi, Uganda**

**Turyasingura Johnan, Niyonzima Vallenge**

**Background;** Sepsis affects millions of people worldwide each year, killing more than one in four sepsis patients. It was estimated that 31.5 million cases of sepsis and 19.4 million cases of severe sepsis occurred in 2015 causing approximately 5.3 million deaths globally. The qSOFA screening tool provides a simple and quick bedside criterion for identifying adult patients with or suspected infection at risk of poor outcomes however its application in developing world remains understudied.

**Objective;** The objective of this study was to determine the ability qSOFA scores to predict in hospital mortality and length of hospital stay among patients with or suspected infection at Kampala International University Teaching Hospital.

**Methods;** A descriptive retrospective study that involved review of patients' records was done at Kampala International University Teaching Hospital. A sample size of 375 patient records systematically selected participated in the study. Only adult patients admitted at KIU-TH from January 2018 to December 2019 with or suspected to have infection were recruited for the study. Data was collected using a data extraction form designed by the researcher. Stata version 12 was used to analyze the collected data. Univariate and multivariate logistic regression analysis was used to determine the association between qSOFA scores and in hospital mortality and length of hospital stay among patient with or suspected infection at KIU-TH.

**Results;** 375 Patient records participated in the study and majority 191(51%) were males. Median age was 45(IQR; 25-70).Median length of hospital stay was 4 days (IQR; 2-6). Majority 171(46%) of the participants had unknown HIV status, 154, (41%) were negative and 50(13%) were positive. Most [251(70%)] of the patients had qSOFA score < 2, [75(21%) had QSOFA of 2 while only [32(9%)] had qSOFA of 3.Respiratory and GIT related infections were most frequently diagnosed accounting for 181(48%) of the participants. There was a significant association between QSOFA score and in hospital mortality. Patients with qSOFA score 3 were 15 times more likely to die than those with qSOFA score <2(aOR; 15.984, p<0.001) while patients with qSOFA score 2 were 9 time more likely to die compared to those with qSOFA score <2(aOR; 9.551, p<0.001).There was no association between qSOFA scores and length of hospital stay [(cOR for qSOFA 3:2.288, p=0.100) (cOR for qSOFA of 2:1.888, P=0.092)]

**Conclusion:** In this study, there was a strong positive relationship between qSOFA scores and in hospital mortality and therefore qSOFA predicts in hospital mortality. There was no association between qSOFA scores and length of hospital stay and therefore qSOFA cannot be used to predict in hospital length of stay.

### **3.1.13.3 Validation of the Safety Attitudes Questionnaire for assessing patient safety culture in critical care settings of three selected Ugandan hospitals**

**Joseph Atukwatse, Hanifah Nantongo**

**Background:** The safety attitudes questionnaire (SAQ) short form (2006) is a very important tool for assessing patient safety culture in clinical environments. Whereas this tool has been validated and utilized widely in high and middle income countries, little is known about its validity and applicability in Uganda. This study assessed the validity of SAQ short form in the Ugandan critical care settings using data from three selected hospitals.

**Methods and materials:** In a mixed methods research design, face, content and construct validity for the SAQ short form (2006) was assessed. For face validity, 8 healthcare experts critiqued the items clarity and overall tool format. Content validity was assessed by 9 experts for relevance of each item of the tool. Following each of the two types of validity above, necessary adjustments were made that resulted in a modified SAQ. For construct validity, a survey of frontline qualified health workers from critical care settings of the three selected hospitals using a modified SAQ was self-administered. Confirmatory factor analysis was used to analyse the survey data. Cronbach's alphas were calculated to examine internal reliability

**Results:** Of the 36 items in the tool's original version, 33 were rated at least clear with a score of 100%. The use of contextual terms and vocabulary, as well as formatting issues arose as concerns the tool attained an overall S-CVI<sub>Ave</sub> of 100%, and S-CVI<sub>UA</sub> of 86.1%. Four new items were suggested for addition on effective communication as a dimension of patient safety culture. The survey had a total of 256 respondents, providing a KMO value of 0.8605. The priori based model had an overall scale Cronbach's alpha of 0.8881 but with unsatisfactory goodness of fit indicators (RMSEA=0.051, 90%CI: 0.044-0.057, *p*<sub>close</sub>=0.427; chi-square = 694.28, *p*<0.001; CFI=0.884, TLI=0.871). The modified final model had overall scale Cronbach's alpha =0.8967 and satisfactory goodness of fit indicators (RMSEA=0.030, 90%CI: 0.019-0.039, *p*<sub>close</sub>=1.000; chi-square = 424.98, *p*=0.002; CFI=0.966, TLI=0.960).

**Conclusion:** Despite satisfactory scores on clarity, face validity was lacking based on qualitative data; thus necessitating modification. Content validity was highly adequate, while construct validity required modifications in construct specifications. However, the overall scale reliability and construct-level reliability were adequate both before and after specification modifications.

**Key words:** patient safety culture, SAQ, tool validation, validity, Ugandan context

### **3.1.13.4 Lived experiences of patients on Hemodialysis Treatment in Kiruddu National Referral Hospital: A Phenomenological study**

**Alobo Jennifer Ogwang, Beebwa Esther, Sara Groves**

**Background:** There is increasing number of hemodialysis patients globally. Patients on hemodialysis experience physical and emotional stress due to the changes brought by chronic kidney disease.

**Aim:** study aimed to explore the lived experiences of individuals receiving hemodialysis treatment at Kiruddu National Referral Hospital.

**Methods:** The study utilized a qualitative approach with a phenomenological design. Data was collected using audio tape recording of the interview from 9 participants selected through purposive sampling in Kiruddu National Referral Hospital. The thematic aspects of the lived experience were uncovered using Van Manen data analysis which included three approaches: the detailed or line-by-line approach, selective or highlighting approach and holistic approach.

**Results:** Six themes emerged during the analysis as hemodialysis prolongs survival, hemodialysis indispensable, family financial support, physical limitations, emotional distress and adaptation.

**Conclusion:** It was concluded from the findings that the patients undergoing haemodialysis are facing a wide range of challenges such as physical and emotional challenges during the course of their treatment and perceive haemodialysis as the only way of survival and these challenges need to be addressed. Understanding gained in this study can help nurses to utilize this information in improving the quality of nursing care and guide patients to provide positive reinforcement for their future living.

**Keywords:** Lived experiences, Hemodialysis, Phenomenology, Adaptation

### **3.1.13.5 Recognition and Management of Febrile Seizures in Children: Caretakers' Perspectives at Mulago National Referral Hospital, Uganda**

**Jalia Nakandi Serwadda, Atwine Fortunate**

**Introduction:** Febrile seizures are the most common neurological disorder in children and among the major reasons for emergency admissions. Febrile seizures can occur at home at any time. It is very frightening, and emotionally draining for the caretakers to witness their children during the seizure. Given the frightening nature of the condition, caretakers are expected to seek urgent medical care. However, in most cases children with febrile seizures are presented late for medical care. There is limited information on what the caretakers recognize as the causes of febrile seizures and what they do to treat these seizures.

**Aim:** The aim of the study was to explore caretakers' recognition of causes and management of febrile seizures of children from caretakers' perspective based on cultural practices at Mulago National Referral Hospital.

**Study design:** The study employed a descriptive study design using qualitative methods.

**Methods:** Data collection was by individual long interviews in order to collect data devoted to understanding the cultural categories that characterize the participants' experience. The interviews were audio recorded and transcribed verbatim. Nine categories including cultural and analytical categories were generated using McCracken 1988 data analysis.

**Results:** 21 caretakers were purposively selected. Participants highlighted febrile illnesses, cultural, social and indigenous religious beliefs as the causes of febrile seizures. The participants tried to stop seizures by inhalation of sturdy odor and weird scent from dirty shoes, ingestion of herbs or water in which a chameleon or a nest of a weaver bird was immersed. Practices like burning the feet, swinging the child held upside down and smearing children with kerosene were also used to stop seizures. Despite all these practices, caretakers still brought the children to hospital

**Conclusion and Recommendation:** Caretakers' practices towards the children with seizures were improper and at times harmful. Health workers should educate caretakers about prevention of seizures and first aid management in case of a seizure. The study could form the foundation of health education program with the aim of reducing infant mortality due to indecorous management of seizures at home.

**Keywords:** Caretakers Cultural practice, febrile seizures, beliefs, Nurses

### **3.1.13.6 Neonatal Resuscitation Knowledge and Practice among healthcare providers of greater Kabale Heath Sub District Centers: Cross Sectional Study**

**Brenda Ninsiima Florence Beinempaka**

**Introduction:** The process of child birth takes several hours but the most crucial moments for newborn child survival are a few hours after birth with the risk of dying decreasing as the child grows. It is difficult to predict neonatal asphyxia before birth therefore effective preparation for emergency resuscitation should be ensured in every unit where a baby is born. Health Care Providers (HCPs) with sufficient knowledge and skills of basic NR prevent most of early neonatal deaths related to asphyxia.

The broad objective of the study was to assess the Neonatal Resuscitation (NR) knowledge and practice of HCPs of heath sub district centers of greater Kabale south western Uganda.

**Methods:** This was a cross sectional, descriptive study. HCPs in heath sub district centers were conveniently enrolled in the study; observation checklist and structured questionnaire were used for NR practice and self-report of NR knowledge respectively. Data analysis was done by Stata version 12 and results presented in tables and graphs.

**Results:** Data was collected in 5 health center fours and 16 health centers threes. There were 33 participants in which 9 were males and the rest females with age mean of 33 (SD=5.65) years. Majority participants scored poor practice across all 4 principle NR steps. Over all NR knowledge level of most observed participants 29(88%) was insufficient (<75%). NR support Supervision had significant relationship with the drying and stimulation step of NR. HCPs that had poor practice if supervised had 16% chance of improving and those who had fair had 5% chance of improving.

**Conclusion:** HCPs in Heath sub district centers have a significant gap in NR knowledge and practice. There is a positive association between support supervision and quality of NR. This study did not find a significant relationship between knowledge and hands on NR skill. A full scale study should be done to provide for generalizability. It is important to implement regular HCP Support supervision to improve quality of NR among HCPs in Health Sub District Centers.

**Key Words:** Neonatal Resuscitation, Health Care Providers, Neonates, Neonatal asphyxia

### **3.1.13.7 Outcomes of cardiovascular emergencies and their predictors among adult patients attending Uganda Heart Institute, Mulago National Referral Hospital-Uganda**

**Peninah Komugabe, Eva Wanyenze.**

**Back ground:** Cardiovascular emergencies are a public health problem with a high burden in low-income settings all over the world. Outcomes of CVEs and their predictors are scantily documented in Uganda. This study was intended to identify the outcomes of CVEs and their predictors among adult patients attending Uganda heart institute (UHI) Mulago Hospital, Uganda.

**Methods and materials:** A retrospective study of adult patients' charts/records from inpatients files at the UHI was reviewed for the year 2018. A convenience sampling method was employed to identify potential patients' charts for, and then systematic sampling was used to extract charts

for review. Patients' data on sociodemographic, presenting signs and symptoms, cardiovascular risk factors, Co-morbidities and emergency interventions. It was coded and entered into EpiData software, thereafter exported to Stata version 14.0 for statistical analysis. The association of outcomes of CVEs and their predictors were measured by logistic regression analysis.

**Results:** We recruited 384 patients' charts with confirmed clinical diagnoses of cardiovascular emergency from a total 1124 potential patients' charts. Outcomes of CVEs were mortality 43(11.2%) and development of new complications 42(12.3%) among discharged patients. Patients who stayed over 24rs with (aOR=0.2, 95%CI: 0.07-0.41, p<0.001) had lower death rates, presentation with dyspnea was three folds predictive of death than those who didn't have. Patients between 60-69years of age were (aOR=2.7, 95%CI: 1.04-16.62, p<0.044) more likely to die than other age groups and the unmarried were (aOR=3.7, 95%CI: 1.14-12.32, p<0.030) almost four times more likely to get poor CVE outcomes than the married.

**Conclusion:** The occurrence of mortality and development of new complications in cardiovascular emergencies within 30days of hospital stay are relatively high. Predictors of outcomes of CVEs were short time hospital stay (first day of admission), marital status (the unmarried) and patients presenting with dyspnea. We recommend timely identification, early continued empowerment of front liners and general public, timely interventions both at health system and community levels with the aim of improving emergency response system. A prospective is recommended to mitigate missing data associated with record chart reviews, and multicenter studies would be more informative for better generalizability.

**Keywords:** Cardiovascular emergencies, predictors, short-term outcomes and mortality.

### 3.1.13.8 Experiences of post ICU survivors from Mbarara Regional Referral Hospital

**Nagaba Ritah, Atuhaire Catherine**

**Introduction:** Post ICU survivors may experience traumatic events which may persist after discharge from the ICU. Since there are no home visits or social support services specific for these survivors in Uganda, it's not clearly documented what these post ICU patients experience after they have reached home.

**Aim:** The aim of the study was to explore the experiences of Post ICU survivors from Mbarara Regional Referral Hospital

**Methods:** A descriptive phenomenological study employing qualitative methods of data collection was used

**Results:** The study findings were highlighted under five themes: Psychological changes, physical changes, social changes, financial hitches and perceived needs. They seemed to remain with emotional distress for a long period after discharge and their physical wellness was questionable. They remained in pain and sustained physical deformities. They endured stigma, unsocial life and financial crisis. The perceived needs by the survivors included need for post ICU continuity of care and financial support.

**Conclusion:** Post ICU survivors undergo a lot of distressing experiences that range from psychological, social, economic and physical challenges. They are also faced with various needs

as they struggle to regain their original state of health. Establishment of post ICU continuity of care services would be very vital in addressing most of these challenges to prevent further deterioration and improve health related quality of life.

**Keywords:** Intensive care unit, patient discharge, qualitative study, experiences, survivors.

### **3.1.14 MASTER OF MEDICINE IN PATHOLOGY**

#### **3.1.14.1 Four year prevalence of Tmprss2-Erg Fusion Gene and its relationship with the Pathological Features of Prostate Cancer among Patients at Mbarara University of Science and Technology Pathology Department**

**Mitala Yekosani, Atwine Raymond**

**Introduction:** Currently, prostate cancer screening is done using prostate specific antigen (PSA) alone or combined with digital rectal examination (DRE) both of which have a low sensitivity and a low positive predictive value for Prostate cancer. This leads to over diagnosis and over treatment of the patients including those with an indolent disease, which increases the complications, related to treatment and diagnosis of prostate cancer.

**Objectives:** In this study, we determined the prevalence of one the potential screening parameter (TMPRSS2-ERG fusion gene) using ERG protein as its surrogate marker and its relationship with prostate cancer grade groups. We also determined the commonest grade group of prostate cancer at diagnosis using the International Society of Urologic Pathologists (ISUP) grade group system on hematoxylin and Eosin stained slides.

**Methods:** It was a cross-sectional laboratory based study utilizing archived prostate specimens. We included 130 trucut and transurethrally resected prostate biopsies collected over a period of 4 years and 3 months (January 2016 to March 2020). Anti-ERG primary (EPR 3864) antibody from Abcam was used as the immunohistochemical marker of the fusion gene.

**Results:** Source patient age was between 50 years and 107 years. The TMPRSS2-ERG fusion gene was prevalent in 93.1% (121/130) of the specimens; grade group 5 was the commonest, followed by grade group 1. We found no relationship between the distribution of the fusion gene and the grade groups and the grade groups were also independent of the source patient age.

**Conclusion:** there is a high prevalence of TMPRSS2-ERG fusion gene among our patients and its presence is independent of the prostate cancer grade group. A significant number of patients present with advanced disease at diagnosis.

### **3.1.15 MASTER OF SCIENCE IN MICROBIOLOGY**

#### **3.1.15.1 Antimicrobial Resistance Patterns and Molecular Characterization of *Klebsiella pneumoniae* in Clinical Isolates at Mbarara Regional Referral Hospital**

**Joseph Turugurwa' Taseera Kabanda**

**Background:** *Klebsiella pneumoniae* is one of the most frequent opportunistic pathogens causing a range of infections and producing enzymes ESBLs, carbapenemases which are responsible for its resistance to beta-lactamases antibiotics including carbapenems.



**Aim:** The aim of the present study was to determine the antimicrobial resistance patterns and molecular characterization of *Klebsiella pneumoniae* in clinical isolates at Mbarara Regional Referral Hospital (MRRH)

**Materials and Methods:** A laboratory-based descriptive cross-sectional study that was conducted from September 2018 to May 2019 at MRRH.

*Klebsiella pneumoniae* was identified by cultural and biochemical methods. Antibiotic sensitivity test was performed by modified Kirby-Bauer disc diffusion technique. ESBL production in *Klebsiella pneumoniae* was tested by double disc synergy test, Carbapenemase production by MHT, Boronic Acid or EDTA test using Meropenem phenotypically and both resistance confirmed genotypically by Multiplex PCR.

**Results:** Out of 1055 clinical isolates, 298 (28.2%) were found positive for *Klebsiella*.spp, 175 isolates were sub cultured among which 22 (12.57%) were *K. pneumoniae* based on API 20E. Overall Sensitivity patterns of these *Klebsiella pneumoniae* isolates to Ceftriaxone, (Amoxicillin/Clavulanate), Gentamicin, Cefepime, Ciprofloxacin, Cefoxitin, Nitrofurantoin, Cefuroxime, piperacillin/tazobactam, Meropenem, Ceftazidime and cefotaxime were 72.7%, 63.7%, 54.5% , 45.5%, 31.8%, 31.8%, 27.3%, 27.3%, 22.7%, 22.7%, 18.2%, 9.1%, 9.1% respectively. ESBL producing *K. pneumoniae* was found at 68.18% (15/22) phenotypically. Genotypically; the ESBL genes were *bla*<sub>CTX-M</sub> (100%), *bla*<sub>SHV</sub> (80%) and *bla*<sub>TEM</sub> (100; 47%); 8/15 (73.3%) had CTX-M, SHV, TEM, 4/15 (26.67%) CTX-M, TEM, 3/15 (20.00%) CTX-M and SHV. Carbapenemase producing *K. pneumoniae* was found at 31.82% (7/22) phenotypically; 1/7 (14.28%) by MHT, 4/7 (57.14%) Boronic acid test and 2/7 (28.58%) EDTA test. Genotypically; 3/4 [(75%) 42.86%] had OXA-48, 1/4 [(25%) 14.28%] OXA-48 and KPC gene, 1/2 [(50%) 14.28%] KPC and VIM, 1/2 [(50%) 14.28%] KPC and KPC gene [(100%) 14.28%]. Antimicrobial susceptibility patterns the genotypically confirmed isolates showed that 31.8% were resistant to Ciprofloxacin, 18.2% Meropenem, 13.63% Colistin, 9.09% Ceftazidime/avibactam and Levofloxacin, 4.54% Ertapenem and there was no resistance for Imipenem.

**Conclusion/Recommendations:** A high prevalence of ESBLs producing *Klebsiella pneumoniae* (68.18%) and Carbapenem production at 38.82% was observed which calls for routine screening of this resistance phenotypically.

### 3.1.16 MASTER OF MEDICAL LABORATORY SCIENCE

#### 3.1.16.1 Sero-antigen prevalence, risk factors of Lymphatic Filariasis and Podoconiosis in Busiriba sub County Kamwenge District South Western Uganda

**Mwesigye Vicent, Nyende Michael Kakaire, Mucunguzi William**

**Background:** Lymphatic filariasis (LF), commonly known as elephantiasis, is a neglected tropical disease that occurs when filarial parasites are transmitted to humans through mosquitoes (WHO, 2017). The painful and profoundly disfiguring visible manifestations of the disease, lymphedema, elephantiasis and scrotal swelling occur later in life and can lead to permanent disability (WHO, 2017). LF is caused by *Wuchereria bancrofti*, *Brugia malayi* and *Brugia timori*. The study was cross sectional and carried out from August to september2018.

**Aims/Objectives:** To determine the Sero – antigen prevalence, risk factors of lymphatic filariasis and podoconiosis in Busiriba sub county Kamwenge district south western Uganda.

**Methods / Materials:** The study was conducted in Busiriba sub-county, Kamwenge district, south Western Uganda approximately 400km from Kampala which is the most badly hit by elephantiasis. A total number of 101 participants were recruited and 4 mls of blood samples were collected in plain vaccutainer tubes and transported to the laboratory, centrifuged, aliquoted and tested for Filarial Circulating antigen using Immunochromatographic Test (Alere Scarborough, Inc. 10 Southgate Road, Scarborough, ME 04074 USA) . Soil samples were collected and tested for silicon using inductively coupled plasma spectrophotometer (ICP).

**Results:** Out of 101 participants 39 (38.61%) were males and 62 (61.39%) females. The overall Sero antigen prevalence of lymphatic filariasis was 1.0%. And 99% tested negative for filarial antigen. Participants who had elephantiasis and tested positive had filarial elephantiasis and those who tested negative but had elephantiasis had Podoconiosis. The prevalence of non-filarial elephantiasis (Podoconiosis) was found to be 34.1% (35/101) (95% CI 25.5 – 44.8%).

**Conclusion:** The Sero antigen prevalence of lymphatic filariasis was found to be 1.0%. Prevalence of Podoconiosis was found to be 34.1%. The average silicon concentration was found to be 36.1ppm (mg/kg of soil). The average pH was 6.2 (range 5.6–6.8).

**Recommendations:** Further research to better understand the genetic dynamics of the Podoconiosis victims in Busiriba Sub County, We recommend foot care and wear to avoid prolonged exposure of feet to soils. There is need to enhance sensitization about prevention and control measures about the two diseases. **Funding:** Makerere-SIDA Research Programme.

**Keywords:** Filariasis, Sero Antigen Prevalence, Podoconiosis, Silicon.

### **3.1.16.2 The prevailing species of African Trypanosomes and Tsetse Flies in Omugo, Koboko, and Inve areas in the West Nile Region of Uganda**

**Embama Angelo Bindu, Michael Nyende Kakaire, Johan Esterhuizen, Selby Richard**

African Trypanosomiasis exists in 37 sub-Saharan African countries and impact on livestock production and human health. Of these, Uganda is the only country known to have both Rhodesian and Gambian forms of sleeping sickness although both sub-species have historically remained geographically isolated with, the Gambian form endemic in the northwest part of the country and the Rhodesian form in the south-eastern. Cattle and human movements into West Nile which is the foci for *T. b. gambienseis* increasing the threat of the introduction of the zoonotic *T. b. rhodesiense* in to the West Nile Region. This study, therefore, investigated the prevailing species of African trypanosomes and tsetse flies in Omugo, Koboko, and Inve areas in the West Nile Region of Uganda.

A total of 259 humans and 238 cattle constituted the human and animal sample sizes respectively from which 40 micro-liters whole blood were collected from each study subject by vein puncture into two heparinised capillary tubes and onto Flinders Technology Associates (FTA) cards.

CATT Test/ microscopy, and Hematocrit/microscopy tests were done for humans and cattle respectively to determine presence of trypanosomes. Ten Epsilon traps (odour-baited with an attractant made from acetone, phenols and octanol) were used to trap tsetse flies, 222 tsetse flies were dissected and examined microscopically for presence of trypanosomes. All Microscopy positive tests were subjected to PCR analysis for trypanosome species identification.

The study revealed that 1.54% of the human subjects tested positive for the Card Agglutination test for *Trypanosome b. gambiense* (CATT/T.b.g) but no trypanosomes were seen in blood smear microscopy examinations. Further, 15.13% of the cattle were infected with at least one of the trypanosome species detected namely *T. Congolense*, *T. Vivax*, *T. brucei brucei* and *T. brucei gambiense*. The most prevalent species was *T. congolense* (8.12%) followed by *T. vivax* (4.49%) and *T. brucei brucei* (1.93%). *T. brucei gambiense* was the least prevalent at 0.32%. The double co-infections observed were *T. Congolense/ T Vivax* 6(2.52%), *T Vivax/ T. brucei brucei* and *T. Congolense /T. brucei brucei* 2(0.84%). Only one cattle had co-infection with three species; *T. Congolense / T Vivax / T. brucei brucei* 1(0.42%). Overall prevalence of Trypanosome infection among Tsetse flies was 5.95 % (9); with *T. Congolense*, 3.29% (6), *T. Vivax* and *T. brucei brucei* 1.76% (2). Only two species of tsetse flies were identified, *G. fuscipes fuscipes* 95.48% (190) and *G. morsitans* 4.52%.

In conclusion, 1.54 % of humans had circulating antibodies against *T. b. gambiense*. The prevailing trypanosome species in cattle were. *T. Congolense*, *T. Vivax*, and *T. brucei brucei*. In addition, cattle were found to be reservoir hosts of *T. b. gambiense* which infect humans. *G. fuscipes fuscipes* and *G. Morsitans* were the prevailing tsetse species in the study area and were found to be infected with *T. Congolense*, *T. Vivax* and *T. brucei brucei*.

### **3.1.16.3 Diagnostic Performance of the Ultra-Sensitive Rapid Diagnostic Test for Malaria in Febrile Children Attending Bugoye Health Centre III**

**Abalinda Mary Gorret, Michael Nyende Kakaire**

**Introduction:** Management outcomes of malaria, a major disease burden in Uganda, are dependent on its proper diagnosis which is mostly done using RDTs. Other diagnostic tools such as microscopy and molecular test such as PCR are expensive, need sophisticated skills and are not available in rural and resource limited areas where malaria remains a great burden. With microscopy and currently used RDTs not ably detecting low density malaria parasitemia, the malaria reservoir remains a threat and a hindrance to malaria elimination. A new ultrasensitive RDT has been manufactured and is said to be highly sensitive with a low Limit of detection. In this study, the diagnostic performance of Alere Malaria Ag P.f Ultra -Sensitive RDT was assessed together with SD Bioline Malaria Ag P.f/Pan RDT in febrile children at Bugoye Health Center III against microscopy as a reference standard.

**Methods:** Capillary blood samples of 86 febrile children were tested for malaria using the usRDT, the dual band RDT and microscopy. The diagnostic performance of the 2 RDTs was obtained using microscopy as the reference standard.

**Results:** Out of 86 participants, 34 (39.5%) were positive for malaria using Microscopy. The sensitivity, specificity of the usRDT was 97.1% and 98.1% respectively while that of the dual Ag band RDT was 94.1% and 98.1% respectively. The us-RDT detected 12/13 (92.3%) of the low level parasitemia while the dual Ag band detected 11/13(84.6%).

**Conclusion:** The findings of this study suggest that the performance of the usRDT is acceptable according to WHO standard requirements of an ideal diagnostic test and hence can be used in case management and malaria reservoir identification in the venture to eliminate malaria since it detected a larger proportion of low level parasitemia compared to the dual Ag band RDT.

### **3.1.16.4 Outcomes of Dengue Virus RT-PCR testing of blood samples from febrile patients attending Mbarara Regional Referral Hospital** **Reginah Nakakande, Lucas Ampaire, Edgar Mulogo**

Dengue is the most rapidly spreading mosquito-borne viral disease in the world and an estimated 50 million dengue infections occur annually where 16% of which are occurring in Africa. The presence of *Aedes aegypti* mosquitos, dengue outbreaks in neighboring countries, and confirmed cases among returning travelers are strong indirect evidence to suggest that dengue transmission is endemic in the African region including Uganda. The objective of this study therefore, was to determine the outcomes of Dengue Virus fever testing of blood samples from febrile patients attending Mbarara Regional Referral Hospital. ). A nested cross-sectional study was conducted where after consent was obtained, eligible children were screened for malaria with a HRP-2 based rapid diagnostic test (RDT). Individuals with a positive result were excluded from further consideration, while those with a negative malaria test underwent additional testing with a dengue RDT (Dengue Duo, SD Bioline). Whole blood was collected in serum separator tubes (SST) for RT-PCR (Real Star, Altona Diagnostics) from 442 children (median age 5 years, IQR 2-10). Out of the 442 serum samples, only one (1) sample tested positive (IgG) with dRDT and none was confirmed positive for dengue viral infection with RT- PCR. The study therefore established that there were no positive cases for dengue virus infection with the RT-PCR. In view of the study findings, there is need for more research to explore other age groups.

## **4.0 FACULTY OF SCIENCE**

### **4.1 MASTER OF SCIENCE IN BIOLOGY**

#### **4.1.1 Neural tube defects prevalence and dietary Folate consumption by females: Folate quantification in leafy vegetables and its retention in Biofortified Porridge**

**Denison Tamale, Kagoro Grace R, Muliro Patrick**

Neural tube defects' (NTDs) occurrence among newborns is due to several reasons, folate (one of the diet micronutrients) deficiency being at the forefront. This study's main objective was to determine the dietary diversity for women of reproductive age (WRA) in Mbarara District in order to reduce neural tube defects among children through fortification of maize flour with folate from common green leafy vegetables for consumption as porridge. Pediatrics ward records of Mbarara Regional Referral Hospital (MRRH) from January, (2016) up to August, (2017) were used to determine number of NTDs. For dietary survey, a 48 hour recall questionnaire was administered randomly to 402 WRA in Mbarara. Folate content for seven most consumed green leafy vegetables from *Cucurbita maxima*, *Vigna unguiculata*, *Phaseolus vulgaris*, *Amaranthus ssp*, *Solanum nigrum sensulato*, *Manihot esculentum* and *Spinacia oleracea* was quantified. Fortification of maize flour was done using the most common leafy green vegetables

(*S.oleracea*, *Amaranthus* sp and *S.nigrum* sensulato), one vegetable at a time and the folate retained by the cooked fortified porridge was determined. All folate analysis was done using an HPLC system. According to the results, 47% NTD cases recorded among children treated at MRRH in a period of 20 months were from Mbarara District. There was no significant association between NTDs and sex established ( $P \geq 0.05$ ). About 70% of WRA attained high Individual Dietary Diversity Score (IDDS) of ( $\geq 6$ ). Only 45.1% WRA consumed folate rich plant and animal sources, of which 4.8%, 8.4%, and 17.6% WRA consumed green leafy vegetables, vitamin rich fruits and animal sources respectively. All the studied green leafy vegetables contributed more than the optimal 50% to food folate RDA of WRA with *C. maxima* and *V. unguiculata*'s contribution of 499.13 $\mu$ g/100g and 433.48 $\mu$ g/100g respectively exceeding 100% of folate RDA. Only *S. oleracea*-fortified maize porridge retained more than 53% of its original folate. The prevalence of NTDs in Mbarara District is high amidst most WRA consuming diverse diets; this is attributed to a very low consumption of green leafy vegetables that contain a high folate content which contributed substantially to WRA folate RDA. Green leafy vegetable fortification of maize flour is a possible and suitable intervention to undertake to increase the dietary folate intake by WRA to curb the NTDs occurrence among children in Mbarara District.

**Keywords:** Individual Dietary Diversity Score, Folate, Fortification, Neural tube defects, WRA

#### **4.1.2 Phytochemical composition and antimicrobial activity of *Symphonia globulifera* and *Allophylus abyssinicus***

##### **Ben Lukubye**

*Symphonia globulifera* and *Allophylus abyssinicus* are used in the management of ailments including skin rashes and sores, cutaneous leishmaniasis, cough, malaria, digestive diseases, stomach ache, wounds, helminthic infections among others in Uganda, Kenya, Ethiopia, and Cameroon. This is suggestive of the presence of bioactive compounds in these trees; however there has been limited or no scientific empirical evidence about the antimicrobial activity of these plants.

The study determined the phytochemical composition and microbial activity of *Symphonia globulifera* and *Allophylus abyssinicus*. Stem bark and leaves of the two plants were collected from Bwindi Impenetrable National Park, air dried and grinded into fine powder. Extraction was carried out using methanol, water and ethyl acetate by cold maceration, decoction and infusion. Phytochemical profiling was carried out using qualitative screening methods and thin layer chromatography. Antimicrobial activity was investigated using agar well diffusion assay, macro broth dilution assay and fractional inhibition concentration index. The stem bark and leaf extracts of *S. globulifera* and *A. abyssinicus* had a wide range of phytochemical compounds in varying concentration. Leaf water extracts of *S. globulifera* and *A. abyssinicus* stem bark methanol extracts of *S. globulifera* and *A. abyssinicus* and the leaf methanol extracts of *A. abyssinicus* had the highest diversity of phytochemicals like anthraquinones, quinones, flavonoids, tannins among others. In regards to antimicrobial activity, *S. globulifera* leaf water extract and *A. abyssinicus* leaf water extract had the strongest over all antimicrobial activity against *S. aureus*. *Allophylus abyssinicus* leaf water extract and *S. globulifera* leaf water extract proved to have strongest activity against *E. coli* and *Allophylus abyssinicus* leaf water extract showed the strongest anti- *P. aeruginosa* activity. *Allophylus abyssinicus* leaf water and *Symphonia*

*globulifera* leaf methanol extract combination had a synergistic activity (SFIC=0.37) against *S. aureus*. Majority of the combinations had indifferent or non-interactive combination effect against *E. coli*. *Allophylus abyssinicus* stem bark water extract and *A. abyssinicus* leaf water extract combination was the only combination with an additive effect against *P. aeruginosa*. The above listed extracts and combinations with significant antimicrobial activity need to further be investigated for their in-vivo activity against microbes (*S. aureus*, *E. coli*, *P. aeruginosa*), toxicity, pharmacodynamic and pharmacokinetics to provide sufficient empirical evidence towards drug development.

**Keywords:** *Allophylus abyssinicus*, *Symphonia globulifera*, Antimicrobial activity, Phytochemical profile

#### **4.1.3 Fungal Contamination and Aflatoxin Occurrence along Production Stages of Ajono (Local Brew) from Soroti District, Eastern Uganda**

**Nantumbwe Sarah**

Local brews are widely consumed beverages that are diverse in composition, taste and nutritional value. The grains from which local brews are made are often contaminated with fungi which produce mycotoxins that are known to have adverse effects to human and animal health. In addition, handling practices along the production stages of the local brew may create a conducive environment for fungal colonization. Therefore, the aim of this study was to assess fungal and aflatoxin occurrence along the production stages of Ajono (local brew) from Soroti district, Eastern Uganda. In this study, a total of 180 samples were collected from the three stages of Ajono production. An interview guide was used to assess the processing practices of Ajono while fungal contamination was assessed using standard methods. Thin layer chromatography and competitive ELISA techniques were used for screening and quantification (ppb) of aflatoxins in the samples. The study showed that the brewers used plastic drums (50%), pits (47%) and pots (3%) as vessels for fermentation. The study found three main stages during Ajono production which were; millet grain, fermented paste and the liquid stage. *Aspergillus* spp. was the most prevalent moulds at all stages of local brew production. Besides *Aspergillus* spp., other moulds were also identified along the production stages of Ajono and these included; *Fusarium* spp., *Alternaria* spp., *Rhizopus* spp., *Penicillium* spp., *Cladosporium* spp., and *Acremonium* spp. In addition, only two yeasts genera were isolated which were; *Saccharomyces* spp. and *Candida* spp. Aflatoxin B and G groups were detected along the production stages of Ajono with the highest prevalence of Aflatoxin B (31.3%) in samples of the liquid stage from plastic drum fermenters. Furthermore, the highest aflatoxin levels ( $14.16 \pm 3.13$ ppb) were in the paste stage using plastic drum fermenters. Plastic drum fermenters produced the highest percentage (46.9%) of paste samples with aflatoxins above East African Community permissible limits (10ppb). Results also showed that plastic drum fermenters produced paste with the highest proportion (81.3%) of samples above European Union aflatoxin permissible limits (4ppb) compared to pit (57.1%) fermenters. In conclusion, Ajono was contaminated with aflatoxin levels above the permissible EU standards. Generally, samples from plastic drum fermentation vessels had higher levels of fungal and aflatoxin contamination than those from pit. Therefore, this study recommends use of pit as a vessel for fermentation. However, brewers should pay attention to

the quality of the raw materials used and ensure hygiene along the entire production chain of Ajono so as to reduce fungal and aflatoxin contamination.

#### **4.1.4 Pesticidal Properties of Selected Plant Species on Pests of Brassica Vegetables in Rubirizi District, Southwestern Uganda**

**Racheal Lamara**

*Brassica* vegetables are important high yielding food crops grown in nearly all Ugandan districts. However, the biggest constraints to their production are insect pests. The use of conventional pesticides has in recent decades become a concern due to environmental contamination; high pesticide residues in produce; health risks; and increased production costs. As a result, there has been increased interest in the application of botanical pesticides which are more environmentally friendly, cheaper and readily available. The objectives of this study were to: document the pests of *Brassica* Vegetables in Katanda Sub-County, Rubirizi District, establish the control measures used by Katanda Sub-county farmers against the pests, determine the effectiveness of crude aqueous extracts of selected plant species (neem, endod, chilli pepper, onion, Mexican marigold and their biorational) on the pests, and profile the phytochemicals in the selected plants that are responsible for the pesticidal properties. Questionnaires were used to get data on *Brassica* pests and their control measures. An evaluation of fresh plant extracts was carried out against important *Brassica* pests in the field basing on the percentage reduction in pest prevalence, leaf damage levels and marketable cabbage heads of the plant extracts against the control. Dry crude extracts obtained from the plants were screened to detect the phytochemicals responsible for the pesticidal properties. The concentrations of these phytochemicals were determined based on their measured absorbance using the linear equation of the calibration curve. The major *Brassica* pests mentioned were cabbage aphid, diamondback moth, cabbage webworm, cabbage looper, cutworm, locusts, snails and black ants. The management practices included application of chemical pesticides, botanical sprays, mulching and uprooting infested plants. Except for cabbage aphid and DBM, the results suggest that extracts from chilli pepper, neem, marigold and the biorational of all five plants reduced *Brassica* pest infestation below economic threshold levels. Phytochemical analysis showed that the aqueous extracts of the pesticidal plants contained tannins, flavonoids, cardiac glycosides, steroids, alkaloids and saponins. The phytochemicals occurring in the plant extracts were at varying concentrations and proportions. Aqueous extracts of chilli pepper and neem with higher quantity of bioactive compounds were more effective in *Brassica* pest control than onion, Mexican marigold and endod extracts which had lower quantities of bioactive components. The use of biorationals proved to be a better alternative than the sole plant extracts as they gave better protection against the pests.

**Key words:** Aqueous extracts, *Brassica* pests, Efficacy, Pesticidal plants, Phytochemicals.

#### **4.1.5 Agronomic Evaluation of Selected Nutrient and Anti-Nutrient Composition of Colocasia Esculenta (L.) Schott Varieties Grown Under Upland Conditions of South Western Uganda**

## Mellon Tumuhimbise, Eunice A. Olet, Grace. K. Rugunda

*Colocasia esculenta* (L.) Schott is commonly grown in wetlands/water logged areas and yet wetlands have their own natural significances and so need to be conserved. This research was therefore aimed at evaluating the yield and physicochemical composition of *C.esculenta* under upland conditions as compared to when grown in wetlands. A randomized complete block design experimental garden was set up at Mbarara Zonal Agriculture Research Development Institute under dry upland conditions. Planting materials of *C.esculenta* varieties grown in south western Uganda were collected from four agro-ecological zones. Soil was sampled from areas where planting materials were collected and from the experimental garden before planting, for analysis. The soil result revealed a significant difference between Upland and Wetland soil parameters,  $P \leq 0.05$ ,  $df=1$  at 95 % confidence except pH which was insignificant ( $P=0.078$ ). A total of 109 accessions were planted on 4<sup>th</sup> September, 2017 in three replicates according to districts of collection since the crop varieties were not yet identified. Quantitative growth measurements of various morphological characters including plant span, petiole length, sheath length, lamina length, lamina width, and lobe length and leaf surface area were taken starting from one month and continuously every after two weeks of considerable change in growth for nine months. The qualitative characteristics of upper leaf color, lower leaf color, leaf petiole color, vein color, vein junction color, leaf margin color of all cocoyam plants were recorded alongside the quantitative parameters. At four months of planting, four varieties were identified and given codes, with the help of an Agronomist. The varietal groupings were confirmed by principle component analysis. The Shannon Weiner Index, H indicated that the most diverse character was sheath color ( $H=1.442$ ), followed by lower leaf color ( $H=1.006$ ), while leaf shape ( $H=0.311$ ) registered the lowest diversity. However, lobe line color (purple) and corm outer texture (rough) were monomorphic (100 % similar) among the four varieties grown. Corm characteristics were assessed at 9 months of maturity. Fresh corms and leaves of each variety were picked at random from the garden and from farmers whose *C.esculenta* was growing under wetland conditions, put in an ice box and taken to the Biochemistry laboratory of National Crop Resources Research Institute (NACCRI) Namulonge, for biochemical analysis. There was a strong positive correlation between lamina width and lamina length ( $r=0.960$ ,  $p=0.004$ , at 95% significance level), lamina length and leaf area ( $r=0.964$ ,  $p=0.036$  at 95% significance level), Among the varieties, variety 1 registered the highest yield under upland conditions ( $303.9\text{g}/\text{cm}^2$ ) followed by variety 3 ( $294.7\text{g}/\text{cm}^2$ ) while variety 2 had the least yield of  $252.2\text{ g}/\text{cm}^2$ . Upland mean corm weight was significantly different from wetland mean corm weight ( $p=0.004$ ). The nutrient results revealed no significant difference in nutritional composition (moisture, starch, total carbohydrate, protein, reducing sugars and fibre) of varieties grown between upland and wetland conditions  $P \geq 0.05$ ,  $df=30$  at 95% confidence. Anti-nutritional contents (cyanide and oxalic acid) were however the opposite with values significantly higher than WHO levels acceptable for human and other animal consumption,  $P=0.000$ . This was more for *C.esculenta* varieties when grown under upland that had even significantly higher cyanide content than when under wetland  $P \leq 0.05$ ,  $df=30$  at 95% confidence. Therefore, efficient methods of preparation like fermentation, sun drying and garification with palm oil are a prerequisite before consumption by humans or value addition to reduce cyanide below the required limits. Since results showed no significant variations in the nutritional contents of *C.esculenta* from both conditions and wetlands perform other unique roles other than agriculture, upland *C.esculenta* growing may be an alternative to save the wetlands.



#### **4.1.6 An assessment of forest recovery in formerly encroached forest areas of Kasyoha-Kitomi Central forest reserve of Southwestern Uganda**

**Makuru Robert, Julius B. Lejju, Morgan Andama**

This study assessed forest recovery after encroachment in Kasyoha-Kitomi Forest Reserve of South-Western Uganda. The objectives of the study were to establish the diversity and density of the woody species, diversity and density of the seedlings and saplings and the measures in place to restore the degraded forest areas. The study was mainly a cross-sectional survey in nature in which data was collected through observation; transect analysis and focus group discussions. Inventory data obtained from sample plots enabled measuring of tree species diversity and richness by using diversity indices; Analysis of the diversity of the woody species using the Shannon-Winner Index Value ( $H'$ ) and Index of Dominance (ID). The completed household interviews were coded and data from open ended questions were categorized into groups to enable easy coding and analysis. Quantitative data analysis was done using SPSS (Version 11.5) computer programme. Descriptive statistical analysis was carried out to measure central tendency and dispersion for understanding the distribution of responses from the respondents. Qualitative data was analyzed by carrying out content analysis. The closed forest stratum was found to be more diverse in terms of woody species than the degraded forest stratum. The degraded forest stratum was found to be more diverse in terms of Saplings and seedlings of ten key species commonly used by fringe communities than the closed forest stratum. Results of this study indicated that closed parts of Kasyoha-Kitomi forest are acting as seed sources for the previously degraded forest parts which are steadily being re-colonized by indigenous species. The study recommends intensification of conservation awareness campaigns in schools and communities regarding the merits of conserving forests.

#### **4.1.7 Farmers' pesticide use practices and pesticide safety standards of tomato production in Biharwe sub-county, southwestern Uganda**

**Arinaitwe Seriano, John Bosco Nkurunungi**

This study was carried out in Biharwe sub-county, southwestern Uganda to assess the farmers' pesticide management practices and their adherence to recommended pesticide safety standards for tomato production in the area. The data, which included pesticide residual concentrations in tomatoes, pesticide management and safety practices and acute illness frequencies, were collected by UV-Visible spectrophotometry, observation and survey methods.

The results revealed that seven pesticides, namely profenofos, dimethoate, malathion, mancozeb, thiophanate-methyl, cypermethrin and avermectin were used by the farmers, and the farmers applied pesticide doses that were significantly different from the recommended doses ( $p < 0.05$ ). Pesticide residues were detected in the tomatoes, with those of cypermethrin significantly higher than its WHO Maximum Residue Limit ( $p < 0.05$ ). Pesticide residue concentration was significantly ( $p < 0.05$ ) increased by farmers' short pre-harvest interval and combination of pesticides. A majority of farmers (67.2%) were non-compliant with the recommended safety practices. Consequently, they experienced acute illnesses more frequently (74.4 %). The only

aspect with which the majority of farmers complied was low spraying frequency (one a week) (54.4 %).

Most of the pesticide management practices and farmer demographics assessed were found significantly associated with multiple factors studied. Majorly, a good knowledge of pesticide hazards was significantly associated with higher education ( $\chi^2 = 26.822$ , d.f=1,  $p = 0.000$ ) and a good understanding of label instructions ( $\chi^2 = 3.606$ , d.f=1,  $p = 0.000$ ); fair use of PPE was directly significantly related with higher education level ( $\chi^2 = 9.637$ , d.f=1,  $p = 0.002$ ), a good knowledge of pesticide hazards ( $\chi^2 = 9.231$ , d.f=1,  $p = 0.002$ ), and a good understanding of label information ( $\chi^2 = 4.656$ , d.f=1,  $p = 0.031$ ); and high acute illness frequency was significantly related to high frequency of applying pesticides ( $\chi^2 = 7.181$ , d.f=1,  $p = 0.007$ ), poor use of PPE ( $\chi^2 = 13.961$ , d.f=1,  $p = 0.000$ ) and unreliable sources of information ( $\chi^2 = 4.310$ , d.f=1,  $p = 0.038$ ).

Generally, farmers failed to adhere to the recommended practices, thus compromising pesticide safety standards. Education and sensitization of farmers on safe pesticide use is recommended.

## **4.2 MASTER OF SCIENCE IN CHEMISTRY**

### **4.2.1 Potential Of Bio-Char from *Ficus Natalensis* (Natal Fig) Fruits in the Adsorption of Lead (II) and Copper (II) from Mono Syntheticaqueous Solutions**

**Musumba Godfrey, Emmanuel Ntambi, Nakiguli Caroline Kiwanuka**

Academic institutions, majorly secondary schools in rural areas with a science-based background usually use heavy metalsalts to make reagents to be used during practicalsessions. Among the commonly used heavy metals in such school laboratories include lead and copper from salts like lead (II) nitrate and copper (II) sulphate respectively. These end up in wastewater, which is not treated because such schools are not connected to the common treatment points. Such laboratories therefore discharge the wastewater to the environment, which compromises ground and surface water quality. Exposure to heavy metals may lead to health issues like kidney damage, mental retardation, nerve disorders, coma and/or even death. This called for the cheap, cost effective, and environmentally friendly technology for the removal of heavy metal ions from wastewater before their disposal to the environment. Removal of copper (II) and lead (II) ions from aqueous solutions was studied using bio-char from *Ficus natalensis* fruits. Batch adsorption procedures were carried out as a function of pH, contact time, initial metal ion concentration, bio-char dose, temperature and salinity. Heavy metal concentrations in equilibrium solutions were analysed using the atomic absorption spectrophotometer and the results were subjected to the Langmuir and Freundlich models to obtain the respective parameters.

From the study, it was observed that the optimum pH was 4.0 for lead (II) and 5.0 for copper (II) ions; the maximum temperature was 45°C for both metal ions. The maximum contact time was 60 minutes for both copper (II) and lead (II) ions at bio-char dose of 0.4g. The maximum adsorption capacity was found to be 161.29(Cu<sup>2+</sup>) and 1250 mg/g (Pb<sup>2+</sup>). It was also observed

that the presence of sodium and potassium ions reduced the percentage removal of metal ions from solutions by adsorption. Results fitted the Langmuir and Freundlich adsorption isotherm models and this was more for lead (II). Both Gibb's free energy and enthalpy change for lead (II) and copper (II) were found to be negative. From the results, it was concluded that bio-char from *F.natalensis* may be used as an adsorbent since its effective, cheap and environmental friendly.

#### **4.2.2 Levels of Hydroquinone, Mercury, Lead, Arsenic and Chemical Requirements in Selected Skin Lightening Creams Sold In Mbarara Municipality**

**Muloogi Derick, Irene Nalumansi, Denis Byamugisha**

**Background:** Skin lightening creams are among the possible sources of heavy metals and hydroquinone. In this study, skin-lightening creams commonly sold in Mbarara municipality were analyzed for chemical parameters (pH, thermal stability and fatty substance content), total hydroquinone, and Lead, Mercury, and Arsenic contents.

**Methods:** Total heavy metal content was determined by atomic absorption spectrophotometry. The levels of hydroquinone were determined using High Performance liquid chromatography (HPLC). Solvent extraction was used to determine total fatty substance content.

**Results:** All the creams showed detectable n levels of mercury, ranging from  $0.07\pm 0.01$  ppm to  $0.33\pm 0.01$  ppm. Only 26.31 % of the creams showed detectable levels of lead and 15.79% creams recorded detectable levels of arsenic. The mean levels of hydroquinone ranged from  $0.54\pm 0.02\%$  to  $4.47\pm 0.02\%$ . All the creams passed the thermal stability and fatty substance content tests. However, all the creams had very low pH values below the recommended 4.5- 8.5 pH ranges by UNBS. The levels of mercury, arsenic and lead in the samples were less than the UNBS, European Union and US Food and Drug Administration's acceptable limits. Only 84.2% of the cream samples analyzed contained hydroquinone levels higher than the recommended WHO limit of 2%.

**Conclusion:** The use of such creams may lead to serious health hazards. While the low concentrations of heavy metals detected in the cream samples analyzed do not pose any potential risk to consumers, repeated application of these creams may cause a cumulative effect over prolonged exposure. The low pH values may cause skin irritations.

**Recommendation:** The community should be sensitized on the implications of using skin lightening creams, and UNBS should conduct periodic analysis to ascertain the levels of hydroquinone, heavy metals, and chemical requirements of skin lightening creams sold in Uganda.

**Keywords:** Heavy metals, chemical requirements, hydroquinone, atomic absorption spectrophotometry, high performance liquid chromatography

#### **4.2.3 Leaching of Copper, Chromium and Lead into Drinks Put in Plastic Cups at Different Conditions**

**Ahimbisibwe Oliver, Denis Byamugisha**

The purpose of this study was to determine the concentration of copper, lead and chromium in drinks put in blue and green cups of plastics companies A and B in Uganda. Blue and green plastic cups were purchased from company A and B. Cups of luminarc white (Saudi Arabia) and porcelain white glazed (China) cups was purchased from the shops in Mbarara Municipality as controls. Ash from burnt blue and green plastic cups from companies A and B was digested for heavy metal analysis using aqua regia. Milk and tea samples got from the blue, green, luminarc-white and porcelain-white cups after a holding time of 30 and 60 minutes were also digested using the same acids. Samples analysis for the supernatants of digests was done in triplicates using an atomic absorption spectrophotometer (Agilent AAS). Blue and green cups from company A were found to contain the metals ranging between, lead (0.73 and 1.86ppm), copper (8.05 and 38.32 ppm) and chromium (655.80 and 756.57 ppm); while those for company B were lead (0.76 and 1.43ppm), copper (5.51 and 22.85ppm) and chromium (756.67 and 815.25 ppm). Company A cups leached metals ranging between copper (ND and 5.75ppm ) > chromium(ND and 0.60ppm ) > lead(ND and 0.41ppm ) and cups of company B leached copper between (ND and 3.59ppm ) > chromium(ND and 1.08ppm ) > lead(ND and 0.29ppm ) , mostly above the respective WHO permissible limits of 0.05, 0.05 and 0.01ppm except at combined study conditions of low temperature of 25 °C, with milk(pH 6.2) and for short drink holding time of 30 minutes. The luminarc white and porcelain white cups did not leach detectable amounts of copper, lead, chromium or concentrations above the WHO permissible limits hence safe for handling drinks while the blue and green cups from A and B should not be used.

#### **4.2.4 Removal of Chromium(VI) From Tannery Effluent Using Bio-Char of Phoenix Reclinata Seeds**

##### **Katenta Joseph**

This research investigated the potential of the Senegal date palm (*Phoenix reclinata*) seeds bio-char to remove chromium(VI) ions from tannery effluent by adsorption. It was aimed at providing an alternative method of removing poisonous chromium(VI) from tannery effluent and other aqueous systems before disposal. Adsorption experiments were performed on the tannery effluent using different contact times and adsorbent doses in the batch mode. Similarly, adsorption experiments were performed on aqueous potassium dichromate solution at different initial chromium(VI) concentrations, pH, temperatures, adsorbent doses, contact times and interfering anionic ions since the concentrations of solutes in the effluent could not be easily changed. The physical and chemical parameters of the effluent were determined and these included heavy metals which were determined using the atomic absorption spectrophotometer. *Phoenix reclinata* seeds bio-char of particle size 710 µm was used in the study and the residual chromium(VI) was determined using the atomic absorption spectrophotometer. The findings showed that the bio-char can remove up to 86% of the chromium(VI) in the effluent if its pH is adjusted to 2. Under similar conditions, the highest percentage adsorption from aqueous solution (97%) was registered at pH 1 but dropped to less than 10% at pH values above 2. The percentage removal from the effluent in its raw form (pH 9) was 5%. There was a general increase in adsorption with increase in temperature up to 60 °C (97.8%) but reduced when the temperature was raised to 70 °C (96.9%). The presence of interfering anions like chloride and nitrate ions

caused reduction in the adsorption of chromium(VI) from aqueous solution. As the initial concentration of chromium(VI) increased, the percentage adsorption decreased. The Langmuir and Freundlich models were used to evaluate the adsorption results. The adsorption process fitted both Langmuir and Freundlich adsorption models with correlation coefficients of 0.9923 and 0.8699 respectively. The maximum adsorption capacity,  $Q_0$ , was 0.6593 mg per gram of bio-char which indicates that PRS bio-char is a good adsorbent for the removal of chromium(VI) from aqueous solution. It can also work well with tannery effluent if the pH is adjusted to 2 by adding sulphuric acid ( $10\text{cm}^3$ , 1M) to 100 litres of the effluent. Therefore, PRS can be used by industries and institutions like secondary schools to treat effluents that contain chromium(VI).

### **4.3 MASTER OF SCIENCE IN MATHEMATICS**

#### **4.3.1 A Mathematical Model of Solid Waste Accumulation and Treatment with a Varying Human Population Size**

**Isaac Rukundo, Pias Ariho**

Solid waste management has continued to be an increasing challenge worldwide and the situation has become worse when it comes to urban areas of developing countries. The rapid urban population growth mainly due to high immigration and birth rates has led to large amounts of solid waste, making it difficult for authorities to effectively manage the accumulated waste. Unfortunately not all people who generate solid waste participate in its treatment and disposal. There is need to predict solid waste generated overtime in order to determine the feasibility of solid waste management strategies.

In this study, a mathematical model of solid waste accumulation with a varying human population size is developed and analysed. Parameters for human immigration and solid waste recycling are included in the model. We find that the model has one interior equilibrium point and no other equilibria. There exists a special case of the model for which there is no immigration and this gives two equilibrium: a boundary solution and one interior equilibrium.

A threshold parameter  $\Gamma$  is derived for the model with no immigration. Stability of the equilibria is analysed. The interior equilibrium exists when  $\Gamma > 1$  and is locally stable, otherwise the system has only the boundary equilibrium implying a possibility for extinction. Numerical simulations are done using ode45 of MATLAB to illustrate the results. In the absence of immigration, very low birth rates may result into extinction of both human population and solid waste. Increasing the recycling rate of non-biodegradable solid waste greatly reduces the accumulated solid waste. We conclude that the final size of solid waste can be controlled by controlling the birth rate of the human population, increasing the recycling rate and increasing biodegradability of solid waste.

### **4.3.2 Modeling Transimission and Control of Onchocerciasis in Uganda.**

**Muhumuza Raymond**

Onchocerciasis, usually referred to as river blindness, a skin and eye parasitic infestation caused by the filarial nematode *Onchocerca volvulus*, is one of the public health and socio-economic problems in Uganda. Besides thriving in low income earning societies, onchocerciasis is a poverty-enhancing prospect as it retards worker efficiency and childhood development, thereby hindering the future earning abilities of such children. Control of the disease has relatively been successful but there has been failure in interrupting transmission after more than 15 years. The failure in transmission interruption has mainly been caused by the continued existence and thriving of black flies, which is the disease transmitting vectors that breed along the banks of fast flowing and highly oxygenated rivers and streams in some parts of Uganda. This study therefore aims at investigating the effect of using vector traps in a bid to eradicate onchocerciasis in Uganda. A human host-black fly vector deterministic model is formulated and analysed for steady states and the basic reproduction number  $R_0$  is obtained using the next generation method. Analysis of the system in the absence of vector traps shows the presence of both the disease free and endemic equilibrium points. The disease free equilibrium point is locally asymptotically stable if  $R_0 < 1$  and unstable if  $R_0 > 1$ . It is also shown that the disease free equilibrium point is globally stable when  $R_0 < 1$ . The model is found to exhibit a backward bifurcation which implies that  $R_0 < 1$  is not sufficient to eliminate the disease from the population and therefore a need to lower  $R_0$  below a certain threshold for effective disease control. For  $R_0 > 1$ , there exists an endemic equilibrium point which is locally and globally asymptotically stable. The model is further extended to determine the effect of using vector traps in a bid to eradicate the disease. This model is shown to have both the disease free and endemic equilibrium points which are locally and globally asymptotically stable. Numerical simulations show that trapping the black fly vectors has an effect on the spread of the disease indicated by a fall in the infected acute and infected chronic human populations when trapping of the black flies is introduced. However, it is discovered that using traps alone is not a sufficient strategy and needs to be combined with other methods if the disease is to be completely wiped out of the population.

### **4.3.3 Estimation of the number of negative eigenvalues of a magnetic Schrödinger operators in a strip**

**Sorowen Ben**

An upper estimate for the number of negative eigenvalues below the essential spectrum for the magnetic Schrödinger operator with Aharonov-Bohm magnetic field in a strip is obtained. It's further shown that the estimate does not hold in absence of Aharonov-Bohm magnetic field.

### **4.3.4 Modeling the Effect of Seasonal Factors and Infective Immigrants on Malaria Transmission in Uganda**

**Victor Yiga, Julius Tumwiine, Hasifa Nampala**

Malaria is one of the world's most prevalent epidemics. Control and eradication efforts are being frustrated by rapid changes in climatic factors such as temperature and rainfall. Human movement is believed to contribute to the changes in the dynamics of malaria transmission. This study aims at assessing the impact of seasonal factors and infective immigrants on the intensity of malaria transmission in Uganda. A human host-mosquito vector deterministic model which incorporates temperature, rainfall and immigration with a proportion of infective immigrants is formulated using a system of ordinary differential equations. Steady states are obtained and the basic reproduction number  $R_{02}$  is computed using the next generation method. Analysis of the system shows that there is no disease-free equilibrium in presence of infective immigrants; however, there exists two disease free steady states in the absence of infective immigrants. It is found that the mosquito population depends on a threshold value  $\theta$ , defined as the number of mosquitoes produced by a female Anopheles mosquito throughout its life time, which depends on temperature and rainfall. There exists a unique endemic equilibrium which is locally and globally asymptotically stable if  $R_{02} > 1$  for the model without infective immigrants. In presence of infective immigrants, the model has two endemic equilibrium. One due to immigration of infectives in absence of the mosquito vector population, and the other due to both immigration and transmission by the mosquito vectors. Numerical simulations show that temperature  $25^{\circ}\text{C}$  and rainfall 30 mm are most favourable for malaria transmission. The proportion of infective immigrants that enters into the community does not significantly change the malaria infection pattern.

#### **4.3.5 Modeling the role of quarantine, contact tracing, treatment and vaccination in the control of Ebola virus disease in Uganda**

##### **Bulemu Ibrahim**

Three models are proposed for the transmission dynamics of Ebola virus disease with quarantine, contact tracing, vaccination and treatment interventions. The models exhibit two equilibria; the disease free and endemic equilibrium points. Stability analysis of the three models indicates that the disease-free equilibrium states are stable. The basic reproduction number,  $R_0$ , which is the main threshold, is obtained using the next generation matrix and the stability of the equilibrium points established using eigenvalue method, Lyapunov and Routh-Hurwitz criteria. When  $R_0 < 1$ , then the disease-free equilibrium is locally asymptotically stable and the disease can-not invade the population, but if  $R_0 > 1$ , then the disease-free equilibrium is unstable and invasion is always possible. The effect of these interventions on the dynamics of the Ebola virus disease is deduced through sensitivity analysis on the basic and effective reproduction number  $R_0$  and  $R_e$  respectively, from which it is revealed that treatment and vaccination strategies combined can reduce Ebola virus infection. In addition, numerical simulation is carried out using assumed parameter values and parameter values drawn from existing literature with the parameters assigned specific hypothetical values and graphs are plotted to investigate the effect of these parameters on the transmission of the disease. It is found out that quarantine of both infected and exposed individuals with proper contact tracing practices and vaccination of both treated and susceptible individuals help to control the spread of the Ebola virus.

## 4.4 MASTER OF SCIENCE IN PHYSICS

### 4.4.1 Cosmological perturbations in modified Gauss-Bonnet $f(G)$ gravity.

**Albert Munyeshyaka, Joseph Ntahompagaze, Tom Mutabazi.**

This dissertation is about the exploration of cosmological perturbations in modified Gauss-Bonnet  $f(G)$  gravity with a 1+3 covariant formalism in use. Gradient variables were defined and using the 1+3 covariant formalism, perturbed linear evolution equations were derived. Using spherical harmonic decomposition method, linear evolution equations were transformed into ordinary differential equations (ODEs) so that the scalar perturbation equations were treated as ordinary differential equations at each mode  $k$  separately. The obtained ODEs were time-dependent which were then transformed into redshift dependent for analysis. After all these transformations, energy density perturbations were studied for two fluid systems namely for a Gauss-Bonnet field-dust system and for a Gauss-Bonnet field-radiation system for two different pedagogical models namely trigonometric  $f(G)$  model and exponential  $f(G)$  model. For a Gauss-Bonnet field-dust system, energy density perturbations decay with increase in redshift for both models. For a Gauss-Bonnet field-radiation system, the wavenumber  $k$  dependency was examined: for long wavelength modes, energy density perturbations decay with increase in redshift for both  $f(G)$  models and they are wavenumber invariant. For the short wavelength modes, energy density perturbations decay with increase in redshift for the exponential model and show an oscillates with a decreasing amplitude due to wavenumber dependency for the trigonometric model.

### 4.4.2 Characterization of the response of the African low-latitude ionosphere to geomagnetic storms: A case over Libreville, Gabon

**Bibino Benard, Patrick Mungufeni, Geoffrey Andima**

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 (GMS). This study focused on providing a detailed characterization of the typical ionospheric storm behaviour over the African low-latitude region. In particular, the response of the ionosphere using Global Positioning System-Total Electron Content (GPS-TEC) over Libreville, Gabon (9.7 °E, 0.35 °N, dip lat. 8.05 °S) to GMS for the period 2000 - 2018 was investigated. Geomagnetically disturbed periods were considered to be those with  $Dst \leq -50$  nT. The magnitudes of TEC deviation from quiet-time median ( $|\Delta TEC| \geq 25\%$  for at least 3 consecutive hours) were used to classify ionospheric storms into positive, negative, positive to negative and negative to positive effects. The low-latitude ionosphere over Libreville, Gabon exhibited a total of 235 ionospheric storm effects with both TEC enhancements (positive effects) and TEC depletions (negative effects). Positive effects were more prevalent (56.6%) than negative (17.0%), positive to negative (13.2%) and negative to positive (13.2%) storm effects. Thus the low-latitude ionosphere is more favourable for the development of positive storm effects than the rest of the storm categories. Seasonally, Positive, negative and negative to positive ionospheric storms are more prevalent (61.7%, 52.5% and 61.3% respectively) during equinox months than in solstice months (38.3%, 47.5% and 38.7% respectively). Positive to negative ionospheric storm effects are more in solstice months (64.5%) than in equinox months (35.5%). Solstice months showed the longest time durations for negative



storm effects compared to the equinox months. Negative ionospheric storms with onset times from 01:00 - < 13:00 LT had longer time durations than those with onset times from 13:00 - < 01:00 LT. The time delay for positive storm response is short for daytime storms but longer for nighttime storms.

#### **4.4.3 The Study Of 1+3 Covariant Perturbations In Modified Theory Of Gravity**

**Murorunkwere Beatrice, Joseph Ntahompagaze, Edward Jurua**

In this study, the 1+3 covariant approach around Friedman-Lemaitre-Robertson Walker (FLRW) background has been applied together with the equivalence between  $f(R)$  gravity and scalar-tensor theory to study cosmological perturbations. The gradient variables in 1+3 covariant approach have been defined. A set of evolution equations from gradient variables describing the matter and curvature fluctuations for two fluid cosmological medium have been derived. Harmonic decomposition method was applied to partial differential equations to get ordinary differential equations and these equations were used to analyse the behavior of the perturbation quantities. We focused on radiation and dust dominated eras; and the perturbation equations were applied to a background solution of  $R^n$  gravity,  $n$  being a positive constant. The transformation of the perturbation equations into redshift dependence was done and the exact solutions for short-wavelength limit and long-wavelength limit were obtained in both radiation and dust-dominated universe. Numerical solutions were computed using Maple software with specific initial conditions. We found that the evolution of the energy density perturbations in dust for different values of the parameter  $n$  decay with redshift, whereas in radiation, the evolution of the energy density perturbations decay with redshift in an oscillatory mode which is in agreement with previous studies.

#### **4.4.4 Design and simulation of a smart master switch system based on multi-input xor logic gate**

**Wanzala Jimmy Nabende, Michael Robson Atim, Andama Geoffrey**

The safety and control of the electrical energy requires switches to complete the flow of electric current. During the switching operations, the circuit breaker protects the cables, electrical appliances, and the building from undesirable power problems or electrical faults. Mechanical switches have been the conventional way of controlling the electrical energy; however, these come with their limitations. They need big sized switches since the load current is carried in the closed circuit and speed of operation is small due to the high inertia of the conventional big sized mechanical switches, and they need physical access. This research, aimed at designing and simulating a multi-input based XOR logic gate master switch system that controls light and socket systems using four switching mechanisms. The system includes wireless communication devices that enable distant switching and limit physical interaction with the mechanical switches. Mechanical switches are included to act as fall-back mechanism. The research involved designing and simulating a Global System for Mobile communication (GSM)/ Bluetooth (BT)/ KEYPAD/ Single Pole Double Throw (SPDT) master switch system based on multi-input XOR relay logic gate. Then the GSM/ BT based Android phone application was developed to remotely control the switching system. During testing of the designed system, the system was able to perform the desired remote switching functions by remotely managing the electrical energy of

the individual sockets and lighting systems as well as the entire consumer unit. The SPDT switches were able to operate as a fall-back mechanism with the system in the off state. Within the recommended electrical safety measures, the design can therefore be streamlined and integrated to remotely control the lighting systems and sockets individually alongside mechanical switches.

**Keywords:** XOR logic gate, GSM, BT, KEYPAD, SPDT switch, CCU

## **4.5 MASTER OF EDUCATION IN EDUCATIONAL ADMINISTRATION AND PLANNING**

### **4.5.1 Motivation and Job Performance among Science Teachers in PEAS Secondary Schools in Western Uganda**

**Hakiimu Comrade Mutebi**

The study explored the influence of motivation on the job performance, focusing on secondary school science teachers within in Promoting Equality in African Schools (PEAS) in Western Uganda, in order to develop interventions that may improve both motivation and job performance of science teachers. A descriptive cross-sectional design with correlational techniques was adopted. Pre-tested self-reported questionnaires were used to collect data. Key informant interviews were conducted with head teachers. 64 teachers from 11 schools and four head teachers participated in this study. Descriptive statistics including mean scores were computed for each variable. Normality test was then conducted and then Pearson correlation method was used. Pearson correlation coefficients ( $r$ ) and the coefficients of determination ( $r^2$ ) were reported. Key findings revealed that there was extrinsic motivation ( $M = 2.73$ ) and intrinsic motivation ( $M = 3.31$ ) were moderate despite high job performance ( $M = 3.86$ ). Findings revealed that intrinsic motivation accounts for 25% change in teachers' job performance ( $r = 0.498$ ,  $r^2 = 0.25$ ,  $p = 0.000$ ), extrinsic motivation accounts for 53% change in teachers' job performance ( $r = 0.729$ ,  $r^2 = 0.53$ ,  $p = 0.000$ ) and the overall motivation accounts for 72% change in teachers' job performance among teachers in PEAS ( $r = 0.875$ ,  $r^2 = 0.72$ ,  $p = 0.000$ ). Thus, it concluded that although there was relatively moderate intrinsic and extrinsic motivation in PEAS, teachers' job performance was exceptionally high. It is recommended that PEAS management take more consideration in these dimensions of motivation if they are to maintain high teachers' job performance by implementing the recommendations made in this study.

### **4.5.2 Teachers' Attitudes toward their Personal Behavior, Students and their Job Commitment in Public Secondary Schools in Mitooma District**

**Dartivah Kitiinisa, Ssenyonga Joseph**

Commitment of teachers on their job plays a crucial role on the overall nurturing of the learners and the development of a nation as a whole. Yet, research focusing on its possible presumptions appears to have been less attended to. This study aimed at examining teachers' attitudes towards

personal behaviour and students on job commitment. Using Census sampling, the study adopted a one-shot cross-sectional survey research design of 359 teachers from 11 public secondary schools in Mitooma district to take part in the study. Job commitment was positively and significantly correlated with teachers' conservative – autocratic attitudes towards students ( $r=.30$ ,  $p < .01$ ). On average, males reported higher job commitment than females. Teacher who had spent 5 years or less in the teaching profession reported the highest conservative – autocratic attitudes towards students and there were no significant differences identified in teachers employed privately by the school or those employed by the government. These findings advocate for the teachers' improved job commitment in their profession and calls upon school administrators and policy makers to support teachers by putting in place policies, guidelines and professional development activities that protect and develop the teachers in their execution of duty.

**Key words:** Teachers' attitude towards personal behaviour, Job commitment, Teachers attitude towards students.

## **4.6 MASTER OF EDUCATION IN EDUCATIONAL PSYCHOLOGY**

### **4.6.1 The Relation between Perceived Teacher's Autonomy Support, Cognitive Appraisals and Boredom in Physics Learning among Lower Secondary School Students in Masaka District, Uganda**

**Margaret Ekatushabe, Muwonge Charles Magoba**

Boredom during learning activities has the potential of impeding attention, motivation, learning and eventually achievement. Yet, research focusing on its possible antecedents seems to have received less attention especially with in physics domain. Based on assumptions of the control value theory of achievement emotions, this study aimed at examining gender differences and structural relationships between students' reported perceived teacher autonomy support, cognitive appraisals (self-efficacy and task value) and learning related boredom in Physics. A sample of 375 (56% females) randomly selected 9th grade students (Mean age of 15.03; SD =1.02) from five secondary schools in Masaka district who provided consent and assent responded to anonymous questionnaires. Results indicated that higher levels of PTAS, self-efficacy and task value were significantly associated with lower levels of boredom during physics learning. Females reported significantly greater task value for learning physics than the males. There were no significant gender differences for PTAS, self-efficacy and boredom. A structural equation model indicated that cognitive appraisals partially mediated the relationship between PTAS and boredom. Self-efficacy ( $\beta = -.10$ ,  $p < .05$ ) showed greater mediation effects than task value ( $\beta = -.09$ ,  $p < .01$ ). PTAS showed significant direct negative contributions to boredom ( $\beta = -.34$ ,  $p < .001$ ). These findings highlight the importance of promoting autonomy among students by adjusting instructional behaviors among physics teachers.

**Keywords:** perceived teacher autonomy support, cognitive appraisals, self-efficacy, task value, boredom, gender, and physics.

## **5.0 FACULTY OF COMPUTING AND INFORMATICS**

### **5.1 MASTER OF SCIENCE IN INFORMATION SYSTEMS**

#### **5.1.1 An acquisition framework for supporting decision making in acquiring computerized Health Information Systems: In-house versus Outsourced**

**Agumenaitwe Patrick, Fred Kaggwa, Atuheire Izaara Ambrose**

Choosing between in-house and out sourced Computerized IS is still a big challenge in health based organizations in the developing countries. This is because most health based organizations mainly focus on the financial aspect while choosing. The main goal of this research was to design and develop an Acquisition framework to support decision making when acquiring computerized IS in health based organizations. The research focused on Mbarara health care giving facilities actively using computerized IS. This research used design science methodology to accomplish the research objectives. Which were; to identify gaps in existing acquisition frameworks used in the acquisition process of computerized IS through literature review, to design and develop an acquisition framework, and finally, to test and validate the framework to determine the effectiveness of the developed framework. Questionnaires were used to investigate the factors considered in acquisition process and, if any guidelines were used. It was interesting to find out that 96% of the participants decide on using outsourced IS and 84% claimed to use acquisition guidelines compared to the 16% who answered that they did not use any guidelines. And 72% of the participants acknowledged considering the cost factor. UCD was used coupled with UML in the designing and development of the framework. The results from the framework tests proved the effectiveness and validation results obtained demonstrated that the developed framework satisfied the research objective. The strength of the acquisition framework compared to frameworks seen in the literature review is that it consolidated factors from the Adaptive Acquisition, Other Transactions (OT) Guide, and The Merger and Acquisition frameworks into one to come up with acquisition factors while the other frameworks discussed in this report only focused on their discrete factors. With the developed framework, an algorithm that's embedded in the framework was coded, developed and implemented in reality while with the existing acquisition frameworks; no algorithm was considered or developed. This has given the framework an upper hand in accomplishing more compared to any of the other frameworks.

#### **5.1.2 Assessing Maintainability of Stable Internal Interfaces in Eclipse Framework.**

**Tusasirwe Charity, Kawuma Simon**

Today, most developers use frameworks to build applications. This is because frameworks offer a number of advantages like production of good quality software and reduction of software development time since the application developer reuses the functionality provided by the framework. The Eclipse framework is one of the widely used and adopted framework that has been evolving for over a decade with over 55 releases. It provides two types of interfaces that are stable interfaces (APIs) and unstable interfaces (non-APIs). The usage of non-APIs is being discouraged by the Eclipse framework developers because they are considered undocumented, unsupported and subject to be changed or removed from the Eclipse framework without notice. Although the usage of non-APIs is being discouraged, their usage by Eclipse Application developers is still common. The previous study discovered that there exist 327K Eclipse stable

non-API classes that have remained unchanged during the Evolution of the Eclipse framework and the same study recommended that these 327K stable non-API classes be promoted to APIs. However, these stable Eclipse non-APIs may still exhibit undesirable source code quality characteristics like being unsupported, undocumented, and immature as claimed by the Eclipse framework developers. To this end, there exists a need to first study the source code quality of these stable non-APIs before they can be promoted to APIs. In this study, we used sonarqube software tool to examine the source code quality of the 327K Eclipse stable non-APIs focusing on their maintainability. Sonarqube is an open-source web-based platform that is used to measure and analyze the quality of the source code. The Maintainability source code quality of the Eclipse stable non-APIs was studied in terms of source code documentation, code smells, technical debt (TD) and maintainability rating. In our results, we discovered that the percentage of documented stable non-APIs that were 100% documented ranges between 9.9% to 31.1%. In addition, we discovered that code smells greatly impact the maintainability rating of the Eclipse stable non-APIs. The research found out that the fewer the number of code smells in the Eclipse stable non-API classes, the more maintainable that class is and the more the number of code smells in that class, the more less maintainable the class is. We further discovered the different percentages for the different maintainability ratings that is 78.6% to 94.9% for maintainability rating A, 5.1% to 18.5% for maintainability rating B , 3.1% as the highest percentage for maintainability rating C and 0.2% as the highest percentage for maintainability rating D in all the analysed Eclipse releases. As a contribution in this study, we provided a set of stable non-API classes that are maintainable (i.e. those with maintainability rating A and those which are 100% documented since source code comments helps in software maintainability) which we further recommended for consideration in the effort to promote Eclipse stable non-APIs to APIs. As future research work, one can investigate other source code quality characteristics for Eclipse stable non-APIs like Security, Efficiency and portability among others in order to fully understand the source code quality of stable non-APIs and then have them ready for promotion to APIs by Eclipse interface providers.

### **5.1.3 A phishing awareness model for improving cyber security in financial SMEs: a case study of SACCOS**

#### **Ssekabira Henry, Fred Kaggwa, Atuheire Ambrose.**

There is an increase in the numbers of SME's in Uganda, according to Uganda Investment Authority (UIA) report of 2016; SME's are spread across all sectors with 49% in the service sector, 33% in the commerce and trade, 10% in manufacturing and 8% in other fields. Over 2.5 million people are employed in these sectors, where they account for approximately 90% of the entire private sector, generating over 80% of manufactured output that contributes 20% of the gross domestic product (GDP). In an effort to cope up with competition and extending services nearer to customers, SME's are getting more digitized as they adopt more technology-based solutions for financial management. Despite of the existing laws and strategies in Uganda, the level of phishing attack awareness amongst the SME's in the country is still low. According to literature 95.6% of cyber security incidents go unreported and only 4.4% of the reported cases are followed through to a successful prosecution. The goal of this research was to improve phishing attack awareness levels amongst financial SME's by designing and developing a computerized model. To achieve the main objective, the researcher broke it into three specific

objectives that is; to identify the requirements for a Phishing Attack Awareness Model through reviewing literature and data collection, to design and develop a Phishing Attack Awareness model and to test and validate the developed model to determine the effectiveness and usability of the developed model and these were achieved by using design science methodology. To achieve specific objective one, the researcher reviewed literature about existing phishing attack awareness models and collected data from participants to derive requirements that were used design and develop the model using unified modeling languages. To achieve specific objective three, an artifact of the algorithm running on Google chrome was developed. Validation results from 5 ICT experts and 5 SACCO members who interacted with the model indicated that the model is applicable for improving phishing attack awareness in financial SME's. However, this research did not cater for phishing attack detection so as mitigate damages to financial SME's resulting from phishing attack actions thus future scholars need to venture in this area.

#### **5.1.4 Assessing the Reliability of Interfaces in Eclipse Framework**

##### **Moses Asiiimwe, Simon Kawuma**

The Eclipse Framework is a popular and widely used framework that has been evolving for over a decade. The framework provides both APIs and nonAPIs. Framework developers encourage the use of APIs because they are considered to be stable, mature and supported however they discourage the use of non-APIs because they may be unstable, unsupported, immature i.e. contain bugs and subject to change or removal without notice. Despite being discouraged by Eclipse, application developers often use non-APIs because when used, development time is reduced and thus the application can reach its market within a shorter period of time. The application developer must be ready to fix the bugs else his application risk failing. Bug fixation can also be done by the framework developers on behalf of the user which may take a long period to fix and resolve the bug and thus the interface user might wait indefinitely for a solution from the developer. This implies that interface users are left with no choice but to fix the bugs themselves or abandon the interfaces. As a solution to avoid waiting indefinite for solutions from interface developers or getting involved in bug fixation, users should use bug free interfaces however interface users may not be aware of the existence of bug free interfaces in the Eclipse framework as evident on Bagzilla1. In this study we used SonarQube tool as it covers the seven qualities of source code quality that is Architecture and Design, Unit tests, Duplicated code, Potential bugs, Complex code, Coding standards, Comments which includes the areas of interest in this study. We aim at identifying and recommending bug-free Eclipse interfaces to application developers. From our research findings, we established the most dominant bug type and we discovered that majority of bugs are major bugs, followed by minor bugs, then followed by Blocker bugs and lastly critical bugs. Furthermore, we found out that on average 81.5%, 10.5%, 6.4% and 1.6% bugs are major, minor, blocker and critical bugs respectively in all the analysed Eclipse releases. In the same analysis while establishing the percentage of bug-free API and non-API interfaces, we discovered that majority of bug-free classes are non-APIs compared to APIs. The percentage of bug-free API classes and non-API classes range from 22.3%-44.9% and 45.5%-67.9% of the total classes respectively in all the analysed Eclipse releases. Furthermore, we found out that on average, 32.2% and 56.8% of the total classes in a given Eclipse release are bug-free API and non-API classes respectively. Based on the claim that non-APIs are bad and unsupported, one would expect the majority to have bugs. However from our results, majority of

non-API classes are bug free with 56.8%. Therefore Application users should be made aware of these bug-free non-APIs so that they can be recommended. Findings from this study lays more strong foundation for API providers to promote bug-free non-APIs (56.8%) and discourage the use of buggy APIs. These findings are going to be launched on GITHUB so that application developers are able to identify bug free and non-bug free interfaces before they are used. In our future work, we intend to make further investigation on other software quality parameters like Technical debt, complexity, documentation, maintainability APIs and non-APIs.

## 5.2 MASTER OF SCIENCE IN HEALTH INFORMATION TECHNOLOGY

### 5.2.1 A Model for Predicting Measles Incidences among Children using DHIS2 and DHDB data

**Tumusiime Besigye Albert, Sembatya Richard, Mugonza Robert**

The World Health Organization (WHO) estimated that 535,000 children died of measles in 2000 globally with the majority from developing countries (Simons, et al., 2012), which accounted for 5% of all under-five mortality. Despite the availability of a stable and effective vaccine, measles outbreaks are still a huge concern in Eastern and Southern Africa. Expanded programme on Immunization (EPI) operates in many countries as much as there are still issues that affect complete coverage in many countries, and this contributes to the continuing measles outbreaks throughout the world per the Joint press release by WHO-UNICEF. To prevent serious outbreaks and deaths in the developing world, measles vaccinations are administered at 9 months of age. A number of factors, including the rate of decay of maternally acquired measles-specific antibodies may influence immunity against measles by immunization in infants. Prior to 2001, measles was a major cause of illness and death in children in Uganda. In Uganda, despite the availability of measles vaccines and elimination programmes, the disease is still endemic and at large in developing countries. The disease continues to affect this country both economically and health wise as much as effort and progress have been made in fighting the infectious disease. Recently measles incidence appears to have rebounded in Kamwenge District in western Uganda with increasing number of measles cases reported since April 2015. Despite the effort and progress made, measles incidence continues to occur and affect both children and young adults, including vaccinated individuals.

**Objective:** Due to these impacts and to help give a clear explanation to this I propose to develop a measles intervention deterministic, compartmental and mathematical model to help predict measles incidence patterns of the infectious disease using DHIS2 and DHD data.

**Methods:** This study follows the Design Science Research Methodology for Information Systems. Datasets are acquired from DHIS2 and DHDB data. We utilize data mining tools like WEKA to explore incidence patterns of measles despite vaccination of patients from Kamwenge Health Facilities, Kamwenge District, and Southwestern Uganda. Binary Logistic regression model was used to estimate and predict the incidence patterns of measles.

**Results:** Using data already generated in the databases of DHIS2 and DHDB, the model yielded a valid forecast of measles cases. The developed model gave dependent variables that is positively correlated with independent variables with a strong correlation of 0.89

**Conclusions:** A mathematical model to predict of measles Kamwenge district was developed. The model successfully met the tests after evaluation and will be instrumental in the decision to

carry out an intensive measles immunization campaign in order to prevent the occurrence of measles outbreak considering other contributing factors

### **5.2.2 A Neonatal Sepsis Prediction Algorithm Using Electronic Medical Record Data.**

**Ezeobi Dennis Peace, William Wasswa, Angella Musiimeta, Stella Kyoyagala**

Neonatal sepsis is a significant cause of neonatal death and has been a major challenge worldwide. The difficulty in early diagnosis of neonatal sepsis leads to delay in treatment. The early diagnosis of neonatal sepsis has been predicted to improve neonatal outcomes. The use of machine learning techniques with the relevant screening parameters provides new ways of understanding neonatal sepsis and having possible solutions to tackle the challenges it presents. This work proposes an algorithm for predicting neonatal sepsis using electronic medical record (EMR) data from Mbarara Regional Referral Hospital (MRRH) that can improve the early recognition and treatment of sepsis in neonates.

This study is influenced by the CRISP-DM model, where an in-depth review of the existing screening parameters and models for neonatal sepsis prediction was carried out to gain a better understanding of how to develop an algorithm with better diagnostic performance. The proposed algorithm implements Support Vector Machine (SVM), Logistic regression (LR), K-nearest neighbor (KNN), Naïve Bayes (NB), and Decision tree (DT) algorithms, which were trained, tested, and compared using Python software. Neonatal EMR data from MRRH that have been purposively selected and cleaned is used to train and test the models. The performance of the proposed algorithm was evaluated by comparing it with the physician's diagnosis. Also, the experiment used a Stratified K-fold cross-validation technique to evaluate the performance of the models. The results of this study show that the proposed algorithm outperformed the physician diagnosis. The study provides evidence that the combination of maternal risk factors, neonatal clinical signs, and laboratory tests effectively diagnoses neonatal sepsis. Based on the study result, the proposed algorithm can help identify neonatal sepsis cases as it exceeded clinicians' sensitivity and specificity. SVM model with radial basis function, polynomial kernels, and DT model performed better than the other models in predicting neonatal sepsis.

### **5.2.3 Algorithms for analyzing cough sounds for detecting Chronic Obstructive Pulmonary Disease**

**Endashaw Amsalu Melese, Nabaasa Evarist**

**Goal:** Chronic obstructive pulmonary disease (COPD) is a heterogeneous disease with various clinical presentations. The basic abnormality in all patients with COPD is air flow limitation. The main techniques for the diagnosis of COPD are using spirometer and Imaging equipment (such as CT and X-ray), which are expensive and not suitable for use. This study aims to develop algorithms for analyzing cough sounds for detecting chronic obstructive pulmonary disease.

**Methods:** Deep learning-based algorithms are developed using augmented and non-augmented cough sound datasets by using four different feature extraction methods; MFCC, MS, TNT, and ZCR.



**Results:** Three different algorithms are developed and tested with augmented and nonaugmented cough sound dataset by considering their accuracy and computational time. Of the developed algorithms CNN and CRNN based algorithms have scored 96.6% and 96.73% accuracy, respectively.

**Conclusion:** The proposed deep learning algorithms using cough sound of different subjects have scored high classification performance.

**Significance:** The findings of this research indicate that cough sound analysis for detecting COPD disease can be done automatically with less intervention from health care professionals. In addition to this, it shows the capability of cough sound analysis as a means to develop low cost and good ease of use diagnostic tools for chronic obstructive pulmonary disease.

#### **5.2.4 A Framework and algorithms for optimizing constraints in locating Pharmacies for finding prescribed drugs**

##### **Matiwos Tekalign Wondmagegn, Nabaasa Evarist**

This research develops a framework and algorithms that simplify the process of identifying and locating the nearest pharmacy while searching for prescribed medications. The main objective was easing the process of identifying the nearest pharmacies with required prescribed drugs by developing a framework and algorithms. Literature was reviewed to identify basic constraints in the process of optimally accessing required prescribed drugs and used as an input for developing the framework and algorithms. Using the latitude and longitude coordinates of the client and pharmacies in the locality, the algorithms optimize the identified constraints (distance, travel time, travel cost, drug cost, opening and closing hour of the pharmacy) and identify the nearest pharmacies with required prescribed drugs. It reduces out-of-pocket money of patients and improves adherence by locating the nearest cost-effective pharmacy with the required medication.

#### **5.2.5 Preterm birth prediction from PM2.5 air pollutant exposure, Kampala, Uganda**

##### **Ajaelu, Comfort Seun, Wasswa William**

There is a growing body of evidence linking air pollution to negative birth outcomes, but few studies have explored the relationship of air pollution on negative birth outcomes such as preterm birth in Africa. Identifying the relationship between PM2.5 and Preterm births and also been able to predict future occurrence of preterm birth from PM2.5 pollutants in Kampala, Uganda, will be a good starting point for intervention and policy changes on air pollution reduction methods. Environmental health data poses huge challenges on traditional epidemiological methods, hence a need to explore novel methods such as Machine learning techniques to identify patterns and predict health outcomes from air pollution exposure. The aim of this research is to provide evidence for considering the benefit of reducing preterm births among women, from exposure to PM2.5 air pollutant in Kampala, Uganda. The study employed quantitative analysis using retrospective cohort method and also predictive analysis using machine learning techniques. Health outcome (preterm births) data was collected from DHIS2 database and exposure of interest (PM2.5) data was collected from open-source U.S. Embassy

database. The study showed that there is seasonal variation PM2.5 level and it was found higher in the dry seasons than wet seasons. The PM2.5 pollution level in Kampala was found to be under unhealthy category. A strong association was found between PM2.5 air pollutant level and preterm births in dry seasons. The raw dataset was preprocessed and specific features were selected to build the preterm births prediction model. The performance of the model was tested in two experiments with four supervised machine learning algorithms. Decision Tree and Naïve Bayes had the best performance in experiment one and two respectively. Decision Tree had the overall best performance because it has the lowest running time for both experiments with high accuracy. Experiment one with 70% split had better performance than 80% split. This study validated that machine learning techniques is very useful for building prediction model for negative health outcome such as preterm births from exposure to air pollution. Knowing the accurate distribution of preterm births occurrence from exposure to PM2.5 among the study population may guide necessary actions towards reduction of air pollution level in Kampala, Uganda.

### **5.2.6 A medical equipment user training needs assessment framework and algorithm for healthcare workers in developing countries**

**Gemechis Melkamu Negasa, Wasswa William**

This research proposed a framework that can be used to plan and monitor the provision of medical equipment user training for healthcare workers. Medical equipment users training and skill development guidelines in some of Sub-Saharan African countries were also assessed. Additionally medical equipment users training need identification algorithm was developed to identify training need of each users and to give priority for those who are more in need. MATLAB Fuzzy Logic Toolbox was used to calculate training need points for each user. Finally the algorithm was tested and verified on sample medical equipment data in Mbarara Regional Referral Hospital through observed expertise. The algorithm can be used by medical equipment user trainer and medical equipment managers. It has substantial importance in provision of adequate training for clinical staffs working with medical devices and to ensure patients' safety and optimum performance of medical devices.

### **5.2.7 An algorithm to detect overlapping red blood cells for sickle cell disease diagnosis**

**Mabirizi Vicent, Kawuma Simon**

Globally, sickle cell anemia is ranked among the most dangerous non communicable diseases with an estimation of 1.5 billion registered cases of babies born with sickle cell trait by 2016. In Africa, Uganda has the highest number of babies (20000) born with sickle cell contributing between 1% - 2% of the total number of sickle cell cases registered every year and 10% - 15% of children who die before reaching 5 years worldwide. Sickle cell is inherited from parents and cannot be treated thus couples are encouraged to go for testing before marriage to avoid carrying the disease to their offspring, according to literature it is believed that if both parents have sickle cell trait there exists 25% chances a baby to inherit these traits from both parents. It is estimated that by 2050 sickle cell cases will increase by 30% if no intervention is put in place. To facilitate

early detection of sickle cell anemia, medical experts employ machine learning algorithms to identify and detect sickle cell abnormality. From existing literature it was identified that these algorithms for example an algorithm for recognizing shape of a sickle cell from blood smear by fractional dimension developed by Manoj Kumar Sahu et al if applied on blood samples containing overlapping cells they can not detect sickle cells. They consider these cells as sickle yet it is biologically proved that not every overlapping red blood cells are sickle cells. Thus, this put a confirmation doubt on results produced by these algorithms especially if applied on blood sample images that contain overlapping cells. With this in mind, we developed an algorithm to detect overlapping red blood cells for sickle cell disease diagnosis. The algorithms take in digital images of overlapping red blood cells as inputs to detect if they are sickle, these images have a scale magnification x200, x400, x650 pixel taken using a photo microscope and a Nikon camera. The algorithm was tested on a total of 1000 digital images and the overall accuracy, sensitivity and specificity was 98.18%, 98.29% and 97.98%. It was observed that; i)if images are taken from a non-controlled light intensity, it reduces the accuracy and sensitivity of results due to much noise caused by either too much or low light intensity. ii) The algorithm execution performance reduces with increase in the size of the data set there by increasing the time taken to produce results. The major contribution of this research is that, the algorithm is able to detect and diagnose overlapping red blood for sickle cells anemia and also reduces on the time required by laboratory technician to test very many sample by offering a bunch testing in limited time. Results assessment was based on cell form factor, area and cell diameter thus future work should focus on evaluating the algorithm basing on the gender, age bracket and race of the participant from which the blood samples were taken from.

### **5.2.8 An Integrated Model for Medical Equipment Life Cycle Management in Public Hospitals in Low and Middle Income Countries**

#### **Jack Gitonga Mwongera, Wasswa William**

A well-managed Healthcare Technology is a key component in the attainment of the United Nations Sustainable goals and specifically the goal number 3 (SDG 3) of ensuring healthy lives and promote wellbeing for all at all ages, and also in the endeavor to deliver quality healthcare in the Universal Health coverage programs for all. Healthcare technology management encompasses the life cycle stages of a medical technology that has; planning phase that consists of planning and assessment of the needs in the healthcare. The acquisition stage that contains assessment and selection, delivery, installation & Commissioning stage. The actual life of the medical device or equipment commences with Inventory and documentation stage, training of users and maintainers, utilization and maintenance stage. The last stage is the technology decommissioning, replacement and disposal. In all these stages Biomedical Engineering department plays a pivotal role. The main objective of the study is to improve Medical Equipment life cycle management in Public Hospitals through development of an integrated decision support model. A descriptive case study was employed to achieve the first specific objective of the study while the second and third were achieved by developing a medical equipment life cycle decision support model and testing the proposed model using a Medical Equipment life cycle decision support dashboard developed during the study. The proposed model is composed of the Medical Equipment lifecycle that has the following stages; Technology acquisition, Technology utilization / Maintenance and Technology replacement

stage. Incorporated are the tools for decision support for each phase and the scope of each lifecycle phase, that is, Health Technology Assessment (HTA), Multicriteria Data Analysis (MCDA) and a technology replacement mechanism. The subject area of each phase and the lifecycle are key determinants of the entire model. An equipment monitoring dashboard was developed and utilized to visualize the output from various stages of technology lifecycle. This contributes towards having the equipment available for use in safe, timely, effective and efficient conditions, describing the technological process quality.

### **5.2.9 Acceptability and feasibility of positiveLinks with a collaborative filtering recommender based algorithm in the self-management of Hypertension**

**Mugabirwe Beatrice, Pius Ariho**

**Background:** Uncontrolled hypertension leads to complications, high disability-adjusted life years, and mortality, particularly in populations with limited access to monitoring of blood pressure (BP) or chronic disease management. We adapted, redesigned and customized PositiveLinks (PL), a mobile health intervention designed to facilitate self-monitoring, social support, and engagement in care initially developed for people living with HIV, among patients with hypertension in Mbarara City, southwestern Uganda. We designed a collaborative filtering recommender-based algorithm for PL, did a preliminary assessment for potential participants to use the system and evaluated the acceptability and feasibility of the PL application with a recommender-based algorithm using Technology Acceptance Model (TAM).

**General objective:** To improve management of hypertension using Positive Links application with a collaborative filtering recommender algorithm among hypertensive patients.

**Method:** We used Python following Pearson correlation formulae to design a collaborative filtering recommender-based algorithm, to suggest health recommendation feedback to the PL application for the patients during engagement with the application. We then enrolled adults on treatment for hypertension at Mbarara Regional Referral Hospital and Mbarara Municipal Health Center IV, Mbarara City southwestern Uganda. We educated all participants on the use of PL application and automated blood pressure monitors. We administered a baseline questionnaire for preliminary individual screening. We conducted an in-depth semi-structured interview 30 days later to explore medication adherence, social support and blood pressure control. We applied TAM to evaluate the acceptability and feasibility of the system.

**Results:** 52 participants were enrolled in this study and completed the interviews. Of the 52 participants, mean age was 58 years and 39 (75%) were female. Positive acceptability was reported by 51 (98.1%) of the participants. All participants (100%) reported positive feasibility. Social support was experienced by 51 (98.1%) of the participants, through use of the community message board and health recommendations. Further 44 (84.6%) participants reported positive medication adherence whereas 42 (80.8%) participants registered improvements in BP control.

**Conclusion:** Among patients of hypertension in rural Uganda, PL demonstrated positive acceptability and feasibility, and improved medication adherence and blood pressure control. Overall, participants felt socially supported by the system through provision of health recommendations and community messages. However, there is need for future studies regarding the cost-effectiveness of PL and the effectiveness of the recommender-based application given that most patients dropped out after study exit.

## 6.0 FACULTY OF BUSINESS AND MANAGEMENT SCIENCES

### 6.1 MASTER OF BUSINESS ADMINISTRATION

#### 6.1.1 Management Styles, Employee Competence and Efficiency of the Procurement Systems in Public Universities of Uganda

**Byarugaba Joseph, Ruth Nyiramahoro**

Efficiency of the procurement system is a concern to all public universities when managing to achieve set objectives (Klehe, 2018). The study examined the relationship between management styles, employee competence and efficiency in the procurement systems of public universities in Uganda. The study was informed by the fact that, management styles (autocratic, paternalistic and democratic), employee competency (skills, experience and knowledge) support efficiency in procurement in public universities which require empirical assessment to investigate the most significant predictor of efficiency. The study was guided by three objectives which were; to examine the relationship between management style and efficiency in procurement system of public universities, to establish the relationship between employee competency and efficiency in procurement system of public universities and to establish the combined effects of management styles, employee competence and efficiency in procurement of public universities. Cross-sectional design was adopted with quantitative and qualitative approaches and the unit of analysis was players in procurement system in the public universities. Primary data was collected from 20 informants using interview guide and 94 respondents using questionnaire anchored on, 5 Likert scaled range. Quantitative data was analyzed using SPSS to generate descriptive, correlation and regression analysis while qualitative data was analyzed using NVIVO software to generate thematic themes.

Correlation analysis indicates that management styles ( $r= 0.460$ ,  $p= 0.000$ ) and employee competency ( $r= 0.720$ ,  $p= 0.001$ ) have positive significant relationships on efficiency in procurement system. Management adopts mixture of management styles to influence staff competences to perform procurement tasks to minimize cost and ensure value for money especially in this COVID-19 pandemic. Other findings from regression analysis revealed that management styles ( $r=0.523^*$ ), employee competency ( $r= 0.654^{**}$ ) have positive significant contribution on efficiency in procurement system. The combined effect of management styles and employee competency explain 55.2% variation on efficiency of procurement system (Adjusted R Square = 0.552) while 44.8% is contributed by other variables. The study concluded that management styles and employee competency with required skills, knowledge and experience improve efficiency of procurement system. The study therefore, recommends that public universities should employ qualified staff with CIPS and encourage on job training to

Implement feasible management styles to perform tasks to support efficiency in procurement system in public universities

**Keywords:** Management Styles, Employee Competence and Efficiency of the Procurement Systems

### **6.1.2 Credit Management Practices and Loan Performance of Saccos in Mbarara District**

**Kiiza Mark, Baguma John Kule**

The study assessed credit management practices and loan performance of SACCOs in Mbarara District. The study was guided by the following specific objectives: to establish the relationship between credit policy and loan performance of SACCOs in Mbarara District, to establish the relationship between client appraisal and loan performance of SACCOs in Mbarara District and to establish the relationship between credit risk controls and loan performance of SACCOs in Mbarara District. The study adopted cross sectional study design and the population was 58 SACCOs. The total sample size was 58 SACCO branch managers, credit managers, credit/loans officers and accountants. The study stratified the population into sub counties and census population sampling was used to select all the sub counties. A structured questionnaire was administered. The study found out a significant substantial positive correlation ( $r=0.696^{**}$ ,  $P<.01$ ) between credit policy and loan performance of SACCOs in Mbarara District, there is a moderate positive correlation ( $r=0.452^{**}$ ,  $P<.01$ ) between client appraisal and loan performance of SACCOs in Mbarara District and there is a moderate positive correlation ( $r=0.576^{**}$ ,  $P<.01$ ) between credit risk control and loan performance of SACCOs in Mbarara District. The study concludes that there is a substantial positive relationship between credit policy and loan performance of SACCOs in Mbarara District, there is a moderate positive relationship between client appraisal and loan performance of SACCOs in Mbarara District and there is a moderate positive relationship between credit risk control and loan performance of SACCOs in Mbarara District. The study recommends that employees of SACCOs, shareholders, policy makers and other stakeholders involved in management of SACCOs in Mbarara district should improve their credit policy since it accounts for 56.7% of loan performance, the study also recommends that employees of SACCOs, shareholders, policy makers and other stakeholders involved in management of SACCOs in Mbarara district should improve their client appraisal methods since they account for 53.0% of loan performance and the study further recommends that employees of SACCOs, shareholders, policy makers and other stakeholders involved in management of SACCOs in Mbarara district should improve on their credit risk control since it accounts for 40.5% of loan performance.

**Keywords:** Credit Management Practices, Loan Performance

### **6.1.3 Electronic Marketing and sales Performance of soft Drinks Companies in South Western Uganda**

**Lukyamuzi Alexander, Arthur Nuwagaba**

The study aimed at examining the relationship between Electronic Marketing and Sales Performance of Soft drinks companies in south western Uganda. The objectives of the study were to establish the relationship between mobile marketing and sales performance of Soft drinks companies in South western Uganda, to ascertain the relationship between website marketing and sales performance of Soft drinks companies in South western Uganda and to establish the relationship between e-promotion and sales performance of Soft drinks companies in South western Uganda. The study adopted both cross sectional and correlational research

designs and the study population was 10 soft drinks companies in south western Uganda from which all the 10 companies were sampled basing on Krejcie and Morgan (1970). Data was collected using a questionnaire and analyzed using both descriptive and inferential statistics with the help of SPSS version 21. The study found out that there is a significant substantial positive correlation ( $r=0.686^{**}$ ,  $P \leq .01$ ) between mobile marketing and sales performance of Soft drinks companies in South western Uganda, there is a significant weak positive correlation ( $r=0.357^{**}$ ,  $P \leq .01$ ) between website marketing and sales performance of Soft drinks companies in South western Uganda and there is a moderate positive correlation ( $r=0.576^{**}$ ,  $P \leq .01$ ) between e-promotion and sales performance of Soft drinks companies in South western Uganda. The study concludes that there is a significant substantial positive relationship between mobile marketing and sales performance of Soft drinks companies in South western Uganda, there is a significant weak positive relationship between website marketing and sales performance of Soft drinks companies in South western Uganda and there is a moderate positive relationship between e-promotion and sales performance of Soft drinks companies in South western Uganda. The study recommends owners, policy makers and other stakeholders in soft drinks companies in south western Uganda should improve their mobile marketing by use of text messages, blue tooth and multi-media messages, the study also recommends owners, policy makers and other stakeholders in soft drinks companies in south western Uganda should improve their website marketing by using banner adverts, pop-up adverts and corporate brand website.

**Keywords:** Electronic Marketing, sales Performance

#### **6.1.4 Training and Performance of Medium Enterprises in Mbarara City**

**Ninsiima Charlotte, Asaph Katarangi Kaburura**

The study examined training and performance of Medium enterprises in Mbarara City, Uganda. It was guided by objectives which included: to establish the relationship between training needs identification and the performance of Medium enterprises, to establish the relationship between training methods and the performance of Medium enterprises and to establish the relationship between monitoring and evaluation and the performance of Medium enterprises of Mbarara City. The study was carried out using cross-sectional research design where quantitative research approach was used. Data were collected using questionnaires and during the data collection, stratified sampling method was used with a sample size of 80 medium enterprises from Mbarara municipality. Findings revealed that: there is a positive relationship between training needs identification and performance of MEs which was affirmed by  $r=0.986^{**}$  ( $P=0.000<0.01$ ) since resource utilization and objectives of training are met through training needs identification which enhances business performance. Furthermore, the study revealed that there is a positive relationship between training methods and performance of MEs which was affirmed by  $r=0.995^{**}$  ( $P=0.000<0.01$ ) since job rotation and mentoring training methods in businesses enhances commitment to achieving business objectives. Finally, it can be concluded that there is a positive relationship between training methods and performance of MEs which was affirmed by  $r=0.992^{**}$  ( $P=0.000<0.01$ ) since monitoring and evaluation of training programs enhances medium enterprises efficiency and effectiveness and given that M & E of training helps in identifying training gaps which is essential in ensuring business performance. Therefore, the study recommends that, there is need for medium enterprises to make training a continuous activity in their operations.

**Keywords:** Training, Training needs identification, monitoring and evaluation, Performance, Medium Enterprises

### **6.1.5 Employee Ethics and Organizational Performance of Mitooma District Local Government Entities**

**Levi Byensi, Adrian Mwesigye**

The study aimed at establishing the relationship between Employee Ethics and Organizational Performance of Mitooma District Local Government (LG) Entities. The objectives of the study were to establish the relationship between employee integrity and organizational performance of Mitooma District LG entities, to establish the relationship between employee justice and organizational performance of Mitooma District LG entities and to establish the relationship between employee authenticity and organizational performance of Mitooma District LG entities. The study adopted cross sectional research design and the population was 200 supervisors of employees of different departments from Mitooma District LG headquarters, 10 Sub Counties and 2 Town councils. The total sample size was 132 supervisors of employees and this size was determined basing on Krejcie and Morgan table (1970). Purposive sampling was used to select the respondents where the total population was 10 and below and stratified random sampling where the population was 12 and above. The study findings were presented in tables and interpreted accordingly.

The study findings established a significant substantial positive correlation ( $r = 0.679^{**}$ ,  $P < .01$ ) between employee integrity and organizational performance of Mitooma District LG entities, a significant weak positive correlation ( $r = 0.357^{**}$ ,  $P < .01$ ) between employee justice and organizational performance of Mitooma District LG entities and a significant moderate positive correlation ( $r = 0.533^{**}$ ,  $P < .01$ ) between employee authenticity and organizational performance of Mitooma District LG entities.

The study concludes that there is a significant positive relationship between employee ethics and organizational performance of Mitooma District LG entities. The study recommended that Mitooma District LG entities' policy makers and other stakeholders should improve on the integrity of their employees by ensuring proper accountability and enforcing compliance with laws and regulations, enhance the justice of their employees by encouraging interpersonal, distributive and procedural justice and boost the authenticity of their employees by ensuring self-alienation, authentic living and social influence.

**Keywords:** Employee Ethics; Organizational Performance; Employee Integrity; Employee Authenticity; Efficiency; Effectiveness; Relevance; Accountability; Justice.

### **6.1.6 Business Planning and Performance of Small and Medium Scale Enterprises (SMEs) in Mbarara Municipality, Mbarara District**

**Johnie Mary Ngattu, Sarah Nabachwa**

The study aimed at establishing the relationship establish the relationship between business planning and performance of SMEs in Mbarara Municipality and was guided by the following specific objectives: to establish the relationship between strategic business planning and performance of SMEs in Mbarara Municipality, to establish the relationship between tactical



business planning and performance of SMEs in Mbarara Municipality and to establish the relationship between contingency business planning and performance of SMEs in Mbarara Municipality. The study adopted cross sectional research design and the population was 4,408 SMEs in Mbarara Municipality from which 367 SMEs were sampled. The study used simple random sampling. A self-administered questionnaire was administered. The study found out that in Mbarara Municipality; there is a substantial positive significant correlation between strategic business planning and performance of SMEs in Mbarara Municipality ( $r=.605^{**}$ ,  $p\leq.01$ ), there is a moderate positive significant correlation between tactical business planning and performance of SMEs in Mbarara Municipality ( $r=.455^{**}$ ,  $p\leq.01$ ) and that there is a low positive significant correlation between contingency business planning and performance of SMEs in Mbarara Municipality ( $r=.309^{**}$ ,  $p\leq.01$ ). The study concludes that there is a substantial positive significant relationship between strategic business planning and performance of SMEs, there is a moderate positive significant relationship between tactical business planning and performance of SMEs and there is a low positive significant relationship between contingency business planning and performance of SMEs. The study recommends that policy makers and SME owners/managers especially in Mbarara Municipality, should improve their strategic business planning by clearly defining their corporate direction, mission, vision and objectives, doing SWOT analysis of the business environment and ensuring proper strategy implementation and evaluation; they should also improve their tactical business planning by defining their action terms, setting their key performance indicators, defining responsibilities more clearly and setting activity timelines and finally they should improve their contingency business planning by putting protection mechanisms, setting detection controls and having recoverability back up plans.

**Keywords:** Business Planning, Performance, Small and Medium Scale Enterprises

### **6.1.7 Market Segmentation on Financial Performance of Telecommunication Firms in Uganda: A case study of Transsion Holdings in South Western Region** **Sarah Mbaziira, Frank Ahimbisibwe**

The study sought establish the effect of market segmentation on financial performance of Transsion Holdings in South Western Region in Uganda and was guided by the following specific objectives: to identify the effect of demographic segmentation on financial performance of Transsion Holdings, to examine the effect of psychographic segmentation on the financial performance of Transsion Holdings and to find out the effect of behavioral segmentation on financial performance of Transsion Holdings. The study adopted cross sectional and descriptive study designs with a population size of 78 employees of Transsion Holdings from which a sample size of 65 was selected. The study used simple random to recruit marketers and agents while purposive sampling was used to regional office staff. A questionnaire was administered to 58 employees while 7 regional office staff members were interviewed making a total sample size of 65 respondents. The study found out that demographic segmentation has a positive effect on financial performance of Transsion Holdings, psychographic segmentation has a positive effect on financial performance of Transsion Holdings and behavioral segmentation also has a positive effect on financial performance of Transsion Holdings in South Western Region in Uganda. The study recommended that Transsion Holdings in Uganda should improve on its demographic segmentation by targeting the youth, women, the highly educated and the different occupation patterns. The study also recommended that Transsion Holdings in Uganda should invest much in

its psychographic segmentation so as to expand its market coverage and improve financial performance. The study finally recommended that Transsion Holdings in south western Uganda should improve on behavioral segmentation by special seasons and festivals, segmenting markets according to benefits accruing them, and improving the brand status of their products to improve financial performance.

**Keywords:** Market Segmentation, psychographic segmentation, behavioral segmentation  
Financial Performance, Transsion Holdings

### **6.1.8 Financial Management Practices and Profitability of Commercial Banks in Kampala District**

**Kizza Patricia Justine, Baguma John M. Kule**

This study examined financial management practices (FMP) and profitability of commercial banks in Kampala. FMP was conceptualized using three components: working capital management practices, capital structure management practices and capital budgeting techniques and profitability was measured using return on asset, return on equity and net interest margin. The study focused on establishing the relationship between WCMPs and profitability of CB in Kampala, finding out the relationship between CBTs and profitability of CB in Kampala and examining the relationship between CSMPs and profitability of CB in Kampala.

The study used a correlational research design. A census study was carried out in all the 24 CB as at 31st June 2019 and purposive sampling technique was used to select respondents from each and every bank. The study used both primary and secondary data with primary data being collected on the independent variable through the administration of a questionnaire and secondary data was collected on the dependent variable from published annual financial statements of the banks. Data was analysed using descriptive and inferential statistics. The descriptive statistics were used to describe the global variables while the inferential statistics was used to determine the relationship between the variables and the predictive power of the FMPs on profitability of CB.

The results of the descriptive statistics revealed that working capital management practices had the highest mean score, followed by capital structure management and finally, the use of capital budgeting techniques, in that order. The Pearson correlation analysis revealed a strong positive correlation between WCMPs and profitability of CB and a moderate positive correlation between CBTs, CSMPs and profitability of CB which were all statistically significant at a 5% level of significance. The results in the regression model also indicated R-Square at 0.506 which meant that FMPs explain up to 50.6% in the variation of profitability in CB. The results emphasize the need for CB to improve on their financial management practice to improve the profitability of their firms.

The study recommended that managers and policy makers should improve the use of capital budgeting techniques as this area of financial management even though it impacts positively on the performance of SMEs had the least score. Most importantly, the managers of CB should use discounted cash flow techniques to evaluate investment and projects before committing the resources of the company.

**Keywords:** Working capital management practices, capital structure management practices, capital budgeting techniques, Profitability, Commercial Banks

### **6.1.9 Consumer Perception of Product Quality on Consumer Purchase Intention of Locally Manufactured Cosmetic Products in Kampala Uganda**

**Ssebbaale Moses, Sarah Nabachwa**

The study examined the relationship between the consumers' perception of product quality on consumers purchase intentions of locally manufactured cosmetic products in Kampala Uganda. It was guided by objectives which included: to determine the relationship between the presence of Quality mark on products and consumers purchase intention and to examine the relationship between product effectiveness on the consumers' purchase intention on locally manufactured cosmetic products in Kampala. The study was carried out using a correlational cross-sectional research design where quantitative research approach was used. Data was collected using questionnaires, analysed, and interpreted with the help of statistical techniques. During data collection, convenience sampling method was used. A sample size of 330 consumers of cosmetics who visit beauty shops in Kampala was used in the study. Findings revealed that: there is a positive relationship between the presence of Quality mark on products and consumers purchase intention on locally manufactured cosmetic products in Kampala which was affirmed by  $r=0.422^{**}$  ( $P=0.000<0.01$ ). Furthermore, the study revealed that there is a positive relationship between product effectiveness on the consumers' purchase intention on locally manufactured cosmetic products in Kampala which was affirmed by  $r=0.416^{**}$  ( $P=0.000<0.01$ ). Finally, it can be concluded that there is a positive relationship between consumers' perception of product quality on consumers purchase intentions on locally manufactured cosmetic products in Kampala Uganda which was affirmed by  $r=0.736^{**}$  ( $P=0.000<0.01$ ). The study recommends that, there is need for consumers to always pay key attention to the quality standard mark put on the product packages by the regulating body like UNBS so as to know the right products or good quality that they should purchase to avoid being cheated. There is also need for continuous improvement from the cosmetics dealers to convince consumers and to compete with other brands. Finally, the study recommends the need for UNBS to carry out promotional activities to create awareness about the need for quality assurance of the products among the dealers in cosmetics products and the consumers.

**Keywords:** Perception, Product Quality, Quality mark, product effectiveness, consumers' purchase intention, locally manufactured cosmetic products.

### **6.1.10 Teamwork and Teachers' Performance in Universal Secondary Education (USE) Schools in Mbarara Municipality, Uganda**

**Natukunda Pheonah, Renne Bakashaba**

The study aimed at establishing the relationship between teamwork and teachers' performance in USE schools in Mbarara Municipality. The objectives of the study were to establish the relationship between inter dependence and teacher's performance in USE schools in Mbarara Municipality, to establish the relationship between commitment to team success and teacher's performance in USE schools in Mbarara Municipality and to establish the relationship between open communication and teacher's performance in USE schools in Mbarara Municipality.

The study adopted a cross sectional and correlational research designs and the population was 6 public secondary schools in Mbarara Municipality. The total sample size was 146 teachers and

head teachers. The study used simple random sampling on 134 teachers and purposive sampling on 12 head teachers. A questionnaire was administered to teachers while head teachers were interviewed. The study found out that in USE schools of Mbarara Municipality: there is a significant substantial positive correlation ( $r=0.691^{**}$ ,  $P\leq.01$ ) between interdependence and teacher's performance, there is a significant low positive correlation ( $r=0.353^{**}$ ,  $P\leq.01$ ) between open communication and teacher's performance and there is a statistically significant moderate positive correlation ( $r=.536^{**}$ ,  $P\leq.01$ ) between commitment to team success and teacher's performance.

The study generally concludes that in there is a significant positive relationship between teamwork and teacher's performance in USE schools in Mbarara Municipality. The study recommends that teachers' supervisors, policy makers and other stakeholders in USE schools of Mbarara Municipality; should improve interdependence among teachers by encouraging building on capabilities of fellow team members, learning together and regular interaction for tasks accomplishment, they should also improve open communication among teachers by ensuring open dialogue and communication, free expression of group feelings and openness and truthfulness and finally they should improve commitment to team success among teachers by ensuring shared strong common goals, strong shared values and beliefs and strong team commitment to success.

**Key words:** Teamwork, Interdependence, commitment, open communication, Teachers' Performance, Universal Secondary Education (USE) Schools, Mbarara Municipality

### **6.1.11 Commercial Banks Financial Innovations and Financial Inclusion among Rural Households in Kigezi Sub Region, South Western Uganda**

**Levi Mwebembezi, Daniel Atwine Wanito**

The study assessed the relationship between commercial banks financial innovations and financial inclusion among rural households in Kigezi sub region, south western Uganda. The study was guided by the following specific objectives: to establish the relationship between commercial banks product innovation and financial inclusion among rural households in Kigezi sub region, to establish the relationship between commercial banks process innovation and financial inclusion among rural households in Kigezi sub region and to establish the relationship between commercial banks institutional innovation and financial inclusion among rural households in Kigezi sub region. Cross sectional research design was used with the study population being 1,376,730 households and 7 commercial banks in Kigezi sub region. The total sample size was 400 household heads and 19 branch managers. The study used simple random sampling to recruit household heads and purposive sampling to recruit branch managers. A questionnaire was administered to household heads while branch managers were interviewed. The study found out a significant substantial positive correlation ( $r=0.620^{**}$ ,  $p\leq.01$ ) between commercial banks product innovation and financial inclusion among rural households in Kigezi sub region, there is a moderate positive correlation ( $r=0.461^{**}$ ,  $P\leq.01$ ) between commercial banks process innovation and financial inclusion among rural households in Kigezi sub region and there is a moderate positive correlation ( $r=0.512^{**}$ ,  $P\leq.01$ ) between commercial banks institutional innovation and financial inclusion among rural households in Kigezi sub region. The study concludes that there is a significant substantial positive relationship between commercial banks product innovation and financial inclusion among rural households in Kigezi sub region,

there is a moderate positive relationship between commercial banks process innovation and financial inclusion among rural households in Kigezi sub region and there is a moderate positive relationship between commercial banks institutional innovation and financial inclusion among rural households in Kigezi sub region. The study recommends that policy makers, managers and other stakeholders in commercial banks in Kigezi sub region; should improve their product innovation by introducing new loan products, using electronic bill payments and by introduction of new deposit accounts, they should also improve their process innovation by introducing mobile banking, electronic banking and encouraging speedier money transfers and they should improve their institutional innovation by encouraging agent banking, use of interbank funds transfer and use of biometric access system.

**Keywords:** Commercial banks, product innovation, process innovation, institutional innovation, financial inclusion, rural households, Kigezi sub region.

### **6.1.12 Control Activities, Managerial Competency and Profitability of Village Savings and Loans Associations in Mitooma District**

#### **Ronald Tugume, John Kule Baguma**

The study aimed at establishing the relationship between control activities, managerial competency and profitability of VSLAs in Mitooma district and was guided by the following specific objectives: to establish the relationship between control activities and profitability of VSLAs in Mitooma district, to establish the relationship between managerial competency and profitability of VSLAs in Mitooma district and to establish the combined effect of managerial competency and control activities on profitability of VSLAs in Mitooma district. The study adopted cross sectional research design and the population was 180 VSLAs. The total sample size was 138 VSLAs. The study used census sampling technique to select all the 14 sub counties, simple random sampling was used to select the associations while the chairperson of each association and the CDOs of each Subcounty were purposively involved in the study. A self-administered questionnaire was administered. The study found out; a significant substantial positive correlation ( $r=0.636^{**}$ ,  $P<.01$ ) between control activities and profitability of VSLAs in Mitooma district, a significant substantial positive correlation ( $r=0.758^{**}$ ,  $P<.01$ ) between managerial competency and profitability of VSLAs in Mitooma district and a combination of control activities and managerial competency also has a significant substantial positive effect ( $\beta=0.750$ ,  $P=.000$ ) on profitability of VSLAs in Mitooma District. The study concludes that; there is a significant substantial positive relationship between control activities and profitability of VSLAs in Mitooma district, there is a substantial positive relationship between managerial competency and profitability of VSLAs in Mitooma district and a combination of control activities and managerial competency has a positive significant effect on profitability of VSLAs in Mitooma District. The study recommends that the leaders, owners and other stakeholders involved in management of VSLAs in Mitooma district: should improve their control activities by ensuring segregation of duties, doing regular reconciliations and verifications, documenting every transaction and ensuring that every transaction is authorised and approved, they should also improve their competency by promoting in service training workshops and acquiring more managerial courses so as to boost their knowledge, skills, personal traits and abilities and furthermore, they should simultaneously invest in improving both managerial competency and

control activities since a combination of both managerial competency and control activities enhances profitability more than each separate variable.

**Keywords:** Control Activities, Managerial Competency, Profitability, Village Savings, Loans Associations

### **6.1.13 the Relationship between Product Innovation and Brand Loyalty of Energy Drinks in Uganda: A Case of Kampala Central Business District**

**Derrick R Mugweri, Nuwagaba Arthur**

The study aimed at finding out the relationship between product innovation and brand loyalty of energy drinks in Uganda. The study was guided by objectives which included; finding out the relationship between product line extension and brand loyalty of energy drinks in Kampala and determining the relationship between the existence of new products on the brand loyalty of energy drinks in Kampala. The study was carried out using a descriptive cross-sectional survey research design where quantitative research approach was used. The data were collected using questionnaires and during the data collection, convenience sampling method was used. A sample size of 320 respondents who were consumers of energy drinks in Kampala was also used in the study. From the findings, it was revealed that there is a positive relationship between product line extension and brand loyalty of energy drinks in Kampala which was affirmed by  $r=0.576^{**}$  ( $P=0.000<0.01$ ) since it was noted that there is a fit between their energy drinks' original products and that the new products and that their favorite energy drinks are packaged in different bottle sizes and updated with new favours. Finally, it can be concluded that there is a positive relationship between the existence of new products and brand loyalty of energy drinks which was affirmed by  $r=0.585^{**}$  ( $P=0.000<0.01$ ) since customers of energy drinks in Kampala noted that their preferred energy drink is considered to be innovative in terms of product design and that their preferred energy drinks differs from competing models in the market. Finally, the study recommends the need for the energy drink companies to do rigorous product innovations in terms of their branding, tastes and flavors plus packaging among others. The study also recommends the need for the energy drink companies to carry out more market about their products to understand their consumers' brand loyalty. Finally, the study recommends the need for the energy drink companies to do more benchmarking from the leading beverage and energy drink companies to ascertain how they can improve on the design of their products.

**Keywords:** Product Innovation, Product line extension, Brand loyalty, energy drinks

### **6.1.14 Budget Management System, Managerial Competence and Financial Performance of Public secondary Schools in Greater Bushenyi Districts**

**Muhangaazi Andrew, Nixon Kamukama**

The study sought to establish the relationship between budget management system and managerial competence with financial performance of public secondary schools in greater Bushenyi Districts, western Uganda. The study was primarily carried out to examine the system of budget planning, budget control, budget monitoring and evaluation and management ability, skills, agility and training and their influence on liquidity and revenue levels of schools. The study population included all head teachers, parents' representatives to the board and staff finance committee members. The sample of 36 schools was taken out of 42 schools in greater

Bushenyi Districts and then 144 respondents. Only 136 responded but in all schools. The questionnaire was used to collect data. The quantitative data was analyzed by use of descriptive statistics together with correlation and regression analysis. The study revealed a positive relationship between budget management system and financial performance ( $r = .419^{**}$ ,  $p < .01$ ), a positive relationship between managerial competence and financial performance ( $r = .618^{**}$ ,  $p < .01$ ) and a high effective budget management system. It was recommended that schools should involve people with right skills and abilities to manage budgeting process and proper budget planning should be emphasized.

**Keywords:** Budget Management System, Managerial Competence, Financial Performance, Public secondary Schools, Greater Bushenyi Districts.

### **6.1.15 Managerial Competency and Budget Performance of Local Governments in Isingiro District**

**Dunant Kamugisha, Nsambu Kijjambu Frederick**

The study aimed at establishing the relationship between managerial competency and budget performance of local governments in Isingiro district and was guided by the following specific objectives: to establish the relationship between behavioral competences and budget performance of Local governments in Isingiro district, to establish the relationship between Technical competences and budget performance of local Governments in Isingiro district and to establish the relationship between organizational competences and budget performance of local governments in Isingiro district. The study adopted cross sectional research design and the population was 24 local governments in Isingiro district. All the 24 local governments were included in the study while the unit of inquiry was 144 employees. A self-administered questionnaire was administered. The study found out that in local Governments of Isingiro district; there is a moderate positive significant correlation ( $r = .512^{**}$ ,  $p \leq .01$ ) between behavioral competence and budget performance, that there is a substantial positive significant correlation ( $r = .734^{**}$ ,  $p \leq .01$ ) between Technical competence and budget performance and that there is a substantial positive significant correlation ( $r = .659^{**}$ ,  $p \leq .01$ ) between organizational competence and budget performance. The study concludes that; there is a moderate positive significant relationship between behavioral competence and budget performance of local Governments in Isingiro district, there is a substantial positive significant relationship between Technical competence and budget performance of local Governments in Isingiro district, and there is a substantial positive significant relationship between organizational competence and budget performance of local Governments in Isingiro district. The study recommends that employees, policy makers, managers and other stakeholders in local Governments in Isingiro district should: improve their behavioral competences by enhancing their thinking and decision-making capacities, ensuring positive attitude and improving their interpersonal skills, they should also improve their technical competences by ensuring effective communication, improving their knowledge and academic qualifications and enhancing their supervisory skills, they should further improve their organizational competences by encouraging teamwork, creativity, quality leadership

**Keywords:** Behavioral competences, Technical competences, organizational competences, budget performance, Local governments, Isingiro district.

### **6.1.16 Time Management Techniques and Work Performance among Employees of Local Government Authorities in Kabale Municipality, Kabale District**

**Turyamuhaki Nicholas, Asaph Katarangi Kaburura**

Time management is a set of principles, practices, skills, tools and systems that help a person use his or her time to accomplish what one wants. This study was conducted to investigate their relationship between three(3) Time management techniques; goal setting, prioritization of tasks and tasks scheduling and work performance among employees of Local Government Authorities in Kabale Municipality.

Work performance was measured using the Individual work performance scale validated and tested by various scholars and four(4) relevant constructs were studied; Task performance, contextual performance, adaptive performance and counterproductive work behavior. Time management techniques were explained based on the Pickle Jar Theory and Pareto Principle theory which talk about prioritization, task scheduling and goal setting. The empirical study from the literature review showed that setting goals, priorities and task schedules act as a compass that points towards improved work performance and provides a clear direction in planning and evaluation for the continuous development of exemplar professional conduct in an organization. In order to prove the theoretical and empirical review about time management techniques and work performance from a local government perspective, the study employed a descriptive cross sectional survey research design to gather information from Local Government Authorities in Kabale Municipality using a structured questionnaire based on 5-point Likert Scale ranging from Strongly Agree(5) to Strongly Disagree(1). This was distributed to staff and management of Local Government Authorities in Kabale Municipality out of which a sample size of 85 respondents was selected using simple random sampling of all staff members from the three divisions in Kabale Municipality namely; Central, Northern and Southern divisions.

Data was analyzed using SPSSv20.0 and presented using frequency tables for biodata and inferential statistics for specific objectives. The findings indicate that all the three techniques of time management; goal setting ( $r = .452^*$ ,  $P\text{-value} = .014$ ), prioritization of tasks ( $r = .476^*$ ,  $P\text{-value} = .029$ ) and task scheduling ( $r = .464^*$ ,  $P\text{-value} = .055$ ) were positively related with work performance. The study therefore, concludes that there is positive significant relationship between time management techniques and work performance. The study recommends Local Government Authorities in Kabale Municipality to establish time management policy and rules, train employees on time management, establish proper system of communication and involve employees in decision making.

**Keywords:** Time management techniques, goal setting, prioritization of tasks and tasks scheduling, work performance, Local Government Authorities, Kabale Municipality.

### **6.1.17 Borrowers' Characteristics Managerial Competences and Loan Performance among Microfinance Deposit Taking Institutions (Mdis) In Western Uganda**

**Nowembabazi Janice, Baguma John Kule**

This study sought to establish the relationship between borrowers' characteristics, managerial competence and loan performance. The study adopted a cross-sectional research design. The study involved a sample size of 22 MDIs and this were considered based on the Krejcie and Morgan table (1970). The Unit of inquiry included the manager, credit officer, relationship officer and a cashier as the units of inquiry. The research instrument was tested for reliability and validity. Respondents were subjected to a close-ended questionnaire; Data from the field was



processed and analyzed using Statistical Package for Social Scientists (SPSS). Given the nature of the research objectives and research questions, Zero order correlation was conducted to test the relationship between the study variables while hierarchical regression was used to test the combined effect of independent variables on the dependent variable. Findings from the study indicate that there was a positive significant relationship between the borrowers' characteristics, managerial competence and loan performance among MDIs in western Uganda. Therefore, the study recommends that the managers under MDIs should try by all means to make sure that the relationship between the borrowers and themselves is maintained by building a strong trust and ensuring that clear and well explained procedures are maintained since this will increase on the compliance and it will increase loan performance greatly.

**Keywords:** Borrowers' Characteristics, Managerial Competences, Loan Performance  
Microfinance Deposit Taking Institutions(MDIS)

### **6.1.18 Corporate Social Responsibility (Csr), Financial Inclusion and Profitability of Commercial Banks in Mbarara City Crescensio Twebaze, Atwiine Daniel Wanito**

The study aimed at establishing the relationship between Corporate Social Responsibility (CSR), financial inclusion and profitability of Commercial banks of Mbarara City. The study was guided by the specific objectives: to establish the relationship between CSR and profitability of commercial banks in Mbarara City, to establish the relationship between financial inclusion and profitability of Commercial banks in Mbarara City and to establish the combined relationship between CSR, financial inclusion and profitability of Commercial banks in Mbarara City. The study adopted a cross sectional research design and the population was 17 commercial banks in Mbarara City. The total sample size was 17 commercial banks. The study used purposive sampling to select commercial banks in Mbarara City whose employees filled a questionnaire. The study findings established a moderate positive and significant correlation ( $r=0.503^{**}$ ,  $p\text{-value}=0.000$ ) between CSR and profitability of commercial banks in Mbarara City, a substantial positive and significant correlation ( $r=0.685^{**}$ ,  $p\text{-value}=0.000$ ) between financial inclusion and profitability and finally, a substantial positive and significant combined correlation ( $r=0.776^{**}$ ,  $p\text{-value}=0.000$ ) between CSR, and financial inclusion and profitability. The study concludes that in commercial banks of Mbarara City, CSR is a key predictor of profitability since there is a moderate positive and significant relationship between CSR and their profitability, additionally financial inclusion is also another predictor of profitability because there is a substantial positive and significant relationship between financial inclusion and profitability and finally, there is a substantial positive and significant combined relationship between CSR and financial inclusion with profitability. The study recommends that supervisors, policy makers and other stakeholders of Commercial banks of Mbarara City; should improve their CSR by engaging more in economic, legal and philanthropic responsibilities, additionally the shareholders, policy makers and other stakeholders involved in management of Commercial banks in Mbarara City should improve on financial inclusion by increasing access of customers to bank services and increasing the coverage and improving the quality of financial products /services. Finally, the banks need to simultaneously invest in improving both CSR and financial inclusion since a combination of the two improves profitability more than considering each variable separately.

**Keywords:** Corporate Social Responsibility (CSR), Financial Inclusion, Profitability, Commercial Banks

### **6.1.19 In-Service Training and Employees' Performance among Selected Local Governments of Greater Kigezi, Uganda**

**Samuel Atwongyeire, Asaph Katarangi Kaburura**

This study examined the influence of Training on Employees' performance among selected local governments of Greater Kigezi, Uganda. The study was guided by three objectives which included to establish the relationship between induction programs and employees' performance among selected local governments of Greater Kigezi, Uganda, the relationship between role playing and employees' performance among selected local governments of Greater Kigezi, Uganda and to assess the relationship between mentorship and employees' performance among selected local governments of Greater Kigezi, Uganda. The study adopted a cross-sectional research design with both quantitative and qualitative approaches of data collection analysis. A sample size of 218 participants who included 210 employees from different district departments and eight key informants (CAOs/Deputy CAOs and Senior human resource officers) were recruited using both probability and non-probability sampling techniques. Data was gathered using both questionnaire and interview methods of data collection. Data gathered through questionnaire survey was analyzed using both descriptive and inferential statistics. Data gathered using qualitative method was analyzed using thematic content analysis. Findings show that there is a significant positive relationship between induction programs and employees' performance among selected local governments of Greater Kigezi local governments. In addition, results found out that there is a moderate positive relationship between role play and employees' performance among selected local governments of Greater Kigezi district local governments. Also, findings revealed that there is a moderate positive relationship between mentorship and employees' performance among selected local governments of Greater Kigezi district local government. The study concludes that there is a significant positive relationship between training and performance of employees in local governments. The study recommends that there is a need to enhance both role play and mentorship in order to fully ignite the influence of training towards employees' performance of district local governments.

**Keywords:** Induction programs, Role playing, Mentorship, Employee performance, Local governments of Greater Kigezi, Uganda

### **6.1.20 Supplier Evaluation Criteria, Staff Competency and Procurement Performance in Electricity Distribution Companies in Uganda**

**Julius Twebaze, Ruth Nyiramahoro**

The purpose of this study was to establish the relationship between supplier evaluation criteria, staff competency and procurement performance in electricity distribution companies in Uganda. It was guided by three objectives namely; to establish the relationship between supplier evaluation criteria and procurement performance, to establish the relationship between staff competency and procurement performance and to determine the extent to which supplier evaluation criteria and staff competency influence procurement performance in electricity distribution companies in Uganda. The study adopted a correlational research design which included quantitative approaches of data collection and analysis. The study involved a sample

size of 8 electricity distribution companies which was also the study population. The whole population was studied since it was small as (Mugenda & Mugenda, 2003) advises that when the population is too small, it is better to examine the entire population. The unit of inquiry consisted of 70 respondents which were selected using purposive sampling technique to generate the study participants. These were selected from the procurement, finance and user departments and included only those who participate in supplier evaluation process. Respondents were subjected to questionnaire method of data collection. Data from the field were processed and analyzed using Statistical Package for Social Scientists (SPSS) version 24. Descriptive analysis was done for all the study variables and non-parametric correlation was conducted to test the relationship between the study variables. Regression analysis was used to determine the variation the dependent variable that was explained the independent variables that were studied. The results from the study revealed that there was a positive relationship between the independent variables (supplier evaluation criteria and staff competency) and the dependent variables (procurement performance) in electricity distribution companies in Uganda. Therefore, the study concluded that there is need by the electricity distribution companies to evaluate supplier's technical capacity, quality commitment and financial capacity to improve on procurement performance and to ensure that they recruit qualified staff and continuously train them to enhance their competency for increased productivity.

**Keywords:** Supplier Evaluation Criteria, Staff Competency, Procurement Performance, Electricity Distribution

### **6.1.21 Leadership Styles and Financial Performance of Commercial Banks in Mbarara City, Uganda**

**Precious Katusiime, Asaph Katarangi Kaburura**

The study was set to investigate the relationship between leadership styles and Financial Performance of Commercial banks in Mbarara City, Uganda. It was guided by four objectives; to examine the relationship between transformational leadership and Financial Performance of Commercial banks in Mbarara City, Uganda, to examine the relationship between transactional leadership and Financial Performance of Commercial banks in Mbarara City, Uganda, to examine the relationship between autocratic leadership and Financial Performance of Commercial banks in Mbarara City, Uganda and to examine the relationship between laissez-faire leadership style and Financial Performance of Commercial banks in Mbarara City, Uganda. The study used data collected by the use of questionnaire method and interview guide and during data collection both qualitative and quantitative research methodologies were used as a sample of 90 respondents were selected from the study. More so, the unit of analysis (commercial banks) was supposed to be 18 banks, however, 16 commercial banks were involved in the study. The response rate was 80 out of 90 which accounts for 96.5% the respondents for the research instruments. Results from the study showed that a unit consideration of transformational leadership in commercial banks will result a .794 increase in financial performance of Commercial banks in Mbarara City, furthermore it was established by the study that a unit consideration of transactional leadership will result a .589 increase in financial performance of Commercial banks in Mbarara City. In addition, findings revealed that autocratic leadership will automatically increase Financial Performance of Commercial banks in Mbarara City by .403 if

considered, also that there is a positive significant relationship between laissez-faire leadership style and Financial Performance of Commercial banks in Mbarara City since findings showed that Laissez-faire leadership style will results an improvement in financial performance of Commercial banks in Mbarara City by .282 if considered. Generally, commercial bank management who are driven by the desire to achieve better financial performance in commercial banks should try and exhibit more of transformation leadership style and less of the rest of the styles. The study recommended the management in commercial banks should be aware of what is important for the subordinates and the organizations as a whole and encourage the employees to see the opportunities and challenges around them creatively. The commercial banks should also have their own visions and development plans for followers, working in groups and champion team work spirit. In addition, the management in commercial banks should have sense of innovation and also encourage followers to seek more opportunities and possibilities, not just achieve financial performance within expectations. Managers should understand the values of the followers and try to build their departmental/ unit's business strategies, plans, processes and practices that will likely to improve the wellbeing of staff. Authoritative leadership style will decrease financial performance in commercial banks. So management in commercial banks should try to avoid this type of leadership style. Contrarily, management should clarify expectations and provide goals and standards to be achieved for the followers. Lastly, those commercial banks can develop certain training programs or mentoring by professionals for the supervisors and leaders. Professionals and trainers can use the results from the current study to develop training programs that support leadership development.

**Keywords:** Transactional leadership, Autocratic leadership, Laissez-faire leadership style, Financial Performance, Commercial Banks

### **6.1.22 Corporate Governance Practices, Intellectual Capital and Financial Performance of Dairy Co-Operatives in Mbarara District**

#### **Francis Twinomujuni, Nsambu Kijjambu Frederick**

This study sought to establish the relationship between corporate governance practices, intellectual capital and financial performance of dairy Co-operatives in Mbarara district and was guided by the following objectives; to assess the corporate governance practices used by dairy Co-operatives in Mbarara district, to establish the relationship between corporate governance practices and financial performance of dairy Co-operatives in Mbarara district and to establish the relationship between intellectual capital and financial performance of dairy Co-operatives in Mbarara district. The study adopted cross sectional research design and the population size was 6 dairy Co-operatives. All the 6 co-operatives and 97 respondents were included in the study. Separate self-administered questionnaires were administered to 45 employees and 46 members of board while 6 managers were interviewed. The study found out that corporate governance practices of Dairy Co-operatives in Mbarara district were weak (mean =2.8097, standard deviation =1.15894), there is a substantial positive correlation ( $r=0.656^{**}$ ,  $p\text{-value}=0.000$ ) between corporate governance practices and financial performance of Dairy Co-operatives in Mbarara district and there is a substantial positive correlation ( $r=0.566^{**}$ ,  $p\text{-value}=0.000$ ) between intellectual capital and financial performance of Dairy Co-operatives in Mbarara district. The study concludes that; the corporate governance practices of Dairy Co-operatives in

Mbarara district were weak, corporate governance practices are key predictors of financial performance of Dairy Co-operatives in Mbarara district since the relationship between corporate governance practices and financial performance was positive, substantial and statistically significant and intellectual capital is another key predictor of financial performance of Dairy Co-operatives in Mbarara district since the relationship between intellectual capital and financial performance was moderate, positive and statistically significant.

The study recommends that Dairy Co-operatives in Mbarara district should improve their corporate governance practices by enhancing their internal controls, accountability systems and independence in decision, the study also recommends that policy makers and owners of Dairy Co-operatives in Mbarara district should invest more in enhancing their intellectual capital since a unit improvement in intellectual capital accounts for the 37.7% of their financial performance and the study further recommends that owners of Dairy Co-operatives in Mbarara district should invest more in enhancing their corporate governance practices since a unit improvement in corporate governance practices accounts for 51.9% of their financial performance.

**Key words:** Corporate Governance Practices, Intellectual Capital, Financial Performance, Dairy Co-Operatives

### **6.1.23 Managerial Competences, Sourcing Process and Performance of Contracts among Public Procurement Entities in Southwestern Uganda** **Noela Atuhaire, Nixon Kamukama**

Performance of contracts in Procurement and Disposal Entities promote resource in public entities to support economic development. The study established the relationship between managerial competences, sourcing process and performance of contracts among public procurement entities in Southwestern Uganda. The study was guided by three objectives which were; to establish the relationship between managerial competencies and performance of contracts among public procurement entities in Southwestern Uganda, to establish the relationship between sourcing process and performance of contracts among public procurement entities in Southwestern Uganda, and to establish the combined effect of managerial competencies and sourcing process on performance of contracts among public procurement entities in Southwestern Uganda. Cross sectional research design was adopted with quantitative approach. The unit of analysis was 38 PDEs where primary data was collected using questionnaires anchored on 5 Likert scaled range. The data was analyzed using SPSS version 20 to generate correlation and regression analyses. The study found out that; there is a significant substantial positive correlation ( $r=0.760^{**}$ ,  $p\text{-value}<.01$ ) between managerial competence and contract performance among PDEs in Southwestern Uganda, there is a significant moderate positive correlation ( $r=0.564^{**}$ ,  $p\text{-value}<.01$ ) between sourcing process and contract performance both managerial competencies ( $\beta= .760$ ,  $P<.01$ ) and a combination of managerial competences and sourcing process ( $\beta=.627$ ,  $P=.000$ ) has a substantial positive significant effect on contract performance among PDEs in Southwestern Uganda. The study concludes that: there is a significant substantial positive relationship between managerial competence and contract performance among PDEs in Southwestern Uganda, there is a significant moderate positive relationship between sourcing process and contract performance among PDEs in Southwestern Uganda and that a combination of managerial competences and sourcing process has a substantial positive significant effect on contract performance among PDEs in Southwestern Uganda. The study also recommends that policy makers, managers of PDEs and other

stakeholders in PDEs in Southwestern Uganda; should improve the competencies of the staff/employees by; offering refresher training courses, enhancing their agility and encouraging teamwork, they should also should improve their sourcing process by ensuring effective procurement planning and contractor selection and finally they should simultaneously invest in improving both managerial competencies and sourcing process since a combination of both of them improves contract performance more than considering each variable separately.

**Keywords:** Managerial Competences, Sourcing Process, Performance of Contracts, Public Procurement Entities, Southwestern Uganda

#### **6.1.24 Consumer Knowledge and Usage Behavior of Umeme Yaka Prepaid Service in Mbarara Municipality**

**Rogers Arinaitwe, Sarah Nabachwa**

The study aimed at establishing the relationship between consumer knowledge and usage behavior of UMEME's Yaka prepaid service in Mbarara Municipality and was guided by the following specific objectives: to establish the relationship between consumer experience and usage behavior of UMEME's Yaka prepaid service in Mbarara Municipality, to establish the relationship between consumer expertise and usage behavior of UMEME's Yaka prepaid service in Mbarara Municipality and to find out the relationship between product familiarity and usage behavior of UMEME's Yaka prepaid service in Mbarara Municipality. The study adopted cross sectional research design and the population was 29,079 UMEME Yaka prepaid users in Mbarara Municipality from which 392 Umeme Yaka Users were sampled. The study used simple random sampling was used Yaka Users. A self-administered questionnaire was administered. The study found out that in Mbarara Municipality; there is a substantial positive significant correlation ( $r=.630^{**}$ ,  $p\leq.01$ ) between consumer experience and usage behavior of UMEME's Yaka prepaid service, there is a weak positive significant correlation ( $r=.382^{**}$ ,  $p\leq.01$ ) between consumer expertise and usage behavior of UMEME's Yaka prepaid service and there is a moderate positive significant correlation ( $r=.557^{**}$ ,  $p\leq.01$ ) between product familiarity and usage behavior of UMEME's Yaka prepaid service. The study concludes that there is a substantial positive significant relationship between consumer experience and usage behavior of UMEME's Yaka prepaid service, there is a weak positive significant relationship between consumer expertise and usage behavior of UMEME's Yaka prepaid service and there is a moderate positive significant relationship between product familiarity and usage behavior of UMEME's Yaka prepaid service. The study recommends that policy makers, managers, employees and other stakeholders in UMEME especially in Mbarara Municipality; should improve consumer experience by ensuring peace of mind among customers before, during and after the purchase of the Yaka service, ensuring moments of truth during service delivery and doing outcome focus through reducing customers' transaction cost, they should improve consumer expertise by building both subjective and objective expertise among their customers and finally they should improve customer product familiarity by ensuring that customer exposure to advertisements, ensuring that customers use their service more frequently and increasing encounters with sales people.

**Keywords:** Consumer knowledge, Consumer experience, consumer expertise, product familiarity, usage behavior

### **6.1.25 Market Segmentation, Personal Selling and Sales Performance among Insurance Companies in Uganda**

**Arinaitwe Innocent, Ahimbisibwe Frank**

This study establishes the relationship between market segmentation, personal selling and sales performance among insurance companies in Uganda. The study was guided by three objectives which included; examining the relationship between market segmentation and sales performance among insurance companies in Uganda, to establish the relationship between personal selling and sales performance among insurance companies in Uganda, to establish the relationship between market segmentation, personal selling and sales performance among insurance companies in Uganda. The study adopted a cross-sectional research design which included quantitative approach of data collection and analysis. The study involved a sample size of 28 insurance companies and this sample size will be determined based on the Krejcie and Morgan table (1970). A sample size of 112 respondents selected using purposive sampling technique. These included a marketing manager, and three sales people as the units of inquiry. Respondents were subjected to a self-administered close-ended questionnaire. Data from the field was processed and analyzed using Statistical Package for Social Scientists (SPSS). Given the nature of the research objectives and research questions, Pearson correlation was conducted to test the relationship between the study variables while Ordinary least square regression was used to test the combined effect of independent variables with the dependent variable. Findings from the study indicate that there was a positive relationship between the independent variables with dependent variables among insurance companies in Uganda. The need to make sure that the relationship between the employees and insurance companies is maintained by building a strong trust and ensuring that clear and well explained procedures are maintained since this will increase on the compliance and it will turn their performance greatly.

**Keywords:** Market Segmentation, Personal Selling, Sales Performance, Insurance Companies

### **6.1.26 Procurement Management Systems, Staff Competency and Contract Performance among Water Projects in Ministry of Water and Environment**

**Akao Mary, Kamukama Nixon**

This study examined the relationship between procurement management systems, staff competency and contract performance among water projects in MWE. The study was guided by four objectives which included; to examine the relationship between procurement management systems and contract performance among water projects in MWE, to establish the relationship between staff competency and contract performance among water projects in MWE, to examine the relationship between staff competence and procurement management systems among water projects in MWE and to assess the contract management tools used in water projects in MWE. The study adopted a cross-sectional research design which included quantitative approach of data collection and analysis. The study involved a sample size of 19 water projects and this sample size was determined based on the Krejcie and Morgan table (1970) sample size determination. A sample size of 76 respondents selected using both purposive and simple random sampling technique to generate the sample size participated in this study. These included project managers, procurement officer, project accountant, a member of the contracts committee and two project beneficiaries. Respondents were subjected to questionnaire method of data collection. Data from the field were processed and analyzed using Statistical Package for Social Scientists (SPSS v21).

Given the nature of the research objectives and research questions, Pearson correlation was conducted to test the relationship between the study variables while hierarchical regression was used to confirm the relationships. In addition, descriptive statistics were used to assess the tools of contract management. Findings from the study indicate that there was a positive relationship between the independent variables (procurement management systems and staff competence) with dependent variables of contract performance among water projects in the ministry of water and environment. Therefore, the study recommends that, there is need by the water projects to train well their staff to ensure that they have the required knowledge and competence about professional experience, technical skills and level of education is the very one required in these projects to enhance high performance in contracts.

**Keywords:** Procurement Management Systems, Staff Competency, Contract Performance, Water Projects

### **6.1.27 Management Styles, Job Satisfaction and Teachers' Performance in Universal Secondary Education (USE) schools in Mbarara Municipality**

**Denis Mwesigye, Babi David Kamusaala**

The study aimed at establishing the relationship between management styles, job satisfaction and teacher's performance in USE schools in Mbarara Municipality. The study was guided by the specific objectives: to establish the relationship between management styles and teacher's performance, to establish the relationship between job satisfaction and teachers' and to establish the combined relationship between management styles, job satisfaction and teacher's performance. The study adopted a cross sectional research designs and the population was 6 public secondary schools in Mbarara Municipality. The total sample size was 144 respondents. The study used simple random sampling on teachers and purposive sampling on head teachers and deputy head teachers. A questionnaire was administered on all the study respondents. The study found a moderate positive and significant correlation ( $r=0.503^{**}$ ,  $p\text{-value}=0.000$ ) between management styles and teacher's performance. Additionally, the study found a moderate positive and significant correlation ( $r=0.592^{**}$ ,  $p\text{-value}=0.000$ ) between job satisfaction and teacher's performance. The study finally established a substantial positive and significant combined correlation ( $r=0.631^{**}$ ,  $p\text{-value}=0.000$ ) between Management styles, and job satisfaction and teacher's performance. The study concludes that in USE schools in Mbarara Municipality; management styles are a key predictor of teachers' performance since there is a moderate positive and significant relationship between management styles and their performance. More so, job satisfaction is also another predictor of teachers' performance because there is a moderate positive and significant relationship between job satisfaction and their performance. Finally, there is a substantial positive and significant combined relationship between Management styles and job satisfaction and teacher's performance. The study recommends that teachers' supervisors, policy makers and other stakeholders in USE schools of Mbarara Municipality; should improve their management styles by maintaining use of democratic style, limiting laissez-faire style and discouraging authoritarian style, additionally they should ensure that teachers are satisfied with their jobs and finally they need to simultaneously invest in improving both management styles and teachers' job satisfaction since a combination of both of them improves teachers' performance more than considering each variable separately.



**Key words:** Management Styles, Job Satisfaction, Teachers' Performance, Universal Secondary Education (USE)

**6.1.28 Tailoring Competences and Competitiveness of Tailoring Enterprises in Uganda: A Case of Rukungiri Municipality, Rukungiri District**  
**Ndaru Monica Immaculate, Diana Kabarangira**

Tailoring in Uganda as elsewhere in Africa has been found to be relatively competitive, small, and dominantly situated in rural areas; with the local inhabitants as the primary market. In the face of global pressure, the need for increased capabilities in producing competitive clothing has proved to be important. This research examines the competences of tailors including technical competences, working experience, and enterprising confidence; and their association with the competitiveness of tailoring enterprises. The study was cross-sectional, employed both quantitative and qualitative methods of data collection, and took place in Rukungiri Municipality in South Western Uganda. 86.1% of the respondents were tailors, and the rest were Principals of Vocational Schools. Technically, 70.4% of the tailors responded that they could draft standard designs for their clients, 66.6% of them had achieved a maximum of primary education, or had no schooling at all (22.2%), and 66.7% had learnt tailoring by apprenticeship, among other findings. The summative results reflect insufficient training and poor exposure to standards for competitiveness. The results show that 37.0% of the tailors had over 10years of Working Experience, and an aggregate of 37% had experience of 3-10years. Though seemingly sufficient for competitiveness, the nature of the experience was tested, and found to be limited by their environment. Only 33.3% of the tailors worked as staff in a tailoring enterprise and could therefore continually grow, and the rest were either sole proprietors or lead tailors whose experience depended on their personal exposure. The tailors were found to have a high enterprising confidence, despite degrees of customer dissatisfaction. It was concluded that the tailors lacked sufficient competency levels for competitiveness, due to limited exposure to proper tailoring standards and prevalent trends of fashion.

**Keywords:** Tailoring Competences, Competitiveness, Tailoring Enterprises

**6.1.29 Motivation and Employee Performance in Public Health Facilities in Kanungu District**

**Tugiramasiko Miriam, Adrian Mwesigye**

This study was to establish the relationship between recognition, rewards, and work environment and employee performance. The study was guided by three objectives which included; establishing the relationship between recognition and employee performance in public health facilities in Kanungu District, to establish the relationship between rewards and employee performance in public health care facilities in Kanungu District, to establish the relationship between work environment and employee performance in Kanungu District

The study adopted a cross-sectional research design which included quantitative approach of data collection and analysis. The study involved a sample size of 26 health centres made up 78 respondents which were developed by Krejcie and Morgan (1970 these employees in these health centres. Respondents were subjected to a close-ended questionnaire; Data from the field

was processed and analyzed using Statistical Package for Social Scientists (SPSS). Given the nature of the research objectives and research questions, Pearson correlation was conducted to test the relationship between the study variables while ordinary least square regression was used to confirm effect of independent variables with the dependent variable.

Findings from the study indicate that there was a positive relationship between the independent variables with dependent variables among health centres. The managers under health sector should try by all means to make sure that the relationship between the employees and themselves is maintained by building a strong trust and ensuring that clear and well explained procedures are maintained since this will increase on the compliance and it will turn their performance greatly.

### **6.1.30 Tax incentives, investment climate and export growth among dairy factories in south western Uganda**

**Annah K Atuhaire, Kahangane Geoffrey**

The study sought to establish the relationship between tax incentives, investment climate and export growth within dairy processing firms in southwestern Uganda. The study adopted across sectional and correlation quantitative design using a sample size of 88 respondents. The data was tested for reliability and validity, analyzed using SPSS version 21 and results presented based on the study objectives.

The correlation coefficient analysis revealed positive and significant relationships between tax incentives, investment climate and export growth within dairy processing firms in south western Uganda which implies that when one variable is improved it leads to improvement of the other. Furthermore, the multiple regression analysis indicates that tax incentives combined with investment climate have a greater influence on the export growth within dairy processing firms (Adj  $R^2$  of 0.328). However, it was further revealed that tax incentives has a more direct effect on the export growth within dairy processing firms and the improvement in the related activities leads to an improvement in export growth within dairy processing firms.

The researcher therefore, recommends that the government of Uganda should promote favourable tax incentives and a favourable investment climate among dairy firms since its crucial in achieving export growth. This can be achieved through giving the owners of the dairy firm's tax holydays, tax exemptions, capital incentives and reducing VAT, this will enable to produce more and it will result into increased export growth.

### **6.1.31 Working Capital Management, Internal Control Activities and Profitability of Selected State Enterprises in Uganda**

**Apollo Tumusiime, Mujuni M B Perez**

The study examined Working Capital Management, Internal Control Activities and Profitability of selected state enterprises in Uganda. The study was guided by Specific objectives which were, 1) to examine the relationship between working capital management and profitability of selected state enterprises in Uganda, 2) to examine the relationship between internal control activities and profitability of selected state enterprises in Uganda and 3) to examine a combined relationship between working capital management, internal control activities and profitability of selected

State Enterprises in Uganda. The study adopted a correlational research design using primary data collected through administering a structured questionnaire to 06 selected state enterprises using a census sampling technique where all members of the population were studied.

The findings of the study indicated that there was a positive strong and significant relationship ( $r = 0.813$ ,  $p < 0.05$ ) between working capital management and profitability of state enterprises. The study further found a positive strong and significant relationship ( $r = 0.829$ ,  $p < 0.05$ ) between internal control activities and profitability of selected state enterprises.

The study concluded that there was a positive strong correlation between working capital management and profitability of selected state enterprises in Uganda and that there was a positive very strong correlation between internal control activities and profitability of selected state enterprises in Uganda. The study recommended that management of state enterprises should put in place policies and processes that will ensure effective management of working capital like reducing accounts receivable payment period and putting mechanisms of recovering receivables. The management should as well institute strong internal control activities such as conducting performance review of activities, safe guard of assets so as improve their profitability levels.

**Keywords:** Working Capital Management, Internal Control Activities, Profitability, State Enterprises

## **7.0 FACULTY OF INTERDISCIPLINARY STUDIES**

### **7.1 MASTER OF ARTS IN CONFLICT ANALYSIS AND INCLUSIVE DEVELOPMENT**

#### **7.1.1 Exploring Alternative Durable Solutions in the Management of Protracted Refugee Situations in Uganda: The Case of Congolese Refugees in Nakivale Refugee Settlement**

**Ashaba Patricia, Frank Ahimbisibwe, Cleophas Karooma**

The protractedness of Congolese refugees in Nakivale Refugee Settlement and the limitations of the traditional durable solutions have contributed to the ineffectiveness to address the problems affecting refugees and their host community. Thus, the main objective was to explore alternative durable solutions due to the rising concern of the increasing protracted refugees in Uganda with a case study on the Congolese refugees in Nakivale Refugee Settlement. The objectives that guided this study were to analyze the nature of the Congolese protracted refugee situation, to examine the limitations of the traditional durable solutions to Congolese refugees and to find out the alternative durable solutions to the Congolese protracted refugee situation.

The study adopted case study design and employed qualitative methods of data collection. This research study focused on the Congolese refugees and part of this study population were the government actors (OPM), UNHCR official and International Rescue Committee (IRC) official who were the key informants of this study. The targeted sample size was 68 respondents but reached 63. The technique used was the purposive sampling for Congolese refugee respondents

and key informants. The sources of data were mainly primary sources like interviews and focus group discussions. Qualitative data was gathered using semi-structured open-ended questionnaires that were administered to each of the Congolese refugees. Government and humanitarian respondents were offered an open-ended questionnaire interview as the Key informant interview guide. The data collected from Congolese refugees was edited to determine the pieces of data that had the needed value and coded by identifying explanatory patterns related to the objectives of the study some of which was summarized into frequency tables. In addition, using thematic analysis, summarized data was presented in form quotations.

Findings revealed that the causes of the protracted situation of the Congolese refugees in Nakivale refugee settlement were relative peace and stability in the refugee host community, corruption and insecurity/conflicts in the refugee home country. The effects of the protracted situation on Congolese refugees were poor living conditions, poor health conditions, financial hardship, tribalism/discrimination and insecurity (intimidation & leaving in fear). The study found that traditional durable solutions had limitations as follows: voluntary repatriation (conflict persistence, lack of land/property and fear to be killed in Democratic Republic of Congo (DRC), resettlement (corruption, bureaucracy and lack of assistance and capacity to pursue it) and lastly local integration (vulnerability of refugees, lack of interest, tribalism/discrimination and lack of land/property in Uganda). The alternative durable solutions include regional integration for ease of mobility, refugee travel documentation, provision of basic needs, provision of services (schools/health/water, etc) and ensuring peace and stability in settlement, and counseling.

### **7.1.2 Refugee Rural-Urban Migration and Livelihoods in Uganda: A Case of Burundian Refugees Residing in Mbarara City**

**Bruno Asimwe, Frank Ahimbisibwe, Cleophas Karooma**

The study investigated the environment surrounding refugees' access to humanitarian assistance which tends to suffocate the spirit of the Uganda Refugee Act of 2006 under Article 30 which allows freedom of movement for refugees in the country. The contradiction is set in the same refugee policy by asking refugees living outside the settlement areas to gather their own support as regards humanitarian assistance.

The main objective of the study was to examine the rural-urban migration of Burundian refugees residing in Mbarara city with the origin of Nakivale Refugee Settlement. Specific objectives were also formulated to reflect a simplified understanding of the broader meaning of the main objective. They included; identifying the push and pull factors of Burundian refugees migrating from Nakivale Refugee Settlement to urban areas, examining the challenges faced by Burundian refugees residing in urban areas and identifying the livelihood strategies of Burundian refugees residing in urban areas.

For these objectives to be achieved a qualitative means of inquiry was used and data collection was done with the aid of semi-structured interviews, Key informant interviews and the

observation method to take notice of some of the refugee livelihoods. The sample size of the study was twenty eight (28) respondents who were selected using snowball and purposive sampling techniques for the mentioned interview guides respectively.

With the help of Atlas ti, the analysis of qualitative data was done for the respondents in Mbarara city and Nakivale Refugee Settlement. The analysis shows specific points of origin of Burundian refugees largely residing in urban areas to have had a close relationship with their current choice of destination for migration. It was noted that many reasons for refugee rural-urban migration hinge on the lifestyle they missed on arrival at Nakivale Refugee Settlement. Importantly, refugees are challenged with access to food rations that was worsened with the presence of corona virus lockdown restrictions; insecurity, unemployment and the socio-cultural nature of life. Amidst this environment, specific livelihood strategies have been noted especially in regard to accessing food assistance. The unnecessary conditions tied to access of food rations by requiring refugees to make a quarterly mandatory return journey to Nakivale Refugee Settlement demean the decision taken by these refugees to migrate to urban areas. There is need to adopt a different direction for monitoring refugees without infringing on their rights to movement and seeking gainful employment.

**Key words:** Refugee Rural-Urban Migration and Livelihoods

### **7.1.3 Biodiversity Conservation and Involvement of Indigenous People: A case of Batwa of Mikeno Sector around the Virunga National Park, Democratic Republic of Congo**

**Bakole Yalire Eliode, Medard Twinamatsiko, Clementia Neema Murembe**

This study examined Biodiversity Conservation and Involvement of Indigenous Batwa of the Mikeno sector of the Virunga National Park, in the Democratic Republic of Congo. The Mikeno sector is located within the Greater Virunga Landscape which is the south sector of the Virunga National Park, a world heritage site and home to the mountain gorillas. Three main thematic areas in this work include the involvement of Batwa in the park benefits sharing (PBS), the decision-making process, the socioeconomic conditions of Batwa, and motivation to support the biodiversity conservation of the ViNP.

The study used a mixed-method approach in which descriptive and exploratory research designs were utilized. The study had four types of respondents, the Indigenous Batwa households, and the key informants inter alia the Protected Area Authorities, the Civil Society Organizations (CSOs), and the local leaders. Data was collected from secondary and primary sources. Households Surveys, and Key Informant Interviews and the GPS coordinate built the primary data of this study. Qualitative survey data was analysed using atlas ti8. This software helped generate the codes, the themes, the meanings, and the network of the transcripts. For the quantitative survey data, SPSS-22 was employed and the latter helped generate the frequency tables, the means, and standard deviation. For the GPS coordinate, ArcGIS was employed.

Results revealed that the ViNP benefit-sharing with Batwa is in terms of community projects aimed at improving the livelihoods of the communities around the park. Nevertheless, very few Batwa benefited from them and were not enough to sustain their needs. However, the Batwa of

the Mikeno sector are still living in poverty, their involvement in the benefit-sharing and the chances to access jobs in the park are limited due to their low level of education. Some Batwa benefited 23 houses, beehives, bean' seeds, and rabbits were distributed, school fees were paid for some, for their livelihood improvement even though it seems hard to realize the sustainable outcome. Based on the findings of this study the participation in policy implementation of Batwa proved not effective. There has been a slight improvement in capacity building among the Batwa in terms of various training sessions in terms of training (carpentry, tailoring, etc.) implemented by some CSOs. This study has also demonstrated that the current socio-economic conditions of the Batwa (lack of education, jobs, livelihood, etc.) cannot motivate them to get fully involved in the ViNP biodiversity conservation. It was found that the Batwa are begging and picking leftovers in other people's gardens to survive regularly, indicating Batwa's poor status, lack of livelihood, and income. While some Batwa households are getting integrated into farming, social life, others are not able to cultivate for self-sufficiency.

The study concludes that in order to fully involve the indigenous Batwa in biodiversity conservation, it is urgent to help them improve their level of education because education is found to be the starting point and create more jobs matching their skills, increase the livelihood support, explore possibilities for employment in the park. The study recommends first improve their level of education then implement the Batwa employment strategic plan, urgently approve and implement the ViNP management plan, implementing a proposed park benefit-sharing scheme and a compensation plan.

**Keywords:** Biodiversity Conservation, Involvement, Indigenous People

#### **7.1.4 The Effect of Human-Wildlife Conflict Interventions on Wildlife Conservation: The Case of Mikeno Sector of Virunga National Park, D.R. Congo**

**Minani Shamwesi Abel, Medard Twinamatsiko, Ronald Twongyirwe**

This study examined the effect of Human-Wildlife Conflict interventions on wildlife conservation of Mikeno Sector, of Virunga National Park (ViNP). Virunga National Park is one of the most particular world heritage sites and a home of endemic Mountain Gorillas especially in its Mikeno Sector. However, Human-Wildlife Conflict is one of main threats to wildlife conservation in the Protected Area. The study aimed at the current spatial distribution of Human Wildlife Conflicts interventions, the ways they are implemented and local people's perception of the effect of the interventions.

Apart from the documentary review, key informant interviews and field-based observations used in the study for qualitative data, a field surveys generated quantitative data from 374 respondents. Qualitative data was analysed using thematic analysis aided by Word 16 and Atlas ti7 version. Quantitative analyses were run in SPSS 22 to generate descriptive values of mean, standard deviation and variable correspondence test. Results show that HWC interventions are spatially discontinuous, while the stone walls and the Gorilla Monitoring Response Team had been replaced by the electric fence. While the majority of the participants 39.8% (n=149/374) considered the effect of electric fence to be weak, 35.3% (n=132/374) considered it to be fair.

However, there was a significant difference ( $X^2= 174.78$ ,  $P=0.00$ , Pearson test) of perceptions among respondents over the effect of the intervention aiming to manage the HWC across their groups of origin. Results from compared estimates and interviews revealed that the impact on the ground in terms of crop production, the decreased movement of the wildlife and its population growth has been reduced. However, participants were reluctant to state the durability of the wildlife conservation. Despite some progress reported in terms of wildlife resource growth, the effect of the HWC interventions is less perceived. The study revealed that the stone walls could not stop the large mammals like buffalos, elephants and gorillas unless when reinforced by the electric fence. However, the electric fence could also be degraded due to the lack of durable materials such as metallic posts that could resist more than the wooden sticks. Participants in the study suggested that the electric fence should be renovated to reduce HWC.

The study recommends a combination of interventions, a strong forum of stakeholders, plantation of non-palatable crops in the farmlands directly adjacent to the Park, early warning systems with response team from local residents caring out a permanent inventory of the wildlife resources going to the farmlands, clearly defined policy for crop raiding compensation and revenue sharing.

**Keywords:** Human-Wildlife Conflict, Interventions, Conservation

### **7.1.5 Marginalization of Bakonjo and Conflict Resolution in the Monarchical Rwenzururu Communities, Uganda**

**Copan Muhanguzi Cleopan, Frank Ahimbisibwe, Charles Muchunguzi**

The study sought to examine the nature of marginalization of Bakonjo and conflict resolution in the Rwenzururu monarchical communities. The specific objectives of the study were: To assess the nature of Bakonjo marginalization in the Rwenzururu monarchical communities; To assess the evolution of conflicts in the Rwenzururu monarchical communities; and to examine conflict resolution mechanisms in the Rwenzururu monarchical communities

This is a qualitative study which adopted exploratory research design. Data was collected using focus group discussions and in-depth key informant interviews. The sample size for this study was 301 participants. Simple random sampling and purposive sampling were employed to obtain study participants who included the local leaders, elders, clan heads and local community members (natives) and data in this study was analyzed using thematic analysis.

Key findings from the study indicate that the nature of marginalization of Bakonjo is mainly in service delivery especially in some areas where Bakonjo people are few with minimal collective voice. In some districts, they are left out during information dissemination. It was also found out that most conflicts that have evolved in the Rwenzururu communities have emanated from land resource and various conflict resolution mechanisms like under the tree dialogues, mediation and negotiation have been used to avert some of the conflicts in the region. This study concludes that marginalization of certain tribes is partly responsible for the current bitterness among ethnic tribes in the Rwenzururu communities; apparently, this has become an ember to endless conflicts that have ravaged the Rwenzururu region. It is imperative to recommend that there is a need to apply multi-faceted approach in order to resolve marginalization of minority tribes in some districts, and also nip in the bud endless conflicts that have become a trademark in the

Rwenzururu region, for they have caused bloodshed and retarded the development of the communities and left the citizens in these areas hopeless.

**Key words:** Marginalization, Rwenzururu region, Conflict resolution

## **7.2 MASTER OF ARTS IN DEVELOPMENT STUDIES**

### **7.2.1 The Role of Electronic Media in the Democratization Process of Uganda**

**Nahurira C Shalom, Frank Ahimbisibwe, Tom Ogwang**

The study examined the role of electronic media in the democratization process in Uganda; focusing on electronic media houses in Mbarara Municipality. The general objective of the study was to examine the role of electronic media in enhancing Uganda's democratization process while the specific objectives were to document the information that electronic media houses broadcast on the democratization process in Uganda, to assess community's perceptions on the broad casted information on the democratization process in Uganda and to analyse the contribution of electronic media broad casts towards the democratization process in Uganda.

The study employed qualitative and quantitative methods of data collection and analysis where information was obtained using questionnaires and interviews from a sample size of 142 respondents. The study respondents were selected using purposive and simple random sampling techniques and the research findings presented in frequency tables and normatively in quotations from interviews.

Findings revealed that the information electronic media houses in Mbarara Municipality broadcast on the democratization process in Uganda includes multiparty politics, voter/voting information, yard sticks for a presidential candidate to be declared winner, campaign schedules of different candidates, rigging information, fairness of an election, power transition and involvement of security agencies in elections. The study findings also revealed that the communities in Mbarara Municipality hold more of positive perceptions on the broadcasted information by the electronic media on the democratization process; arguing that the broadcasted information is useful in the democratization process; which however depends on the sitting government/government in power to take that information into consideration and allow media freedom. Finally, the study findings revealed that the electronic media contributes much towards the democratization process in Uganda through dissemination of information like on how peaceful transition/handover of power can be done; shaping of public opinion on democracy and governance and forcing government to account or take action on matters that affect democracy such as shifting of polling stations outside police and army barracks to where voting is in full view of the public; which was done prior to the 2011 and 2016 elections.

The study concluded that the electronic media plays a more positive and influencing role in the democratization process in Uganda mainly through dissemination of information; which shapes public opinions on democracy and governance. The study recommended that media houses should give equal opportunity to all political parties contesting in the general elections regardless of their popularity. The study also recommended that government should create a conducive



working environment for journalists because it is the information that they collect that shapes the democratization process in Uganda.

**Keywords:** Electronic media, Democracy

### **7.2.2 Teachers' Motivation and Students' Academic Performance: A Case of Mixed Government Secondary Schools in Rubirizi District in Uganda** **Nyakato Clare, Neema Clemencia Murembe, Kemigisha Prudence**

This study established the role of teachers' motivation on students' academic performance in mixed government secondary schools in Rubirizi District. The study was guided by three objectives which included examining motivational strategies in place to motivate teachers, assessing students' academic performance and establishing teachers' suggested views on motivation and students' academic performance in government schools of Ndekye and Kirugu SS. The study adopted a descriptive research design with qualitative approaches of data collection and analysis. A sample size of 31 respondents were selected among 85 (academic staff), 1150 students, 2 PTA representatives, of the two schools and the DEO using purposive sampling techniques. Both interview and FGD methods of data collection were employed to collect primary data among these respondents. Primary data collected from the field was analysed manually and qualitative data was presented through verbatim quotations. The study concluded that there was a strong relationship between teachers' motivation and students' academic performance. Teachers were motivated by different stakeholders in different ways but the government has some gaps in motivating teachers although it is the central actor. However, teachers' motivation was not the only determinant of student academic performance as there are other determinants of students' academic performance including students' discipline, time management, school policies and family background. The study revealed that teachers are not impressed with the motivation strategies put in place calling upon the stakeholders to adjust accordingly if they are to realize Students' academic performance.

**Key words:** Motivation, Academic performance

### **7.2.13 Women Entrepreneurship and Socio-Economic Development of their Households in Mukaza Commune-Bujumbura –Burundi**

**Gloria Arlene Ininahazwe, Clementia Neema Murembe, Prudence Kemigisha**

The focus of this study is on Burundian women entrepreneurs and socio-economic development of their households in Mukaza Commune-Bujumbura Burundi, it aims to explore different factors that motivate women to become entrepreneurs, their contribution on socio-economic development especially in their households, also to analyze various challenges they face in their entrepreneurial activities.

I conducted a qualitative research approach and employed purposeful sampling to select respondents. The individual in-depth interviews were done on 20 female entrepreneurs in Mukaza commune, 4 husbands of women entrepreneurs and 3 key informants. The interview

guide questions were set basing on objectives to collect primary data and the data available on the internet, company reports, and newspaper publications were considered as sources of secondary data.

The findings indicate that women entrepreneurs have been motivated by numerous factors such as unemployment, poverty, low family income, need to make more money, need to improve their standards of living, etc. and their contribution is noteworthy where they participate in poverty alleviation, they contribute to payment of bills and ensure the well-being of their families and surroundings. However, these women entrepreneurs face challenges which are debts, over taxation, lack of capital, lack of managerial skills and discrimination.

Therefore, even if these women entrepreneurs have challenges in their entrepreneurial activities, they manage to solve them and keep moving on. The role they play in the socio-economic development of their households is noteworthy. That's why it is commended to consider women entrepreneur as actors of socio-economic development especially in their households; they need not to be left behind men.

**Key words:** Women entrepreneurship, socio-economic development

#### **7.2.4 Willingness and Acceptability of Care Givers and Primary Care Providers in Community-Based Management of Dementia in Bugamba Sub County, Rwampara District**

**Christine Karungi, Charles Muchunguzi, Edgar Mulogo**

The rising incidence of Alzheimer's disease among older-age adults worldwide has been accompanied by an increase in the need for care and management at community level. Limited work has examined the lived experiences of both willingness and acceptability of care givers and primary care providers in community-based management of dementia. This study focused on this phenomenon with primary focus on Bugamba Sub County, Rwampara district in Southwestern Uganda.

The study conducted one-on-one, in-depth qualitative interviews with a purposive sample of 15 VHTs, 04 Health workers and 06 caregivers. They were interviewed about their willingness, acceptability, experiences and measures that can be taken to enhance the willingness and acceptability of primary care providers on dementia management in rural southwestern Uganda. All interviews were audio recorded, transcribed into English, and thematically analyzed.

Three primary data themes emerged; factors associated with caregivers and primary care providers' willingness in community-based management of dementia, caregiver and primary care providers' acceptability to engage in community-based management of dementia and the measures that can be taken to promote caregiver and primary care providers' willingness and acceptability in dementia management.

Factors associated with willingness and acceptability: They are influenced by various reasons among which include the environment and negative attitude towards people with dementia.

Primary care providers and caregivers are willing to care for people with dementia since it is socially acceptable for the community to provide care to the elderly. There is need to create enablers for dementia care and management in the community.

**Key words:** Care givers, Primary Care Providers, Dementia, Community Based Management

### **7.2.5 Informal Women Groups and Socio-Economic Development of Women in Rural areas: A Case of Rotating Savings and Credit Association (ROSCAs) in Kikyenkya Sub County, Ibanda District, Uganda**

**Macklean Ahabwe, Rogers Bariyo, Primrose Nakazibwe**

The study aimed at assessing the effect of Rotating Savings and Credit Associations on socio economic development of women in Kikyenkya Sub-county, Ibanda District. The study objectives were; to examine the factors influencing women membership into ROSCAs, to assess the social economic benefits of ROSCAs to women participants, to identify the challenges faced by ROSCAs in their effort to improve socio economic development of women and to establish measures to the challenges faced by ROSCAs in their effort to improve socio economic development of women.

The study used descriptive research design. The study used qualitative and quantitative approaches of data collection. A sample size of 92 respondents was selected for the study. Interviews, documentary review and observation were used as data collection methods. Questionnaire, interview guide, documentary review guide and observation check list were used as data collection tools. Qualitative data was analyzed using themes and sub themes while quantitative data was analyzed using frequency tables, descriptive statistics, photographs and statistical package for social sciences (SPSS) version 21.

The study findings revealed that Rotating Savings and Credit Associations enabled members to meet household obligations such as education, medical and other emergencies. Rotating Savings and Credit Associations assisted in initiating group projects like chicken rearing, outside catering, renting out utensils to different ceremonies. Accessing soft credits at low interest rate was the biggest economic benefit enjoyed by ROSCA members. This enabled Rotating Savings and Credit Associations members not only generate income which enhanced their livelihoods but also in development of their communities.

On the other hand, Rotating Savings and Credit Associations faced various challenges including; failure by members to honor their obligations like repayment of group subscriptions which resulted to group disharmony, hence a need to improve the management of ROSCAs. There was a good ROSCAs management and performance like thorough organization of group's financial records, meeting attendance registers and "pot" receiving records. Thus the study recommended that ROSCAs should diversify saving products to include education and medical care that goes beyond merry ground. ROSCAs should set out a whole platform kitty for school fees and medical cover different from the ordinary 'pot' contributions.

**Keywords:** Rotating Savings and Credit Associations

## **7.3 MASTER OF ARTS IN LOCAL GOVERNANCE AND PLANNING**

### **7.3.1 Conservation Organisations and Human-Wildlife Conflict Interventions at Bwindi Impenetrable National Park, South Western Uganda**

**Isaac Twinomuhangi, Medard Twinamatsiko, Charles Muchunguzi**

The study examined the contribution of conservation organizations towards Human-Wildlife Conflict (HWC) interventions at Bwindi Impenetrable National Park. The study specifically mapped the spatial and temporal distribution of HWC interventions around BINP undertaken by communities with support of conservation organizations, explored the perceptions of local residents on the contribution of conservation organizations towards HWC interventions and determined the effectiveness of HWC interventions introduced by conservation organizations. Descriptive and explanatory research designs using a mixed method approach were adopted. The study used stratified, simple random and purposive sampling techniques to select the respondents. Data was collected from both primary and secondary sources.

The study used a mixed methods approach where household surveys, Key Informant interviews, Focus Group Discussions, Direct Observations and Geographic Information System (GIS) mapping were used. Analysis of data collected from the field was done to generate descriptive statistics using SPSS and Microsoft Excel 2013 packages and thematic analysis was used for qualitative data. Findings about spatial and temporal distribution show that, interventions were close to the boundary of the park and implemented in different years. On the contributions of organisations, financial assistance was the greatest contribution by organizations towards HWC interventions. On the effectiveness of interventions, tea was the most effective intervention as it was associated with financial benefits in addition to reducing crop raiding, followed by HUGO, Mauritius thorn hedge and beehive fence.

It is concluded that the trend of interventions supported by conservation organisations were very effective in the initial years but got ineffective in the subsequent years. Most physical interventions were close to the park, more support towards the interventions was from international organisations compared to local organisations and much as conservation organisations supported the interventions, the problem of human-wildlife conflicts persisted. The study recommended that local residents and conservation organisations to have agreements with UWA to cut down boundary tree branches to allow the growth of interventions, UWA to use revenue sharing money to facilitate HWC interventions, conservation organisations to consult local residents and UWA before the implementation of interventions and finally conservation organisations should involve local residents in decision making and implementation processes.

**Key words:** Human Wildlife Conflicts, Uganda Wildlife Authority, Conservation Organisations

### **7.3.2 Operation Wealth Creation (OWC) and Farmers' Service Provision in Rugando Sub County, Rwampara District**

**Sarah Ahabwe, Rogers Bariyo, Viola Nyakato**

This study was mainly conducted to analyze the contribution of Operation Wealth Creation (OWC) on farmers' service provision and household poverty reduction in Rugando Sub-County, Rwampara district. The specific objectives were to assess the services provided by OWC to

farmers in Rugando Sub-County, to examine the mode of delivery of the services provided by OWC to farmers, to examine the factors hindering effective delivery of OWC services among farmers and to examine the contribution of OWC on household poverty reduction in Rugando Sub-County, Rwampara District.

A qualitative study design was employed to collect data from a population of farmers in Rugando Sub-County and key stakeholders in the OWC at Rwampara district and Rugando Sub-County. These included among others the CDO, Sub-County Chief, OWC Coordinator, agricultural Officers and LC1 Chairpersons. Data was collected using focus group discussions with farmers and interviews with key informants and analyzed using thematic approach.

The study findings revealed that extension services, planting materials and animals (Livestock) had been provided by OWC to some farmers in Rugando Sub-County, Rwampara district. However, not all farmers or areas benefited from these services of OWC. Seedlings like beans and maize seeds were only given in small quantities of less than 2 cups (1 kg) per farmer. Extension workers were also few compared to the number of farmers. The mode of distribution of OWC services was basically an up-bottom approach from central government to lower local governments through distribution agents/contractors. While the services were distributed free of charge, most of the services were distributed unequally with much focus on farmer groups of marginalized people such as the women, disabled, widows and orphans leaving out other individuals. Limited quantity of services, Limited number of extension workers, unfair distribution, bureaucracy and pests and diseases were reported as the major factors hindering effective service delivery by OWC officials and utilization of services by farmers in Rugando Sub-County, Rwampara district.

Despite the challenges, the study concludes that OWC may lead to poverty reduction when farmers' demands are met and services are delivered equitably to all farmers and in large quantities. There was some evidence of improved incomes, improved agricultural productivity, increased ability of farmers to provide basic services to their farmers including food and education. However, considering the limited number of beneficiaries, there was also evidence that OWC has not achieved its aims of commercializing agriculture to improve agricultural productivity, incomes and poverty reduction especially in Rugando Sub-County.

The study recommends need for follow-up and monitoring, increasing the quantity of inputs, changing the distribution model to benefit all farmers than only few. The researcher proposed a model that would assist policy makers in increasing effectiveness in delivery of services to farmers.

**Key words:** Operation Wealth Creation, Farmers' Service Provision, Poverty Reduction.