

## Editorial

### Dear Readers,

The year 2020 goes down in history as one when human kind was extremely challenged and devastated by the COVID-19 pandemic. "A challenged world is an alert world and from challenge comes change". We look forward to "Building on women's strength for a better future in a COVID-19 world". That was the theme this year on March 8, when international Women's day is commemorated. We have also come to the end of March, a month that was globally recognised as the Women's month. In 1975 the United Nations officially began sponsoring International Woman's Day on March 8. The UN's General Assembly declared that they aimed "to recognize the fact that securing peace and social progress and the full enjoyment of human rights and fundamental freedoms requires the active participation, equality, and development of women; and to acknowledge the contribution of women to the strengthening of international peace and security." No country can holistically prosper without the engagement of women and girls. We should, moving forward reflect once again and take stock of women's participation in science and research.

The vision of the Global 2030 agenda and the Sustainable Development Goals is to ensure the engagement and representation of women and girls in all the cultural, social, economic and political situations and science is no exception. Others have stated before that "diversity and inclusion create a more dynamic and

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## THRiVE-2 Gulu University showcases research in an Open Science day

By Dr. Tabo Geoffrey; Aol Caroline; Okot Denis & Prof. E.A. Opiyo

On February 22 2021, various faculty of Gulu University funded by THRiVE-2 showcased their research in an open science day under the theme, "Enhancing Public & Community inclusion in research and decision making." The theme emphasized the need to engage communities to discuss research outputs as one way to improve research uptake within the region.

The day was officially opened by the Resident District Commissioner for Gulu City/District and attended by the Deputy Vice Chancellor Gulu University, The Director THRiVE and team from the THRiVE Secretariat, University Secretary, Faculty Deans and the university's Director for Research and Graduate Studies. Researchers, Research Ethics committee members,

community representatives and media houses also participated.

In her opening remarks, Prof. Elizabeth Opiyo, the co-applicant of THRiVE-2, indicated that research is complete if the consumers of research products are productively engaged in discussions relating to the findings rather than purely doing research for scholarly purposes.

"Local communities who participate and contribute to research programmes have been missing in the end of the research output. If research is to create impact, then communities and public have to engage with researchers in the research process and research output should speak to current society issues," she said.

The day was graced with four



Prof. Elizabeth Opiyo, co-applicant of THRiVE-2 gives her remarks during the open day

presentations from Career Development Awardees (CDAs) of the university who presented their research findings and how these are impacting policy and practice. The studies were conducted

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### MUST READ

#### Dr. Amongin's passion to improve adolescents' reproductive health inspired PhD work

Dr. Dinah Amongin is a THRiVE doctoral candidate at Makerere University's College of Health Sciences under the mentorship of Dr. Annette Nakimuli, dean of the School of Medicine.... [Story on page 3](#)

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Data science is an inter-disciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from many structural and unstructured data from diverse sources...

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#### THRiVE-2 PUBLICATIONS FOR 2020

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PEER REVIEWED PUBLICATIONS

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**Editorial ... from Pg. 1** innovative institutional science and research culture, bringing different points of view to bear on challenges and discouraging groupthink.” It is the experience that different perspectives, world views and opinions positively contribute to problem-solving and resilience leading to exceptional performance.

To achieve successful transformation that genuinely and sustainably embraces gender equity, diversity and inclusion, in research and development institutions should not view the approach as just a tick box exercise. In order

to bring meaningful value to an organisation there is need to embrace the ideas by the leadership, staff and trainees along with effective mentorship and building organisational resilience so that the drive towards gender equality can withstand changes in leadership and remain sustained over time.

Institutions should be very deliberate about recruitment, nurturing and retention of talent. Appropriate policies, data and information driven decision making is essential to put in place and also monitor the impact of policies and practice.

**Open day ... from Pg. 1** within northern Uganda, covering Non-Communicable Diseases (NCDs), Neglected Tropical Diseases (NTDs) and vector-borne diseases that pose great health challenges to communities. The researchers were: Dr. Richard Echodu who presented his findings on the high level of insecticide resistance in Anopheles mosquitoes in northern Uganda; Dr. Geoffrey Malinga who presented his research on the impact of annual and semi-annual treatments of river blindness in Pader district; Dr. Simon Peter Alarakol who presented findings on the prevalence of pork tapeworm in Amuru and Gulu districts and Dr. Robert Opiro who presented findings from a study on trypanosome species circulating in vectors and cattle in the transition zone in northern Uganda.

Additionally, there were poster presentations by Masters Research Fellowship Awardees.

In his remarks, Prof. Nelson Sewankambo, THRiVE's director, detailed the aim, history and future directions of THRiVE, based on regional health issues including emerging and re-emerging diseases such as Ebola in DRC.

“Communities in Northern Uganda face health challenges from emerging and re-emerging diseases such as Nodding Syndrome, Ebola, Hepatitis, HIV and

Malaria, among others. Therefore, developing research leaders and mentors to advance the agenda for nurturing health research excellence in East Africa is a very important approach,” Prof. Sewankambo told participants.

Dr. Daniel Komakech, Director, Institute of Research and Graduate Studies-Gulu University, emphasized that research and critical thinking must lead to solving problems in the community. He underscored the need for researchers to conduct transformative research which leads to innovation and resilience.

“Researchers should also create data thinking as source of rationality surrounding those data” he added.

### RESEARCH DISCUSSIONS

Discussions following the presentations centered around policy and practical implications of the research results. For example, following Dr. Richard Echodu's research showed that there is a high level of resistance currently seen in malaria vectors in northern Uganda which reduces the efficacy of pyrethroid-based interventions in the region. Therefore, participants appreciated the need to work on reducing malaria burden in Northern Uganda by use of alternative approaches to control mosquitoes such as use of bed nets.

Similarly, in a study to determine the

prevalence and risk factors associated with Nagana among livestock, Dr. Robert Opiro recommends better veterinary services and continuous surveillance and monitoring as a means to reduce the disease in the area. Dr. Simon Peter Alarakol's research showed pig husbandry in Amuru and Gulu districts predisposes the animals to pork tapeworm infection. He recommended routine vaccinations of all pigs, mass deworming of pigs and humans and continuous public health education, among others.

After more than 10 years implementation of Mass Drug administration (MDA) to combat River Blindness (Onchocerciasis) in Pader District, Dr. Geoffrey Malinga observed that the disease is being controlled, seeing that few community members present with signs and symptoms such as skin nodules and discoloration. He however advised that the 15-year cycle of MDA must continue, coupled with monitoring of the disease, to realize elimination.

To crown the open day, Dr. Christine Oryema, an Ethnobotanist and THRiVE CDA showcased a documentary on how she established a medicinal plant garden at Otumpili Village, Kock Ongako Sub-county, Omoro District. She recommended that research into usage of medicinal plants and conservation of such plants should be given priority.



Some participants of the Gulu-THRiVE open day pose for a group photo



# Collaboration is the key to success

*Corinna Alberg, co-ordinator THRiVE-2 at Cambridge, UK*

One thing has dominated our lives in Cambridge, the rest of the UK and much of the world over the past year. A number of the Cambridge based THRiVE mentors have been particularly active research activities to help us get to grips with SARS-CoV-2 and I would like to highlight some of their work here.

Professor Ravi Gupta's work has had enormous impact. His research group, together with colleagues at University College London (UCL), first identified the new variant circulating in the UK that makes SARS-CoV-2 much more infectious. The UK had a second lock down in November 2020 and despite this, epidemiologists noticed that the rate of new infections were not significantly decreasing as they had as a result of the first lockdown. Rates were especially high in the south east and east of England - London and Cambridge being in these parts of the country. This lower impact of

the lockdown was one of the factors that alerted those studying the disease that something seemed to have changed in the virus. Many of the mutations were affecting the spike protein, a protein that enables the virus to enter our cells.

At the same time, other work in Cambridge led by Prof Gupta highlighted how such clinically significant mutations may arise. A patient with blood cancer was in hospital in Cambridge over the summer with SARS-CoV-2 and was not improving. He was isolated in a room and the virus he was infected with was sequenced many times at various times while he was in hospital. He died in hospital. The sequences identified that the virus was mutating and evading the man's immune system, already weakened by the lymphoma and the convalescent plasma therapy he was receiving. Although the mutations did not spread from this patient, it revealed the process whereby mutations might arise.



*THRiVE mentor, Prof Ravi Gupta (2<sup>nd</sup> from right) and Fellow Researchers in Cambridge*

Prof Gupta and many of his colleagues in Cambridge have particular expertise in disease genomics. A lot of Prof Gupta's previous work had been in HIV genomics and how viruses interact with the immune system. He led a team who functionally cured the second person in the world of his HIV status. Prof Gupta's work also resulted in big policy changes. A third lockdown is underway as I write this in a bid to decrease the spread of this more infectious variant before our health system is unable to cope with the number of people needing hospital treatment – the number being much higher than in the first wave in 2020. Another important aspect of Prof Gupta's work has been his international collaborations in Africa. He works very closely with colleagues in South Africa and is a member of the faculty of the Africa Health Research Institute in Durban, South Africa. In Durban, scientists noticed an increase in patients in their wards with SARS-CoV-2 in October. The South African variant is being examined in the highest security level laboratory (a category 4 laboratory) in Porton Down in the UK and Prof Gupta is now examining the impact of the variants on vaccine efficacy.

Other Cambridge mentors have also made a significant impact. Dr Charlotte Summers is a university lecturer in Intensive Care Medicine and the intensive care lead

for COVID-19 at Addenbrooke's hospital. Dr Summers combines her work on the intensive care wards with research. She observed that when the COVID pandemic began, she knew that science was the only escape route to normal life. She is leading two SARS-CoV-2 studies in Cambridge involving international collaboration - one is part of an international study to reduce mortality in intensive care patients and also examine how admission to intensive care can be prevented in patients severely ill with the virus. The other study, GenOMICC, is to identify genes that cause some people to be more susceptible to critical illnesses such as SARS-CoV-2 and is the largest such study in the world.

She has also been communicating with the public about the pandemic through regular articles in UK's daily National newspaper, 'The Guardian'. A recent issue she has been highlighting is the longer-term consequences of SARS-COV-2 with many patients being readmitted to hospital after discharge and many developing severe chronic diseases that will require long term treatment such as diabetes.

The accounts of these clinical scientists underline the importance of collaboration. The scientific advances they make only proceed at such a pace due to collaboration between teams of scientists within institutions, between institutions and between countries. They have both built collaboration with African scientists into their work as mentors and beyond. The competitive nature of academic careers has sometimes worked against open sharing but this pandemic has shown that collaboration is essential including international collaboration. THRiVE is built upon being a collaboration between partners across East Africa and also North-South partnerships. May this collaboration continue!



*Dr Charlotte Summers, THRiVE Mentor, caring for patients and researching cutting-edge treatments for SARS-COV-2*



# Dr. Amongin's passion to improve adolescents' reproductive health inspired PhD work

Racheal Ninsiima



Dr. Dinah Amongin, THRiVE-2 PhD fellow

Dr Dinah Amongin is a THRiVE doctoral candidate at Makerere University's College of Health Sciences under the mentorship of Dr Annette Nakimuli, Assoc. Prof Lynn Atuyambe, Dr Frank Kaharuzza and Dr Claudia Hanson. Her research focuses on identifying the motivators and circumstances of repeat adolescent births in eastern Uganda's districts of Soroti and Katakwi. This is an important topic as adolescent births remain a major public health challenge, mostly in low- and middle-income countries. According to the 2016 Uganda Demographic and Health Survey (UDHS), 24.8% of women aged 15-19 years have begun childbearing (pregnant or have given birth).

In eastern Uganda, three in every 10 (31%) adolescents aged 15-19 have begun child bearing. This statistic is above the national average of 25%.

"We would want these girls to be in school because the first 18 years are essential to what happens to you later in life, both social-economically and in terms of reproductive health outcomes. We postulate that if a girl gets another birth before she exits adolescence, it is going to be more detrimental to her," Dr. Amongin explains. She is tackling the problem of repeat adolescent births with enthusiasm, not only making it the focus of her research but also sensitizing local communities about it. An obstetrician by profession, Amongin has over 15 years of experience in maternal and child health, HIV/AIDS research and community outreach work. Her work in adolescents' reproductive health is getting noticed. Recently, a paper she authored together with her supervisors titled: 'Later life outcomes of women by adolescent birth history' was published in the British Medical Open Access Journal.

## Knowledge Gaps Fuel PhD Research

Although factors that encourage a girl's first teenage pregnancy in Uganda have been well documented, information on motivators for and circumstances of repeat adolescent birth is limited. Curiosity about what persuades teenage girls to have a second birth before 20 years was a huge motivator for Amongin.

Girls aged 20-24, who had had a second birth before 20 years were interviewed and majority cited inadequate financial support from their parents as a major contributing factor to having a repeat birth.

"Many of the girls told our research team that they got male sexual partners who could provide for them financially in order to be able to obtain basics such as menstrual pads and undergarments. Their partners give them as little as UGX5,000 and this serves as conduit for the boys to demand sex from them," she explains.

On the other hand, parents, predominantly peasant farmers, are unable to regularly provide basic items to their children because of limited income and many children to take care of. (On average, each home consists of a minimum of eight children). This persuades girls to initiate sexual relationships with boys in order to obtain these basic needs.

Ironically, the girls' male sexual partners reported being uncomfortable with the use of condoms and neither do they follow up to ensure that girls are using contraception. Additionally, owing to the fact that adolescent girls usually live alone, in a hut independent of that of the parents, this encourages their partners to have easy access to them, especially at night. All these factors perpetuate unwanted and repeat adolescent births.

## Engaging communities with research

Under THRiVE's Research Enrichment Community and Public Engagement (RECPE) program, PhD fellows are required to engage various communities with their research in order to maximize the relevance and impact of research. Throughout her research, Dr. Amongin has engaged parents, seeking their views on her research. Most of the fathers reported that they rarely provide menstrual pads to their daughters because food is more important than pads.

"Owing to this feedback, I have modified my research to include a question that delves into menstrual hygiene practices and here, I am intent on finding out what information parents provide their daughters about

menstrual hygiene," she said in an interview.

During her engagement with teenage girls, many reported that they would want to have their first and second births later in life. This feedback has further compelled Dr. Amongin to include another research question on the age that the girls want to have the first and second birth and what forms their decision about this age.

## Research Impact

Julius Ekadit, a village health team member in Amoru village, Soroti district is amazed with the difference her research is making in the community. When he was first recruited as a community mobilizer for the study in 2020, little did he know that his involvement would have far-reaching implications for her study. During the mobilization process, he noticed that many girls that get pregnant the first time do not live with their parents. Many live with relatives, friends and a few with the boys that impregnated them.

"I found that most of the girls had been chased from home because parents think that they are a burden and this predisposes them to second pregnancies. I strongly advocated that Dr. Amongin designs interventions for parents' involvement in their children's lives if this problem is to be averted," he said during an interview.

This was done. Currently, parents have revived community evening meetings where they discuss various issues such as use of contraception with their children. These meetings are helping to bridge the gap between parents and children and act as forums for parents to develop solutions to curb teenage pregnancies. One of the parents we spoke to in Kapujan subcounty, Katakwi district said that in one of parents' meetings he attended, parents discussed how to speak to their daughters about sexual and reproductive health issues.

In a continuous effort to curb unwanted and repeat births among adolescents, Dr. Amongin is sensitizing parents in Katakwi and Soroti district on always providing basic needs for their adolescent girls.



Dr. Amongin (talking) holds a dialogue with teenage mothers in Soroti district



# Sensitizing Communities on Maternal Health Care through drama

*Dr. Imelda Namagembe and Francis X. G. Luyera*

Although COVID-19 has devastated the world, jeopardizing nearly all socio-economic activities, it has also provided opportunities for communities and decision makers to engage in order to find solutions that will nip it in the bud. However, the pandemic has become a learning lesson for the world to make an audit of the health sector, focusing on the prevention and cure of the existing ailments. Among these is maternal health. According to the 2016 Demographic and Health Survey, Uganda's current maternal mortality ratio is 336 maternal deaths per 100,000 live births implying that many women die from pregnancy and childbirth-related complications. Over 100 maternal deaths are recorded annually at the National Referral Hospital in Kawempe.

It's against this background

that Dr. Imelda Namagembe has designed a school engagement project to sensitize students and parents about this precarious phenomenon. Under the auspices of THRIVE-RECPE, Dr. Namagembe, a PhD fellow, is working with students of St. Aloysius Secondary School in Nabbingo to deliver messages on safe motherhood through drama and songs. Their most recent performance was on the school's blessing day, Sunday 20<sup>th</sup> February 2021, presented by senior four and six students to an audience comprising mostly of parents. This was held under the theme: 'Engaging communities to revamp safe motherhood and COVID-19 prevention.'

The 15 minutes play titled, 'Act Now-Save Mothers and Babies' was packed with thought-provoking scenarios that stir one to identify the missing links in Uganda's maternal and neonatal health system

and consequences it bears if it is not urgently addressed. The piece emphasized things such as; antenatal visits, proper nutrition, spouses' support and quick medical attention as measures to reducing the maternal and neonatal deaths in the country.

Additionally, the students showcased the role of different health workers such as the nurses, midwives and gynecologists in preventing maternal deaths. In a bid to emphasize their message, the students also composed songs that were intermittently sang during the skit.

"It was a fantastic show of talent by the students who ably depicted various personalities namely the pregnant mothers, husbands, relatives and friends as well as medical workers. I learned that I have to escort my wife for her antenatal visits and when she goes to deliver in a health facility," says one of

the parents who watched the drama.

Under the stewardship of Mr. Paul Remmy Matte, their headteacher, the students formed a drama group where they intensively developed the drama skit and songs as an information and empowerment tool. The club was formed to unlock and display student's talents, while entertaining and educating the masses.

"My engagement in the club has helped me learn several things about maternal health. Before joining the club, I did not have any idea what maternal health meant. However today, my knowledge about the issue has greatly improved and so has my public speaking," testified one of the students that participated in the skit.

As a sustainability plan, the club members are imparting skills learnt to other students so that they can act as change agents in their community.



Students of St. Aloysius Secondary School in Nabbingo performing the skit on saving expectant women during the school's blessings day.



# Engaging youths as partners in science and research development

Dr. Denna Michael Mkwashapi –  
THRiVE-2 PhD Fellow

For the past decade, I used to think that community engagement was about preparing the community for planned research activities and providing feedback to them after results are obtained. When THRiVE requested all research fellows to implement community engagement in what has been termed “Research Enrichment Community and Public Engagement (RECPE), I was uncertain on how this engagement was going to be designed and implemented.

Uncertainties arose when THRiVE insisted that engagement should have a focus on secondary school students. However, I had a lingering question at the back of my mind because secondary school students are neither the targeted study community nor are they policy makers. Thus, how could the research community engagement benefit these youths?

Nonetheless, I proceeded to design my youth engagement project as part of the RECPE program by adopting a secondary school in Mwanza, Tanzania. My main objective was to work with selected students at Mwanza secondary school to co-create and

co-design a project where students would be engaged with my PhD research in order to be able to relate with science in their day-to-day activities. My PhD research focuses on exploring the effect of HIV and antiretroviral therapy (ART) on fertility. It also aims to ascertain trends in the use of family planning services and unmet need for family planning amongst women of reproductive age in Magu district, Tanzania between 1994 and 2018.

During implementation, I organized several consultative meetings with students who discussed issues around fertility and family planning which came out prominently in my research. At this stage, youths were greatly empowered to discuss the research and science and made decisions that would affect them and the process of engaging other fellow students.



Brainstorming session during the consultative meeting with students

To engage these students, I used a human-centered approach where ideas, attributes and concepts were generated by students themselves. Fictitious characters and scenarios were used to stimulate thought, provoke discussions and gain mutual understanding, trust and collaboration between me, and the students. With further engagement, students proposed use of drama and songs as the best method to engage fellow peers and the community at large.

Therefore, experts in theater and performing arts were consulted to train students on the state of art hall performance. Through a series of training and rehearsals, students were able to perform a drama before a group of selected secondary school students as the audience. The drama was named “*mrithi wangu*” in Swahili which means “*My heir*”. The drama presents ongoing social conflicts; whether HIV infected women should access Family Planning services and deliver babies and social-cultural reasons prevailing in our society that conflict the use of family planning.

When an impact evaluation of this engagement was done, it was found to impart new knowledge to selected students who attended the performance at school. The performance was video- recorded and produced for future use and experiments.



Development of prototypes: technical drama training and rehearsal

Through the THRiVE-RECPE program, I have been able to install a new look on how communities and particularly youths should be engaged to research and science. Wholly, this engagement empowered student to make decision on areas important to them. Therefore, Positive Youth Development (PYD) in Science and research is achievable through a successful youth-led engagement project. Youths possess indigenous skills and talents to make themselves changing agents. Youths can be knowledge-transfer vehicles to their peers. Through scientific citizenship, youth can be partners in science and research.



THRiVE-RECPE output: drama film

# New technology in physical activity: misconceptions, perceptions & beliefs

By Dr Kidola Jeremiah and Brenda Kitilya

Physical activity sounds like a new norm in our communities. However, it is recently being promoted to keep the community healthy and reduce the risk of developing non-communicable diseases (NCDs) such as diabetes and hypertension. Increasing overall life expectancy and unhealthy lifestyles previously seen in high-income and now low-income countries has fueled the need for uptake of physical activity and research on physical activity as an intervention for NCDs.

Owing to the importance of physical activity, my colleagues and I have been assessing its level (physical activity) among HIV and diabetes patients for three years. The main objective of doing this is to determine factors associated with physical activity levels and to promote more physical activity in people at risk of NCDs. In our study titled: 'Assessment and Comparison of Physical activity using subjective and objective measures of Physical activity among HIV-infected and HIV- uninfected Tanzanian adults', we assessed physical activity using new technology called Actiheart. This is a compact, chest-worn device that records heart rate, inter-beat-interval (IBI), and physical activity.

With funding support from THRIVE, we managed to purchase five ActiHeart devices which were used to measure physical activity among HIV-infected and HIV- uninfected individuals. We compared the performance of these devices with the International Physical Activity Questionnaire (IPAQ), a standardized self-report measure of habitual physical activity. Our goals were to see whether there is a difference in interpreting physical activity among HIV infected and HIV-uninfected individuals when the two methods are tested independently on the

same individual. Furthermore, we wanted to assess if the modern device, Actiheart performs better or is similar to IPAQ.



Dr. Kidola engages one of his study participants

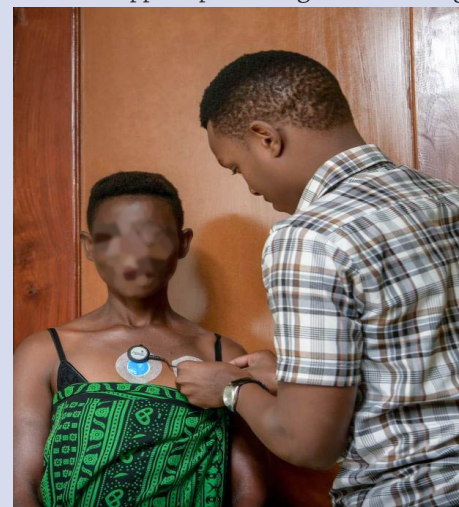
We requested our study participants to wear the ActiHeart device for five days consecutively as it recorded all movements, heart rate and energy spent. At the end of day five, we administered the IPAQ on the same individual.

We discovered that as one ages, his/her level of physical activity decreases and that HIV does not influence the level of physical activity.

Furthermore, we found that the IPAQ, a subjective tool of assessing the level of physical activity, has less than 50% chances of identifying individuals with the same level

of physical activity as identified by ActiHeart. Although we successfully implemented the study, some participants reported discomfort with the device. The ActiHeart device was fixed on their chest and kept blinking with a red light which scared participants especially at night. Some even reported that the device was accelerating their heartbeats because it blinks all the time. Participants also reported skin itching because of wearing the device.

However, in an interesting turn of events, some patients used the opportunity of wearing the device to earn extra income from community members. These participants traversed the community begging for financial support, pretending to be suffering



Dr. Kidola fixes an ActiHeart device on the chest of one of his study participants

from a heart problem as indicated by the blinking device on their chest.

With these striking observations, our research team learnt that there is low awareness of the use of modern devices such as ActiHeart to measure physical activity.

## My Experience as a THRIVE Graduate Trainee

Flavia Nakanjako – THRIVE-2 Graduate intern, UVRI



Ms. Flavia Nakanjako

I finalized my studies at Ndejje University in 2018 and graduated with a Bachelor's degree in Business Administration. Despite the fact that I had gained knowledge during modules taught and examined during my undergraduate programme, I lacked practical skills and experience on project Monitoring and Evaluation. However, this was set to change with advice from a friend who notified me about the THRIVE-2 internship program at Uganda Virus Research Institute (UVRI). She encouraged me to pick and fill in the application forms and also apply online.

Alas, I received a call from the UVRI Training office in April 2018 inviting me for a six-month internship placement opportunity at UVRI- THRIVE-2 Office. On reaching the training office, I signed my letter of placement and was handed an internship Identity card. I later met my supervisor who gave me several documents to read including the THRIVE-2 proposal. The proposal had a Monitoring and Evaluation Matrix with several indicators which she slowly guided me



to understand. I was also guided on the functionality of the online tracking tool for program activities.

In addition to performing monitoring and evaluation roles, I was tasked to support with daily administrative and procurement activities. Through my day-to-day activities, my expectations of gaining hands-on skills were met and the fears I had were all allayed. Working as a graduate intern on THRIVE-2 exposed me to many trainings and mentors who helped me understand and acknowledge the field of research which I have found more

thrilling. Furthermore, this has furnished me with opportunities to learn and build my career.

Through THRIVE-2, I was introduced to the European and Developing Countries Clinical Trials Partnership (EDCTP) funded projects which were managed in the research support and networking offices. Here, I was privileged to work as the study data clerk on the African Coalition for Epidemic Response and Training (ALERTT)- Clinical patterns, severity, management and outcomes of febrile illnesses in sub-Saharan Africa (FISSA) study in November 2019. I was

given the research protocol to review and undertook several trainings to understand my tasks as a data entry clerk.

After a few months of the enrollment of patients, we have enrolled more than half of the 600 study participants. In the meantime, data collection, entry and follow up of clients to meet the goals and objectives of the study are also ongoing. However, study progression was delayed by the COVID-19 associated lockdown and this hindered the study from being completed within one year.

Nevertheless, COVID-19 presented me with another work opportunity as a data entry clerk on yet another study, 'Clinical Characterization Protocol-CCP' where I handled data for COVID-19 patients at the UVRI clinic. I am excited to work and achieve the targets of the study.

I would like to acknowledge THRIVE-2 for establishing the graduate mentorship program and the UVRI administration for offering me opportunities to explore, learn and understand research.

## Embracing data science and the fourth industrial revolution (4IR) in Uganda

*Dr. Mboowa Gerald*

Data science is an inter-disciplinary field that uses scientific methods, processes, algorithms and systems to extract knowledge and insights from many structural and unstructured data from diverse sources. Lately, research is becoming increasingly data driven and the field of data science is emerging to address the challenges in finding insights from massive datasets. For example, computer-based algorithms can now be used to interpret Magnetic Resonance Imaging (MRIs), X-rays, mammographies, and other types of images; identify patterns in the data and detect tumors, organ anomalies, tuberculosis and much more. Researchers have also developed data-driven algorithms that diagnose irregular heart rhythms more quickly than a cardiologist.

This advancement in data-driven technology is attributed to the Fourth Industrial Revolution (4IR or Industry 4.0). 4IR is the ongoing automation of traditional service delivery approaches using modern smart technology. This is characterized by the fusion of the digital, biological and physical worlds, as well as the growing utilization of new technologies such as artificial intelligence, robotics, 3D printing and advanced wireless technologies.

In Uganda, a number of steps have been taken to be a part of this revolution. Data centers and High-performance computing (HPC) infrastructures have been set up. Due to increasing availability of large related datasets, bioinformatics and data science are steadily being simultaneously developed. The bioinformatics capacity in Uganda has been built mainly with funding from the Human Heredity and

Health in Africa (H3Africa) while Harnessing Data Science for Health Discovery and Innovation in Africa (DS-I Africa) program plans to build capacity for Data science. Bioinformatics and data science are very similar requiring more specialization and powerful compute capacity. In Uganda such resources can be found at;

**The African Center of Excellence in Bioinformatics & Data-Intensive Sciences**

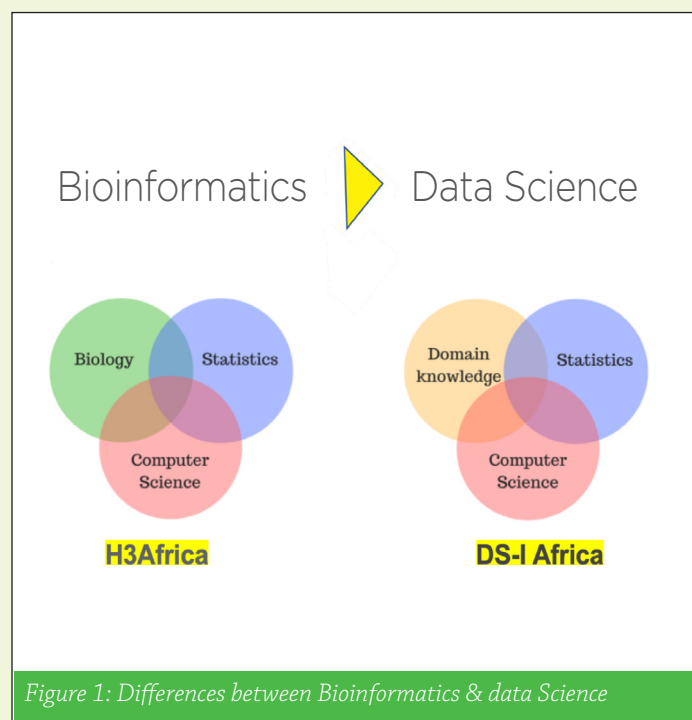


Figure 1: Differences between Bioinformatics & data Science

(<https://ace.idi.co.ug/>)

The Infectious Diseases Institute (IDI) at Makerere University established the African Center of Excellence in Bioinformatics & Data Sciences (ACE), one of two such centers in Africa. ACE is a centre for Computational Biology and big data analysis with a dedicated high-performance computing cluster, tele-learning center and Virtual Reality room for the latest 3-D pedagogical and

diagnostic approaches.

**MRC Uganda Medical Informatics Centre (UMIC)**

(<https://www.sanger.ac.uk/collaboration/mrc-uganda-medical-informatics-centre-umic/>)

UMIC is a UK Medical Research Council (MRC) funded initiative that operates a high-throughput medical bioinformatics data center in Entebbe Uganda. It is currently utilized by the African



Partnership for Chronic Disease Research (APCDR) programme. It has significantly increased human research capacity in bioinformatics and computational genomics in sub-Saharan Africa by offering access to high-capacity servers and analytical software packages that are able to store and analyze high-volume complex datasets.

**Raxio Data Centre** (<https://www.raxiogroup.com/locations/uganda/>)

This is a centre-piece of infrastructure supporting the growth and digitalization of the Ugandan economy and goals set in the Ministry of Information, Communications and Technology Data Strategy. This data centre is the first of its kind in Uganda and is located in Namanve Industrial and Business

Park, operating as a carrier-neutral facility.

### National Data Center

National cloud data centre is located in Jinja district and was set up by Ugandan government to provide centralized hosting services for government applications and data.

In health, potential sources of big data in Uganda include files from the Ministry of Health and research institutions such as Makerere University's College of Health Sciences. In 1985, government designed the Health Management Information System (HMIS) to capture and analyze morbidity data for selected communicable, non-communicable diseases, and other services such as immunization and family planning.

The core function of the Uganda HMIS is to establish and maintain a comprehensive source of health and management information for planning, monitoring and evaluation of the health sector strategic plan. This HMIS was initially paper-based but is now available both in paper- and electronic web-based version for health facilities.

Despite the growing trend of using big data in health care, several challenges still remain including lack of analytical talent to get most out of the healthcare databases housed in the different data centers. Additionally, ethical concerns associated with patient data access and sharing and lack of integration between clinical and administration systems are also rife.

## NIMR set to introduce new masters in Biostatistics

*Prof. Jim Todd & Jacqueline Materu*

THRiVE has had a big effect on biomedical research in East Africa so much so that its methods and success have encouraged others to learn from it. At the National Institute for Medical Research (NIMR), we applied the methods learned from teaching THRiVE courses to another institution, Catholic University of Health and Allied Sciences (CUHAS) in Bugando, Tanzania. CUHAS has been teaching medical students for more than 30 years. Recent PhD graduates including Humphrey Mazigo (THRiVE-1) and Eveline Konje (ex NIMR statistician) have helped to initiate changes to the Masters programs in CUHAS. In collaboration with NIMR, Mwanza, a new MSc in Epidemiology and Applied Biostatistics is being planned at the institution. This will be implemented in a new teaching block with large classrooms and excellent resources.

Several staff from NIMR, Mwanza have been included in the planning. Jacqueline Materu (NIMR, Mwanza) and Jim Todd (LSHTM) have been invited to develop biostatistics teaching courses. The initial foundation course for Masters' students is a nine-week course (4 hours a week) which introduces generalised linear models. With over half the time devoted to practicals using either Stata and Epi-Info, students learn to perform their own analysis, which helps in understanding the technical explanation of regression models.

The next step is preparing for a course to teach more advanced techniques. For this, we need to work out how to introduce R software and provide support for students in their early phase of learning. We have started discussions with Tabitha Mwangi (Cambridge Africa) in order to plan and develop an on-line course with local tutors

to introduce R to non-statisticians (watch this space). This will be a way to show that THRiVE has outreach to build capacity in other institutions in East Africa.



*CUHAS Teaching block*



*Bugando Referral hospital, is an 800-bed referral hospital located on a hill above Mwanza City.*

# Co-development and delivery of a new MSc in Sexual & Reproductive Health – Policy and Programming

**Dr Jenny Renju (LSHTM/KCMUCo) and Prof Jim Todd (LSHTM/NIMR Mwanza)**

London School of Hygiene and Tropical Medicine (LSHTM) has secured funding to co-develop and deliver an innovative MSc in Sexual & Reproductive Health Policy and Programming (working title). The development of the new programme began in January 2021 and various THRIVE supported LSHTM staff (Dr Jenny Renju, Profs. Jim Todd, Phillippe Mayaud, Janet Seeley) and staff from the LSHTM-MRC Uganda units (Dr Yunia Mayanja and Dr Agnes Ssali) and LSHTM collaborating institutions (e.g., Prof Sia Msuya from KCMUCo and Mandi Tembo from BRTI in Zimbabwe). The team is embracing this opportunity to develop a new model of engagement with higher education institutions and partners in sub-Saharan Africa, as well as LSHTM's Medical Research Council (MRC) units in The Gambia and Uganda.

The programme will be developed in partnership with African Institutions and aims to support and mentor the next generation of healthcare professionals and practitioners in sexual and reproductive health, including: policy advisors; service providers; implementation sciences researchers; programme managers and technical advisors. The new Masters will be an integrated training programme that blends theoretical elements with practical training. It will provide students with tangible skills to become effective leaders in sexual and reproductive health policy and programming.

It is likely to include core and elective modules, as well as a research or policy attachment supported by a mentoring scheme. The overall organisational and course structure will be decided and finalised in partnership with LSHTM and the co-lead African teaching institution. There will be two programme directors, one from each institution.

Funding is in place to cover the development and delivery of the programme over a three-year period, as well as 90 scholarships to support students to participate in the programme. In-depth consultation with potential partner institutions is underway, including many within the THRIVE network (including Dr Dinah Amongin from the School of Public Health, Makerere University and Prof Sia Msuya from KCMUCo), potential collaborators and potential students. We would like to thank all those that have contributed so far for their time and insights.

If you or others in your organisation have expertise in sexual reproductive health or other relevant areas and would like to share your thoughts on the programme, the team want to hear from you. We are particularly keen to hear from potential students on this course, to learn more about your needs and requirements for such a programme. Please contact Dr Jenny Renju ([jenny.renju@lshtm.ac.uk](mailto:jenny.renju@lshtm.ac.uk))

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