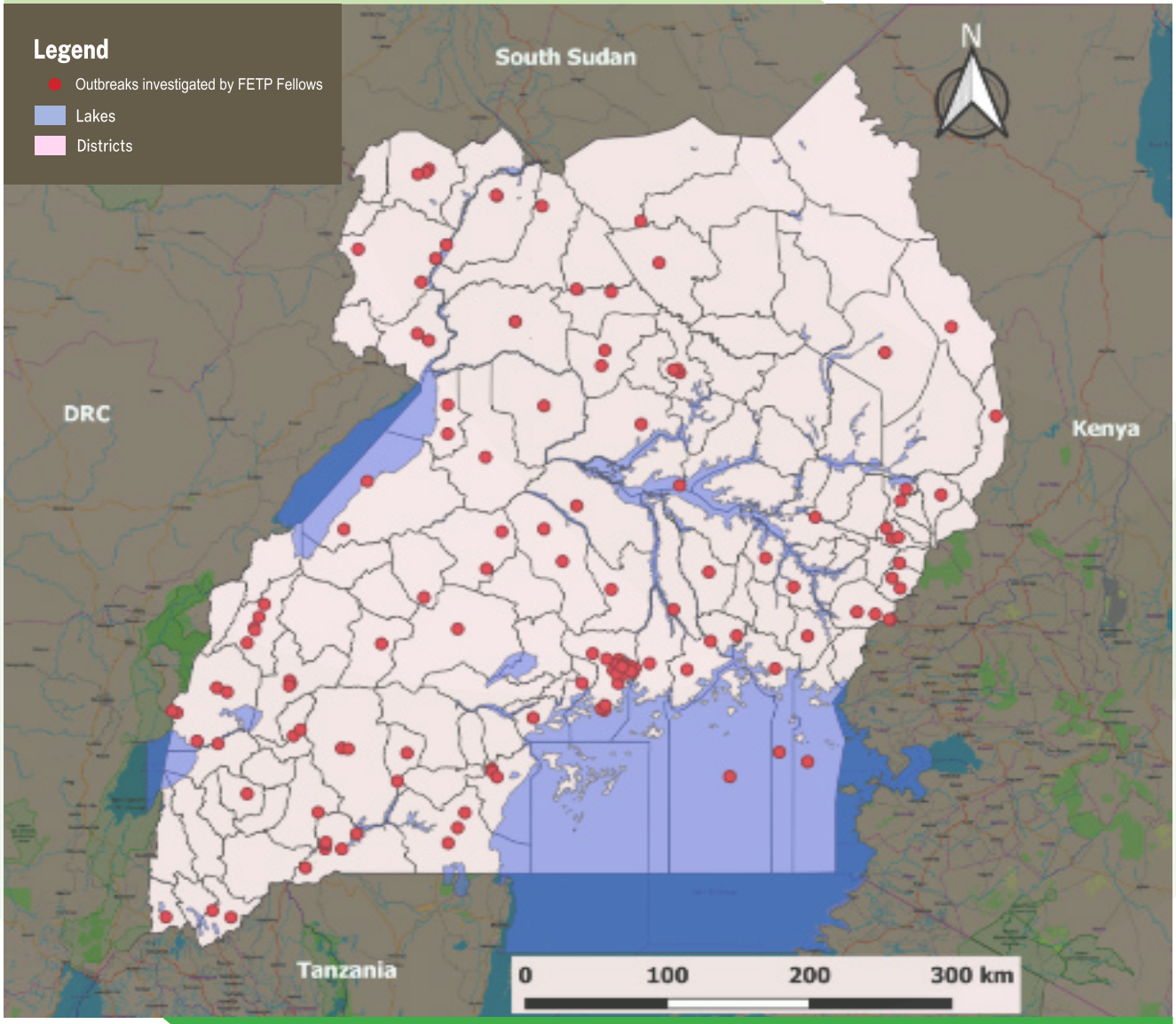

Map showing outbreak investigations carried out by Fellows over the Fellowship Period, 2022 - 2023

DISCLAIMER

This Program is funded by the US Centers for Disease Control and Prevention (US CDC) through the Public Health Workforce Cooperative Agreement number NU2GGH001353-04. The contents of this report are solely the responsibility of the authors and do not necessarily represent the official views of the US Centers for Disease Control and Prevention, Ministry of Health or Makerere University School of Public Health.

PREFACE

The Uganda Public Health Fellowship Program (PHFP) has enrolled 108 Fellows in Advanced Field Epidemiology Track since its inception in 2015; with the highest ever enrollment of 15 in 2022. Over the past 8 years, Fellows have contributed immensely to disease detection and control by conducting outbreak investigations, analyzing public health surveillance data, evaluating public health surveillance systems, conducting epidemiological studies and developing quality improvement projects. The last 3 years of COVID-19 interspersed with Ebola outbreak witnessed the value of having frontline responders deployed within short notice by Ministry of Health. In the process of response, Fellows have generated valuable information which shall be used to streamline detection and response to future outbreaks in the country.

In addition, Fellows have made numerous award winning presentations at national and international conferences. Fellows have made significant appearances in the local media, contributing feature articles on key topics of public health importance.

The production of policy briefs and publication of the Uganda Public Health Bulletin, where Fellows have participated very effectively as editors and article contributors is another tremendous achievement. Twenty eight volumes have so far been produced since commencement of the program. In addition, Fellows have continued to contribute to the production of the Malaria Quarterly Bulletin, National TB and Leprosy Program Bulletin, and Weekly Epidemiological Bulletin where the fellows and other MoH epidemiologists and officers publish valuable public health information for consumption by the public and the scientific world.

The program has produced over 265 manuscripts submitted to reputable peer-reviewed journals; 98 of which have so far been published.

In this report, we present to you the profiles of Cohort 2022 Fellows and their achievements over the two-year period of training in-service while placed within priority programs or institutions of the Ministry of Health.

Dr. Henry G. Mwebesa

Director General Health Services

PHFP FIELD EPIDEMIOLOGY TRACK – COHORT 2022

Jane Frances Zalwango

B. Pharm (MUK), MSc CEB (MUK), & Advanced Field Epidemiology Fellow (UPHFP)

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Host Institution: Ministry of Health, National Malaria Control Division (NMCD)

Host Mentor: Dr. Gerald Rukundo

Jane Frances' Profile

Jane Frances Zalwango is a pharmacist passionate about understanding population disease dynamics and improving population safety, with a special focus on maternal and child health. She holds a Masters of Science in Clinical Epidemiology and Biostatistics and now the field epidemiology training program. Throughout this journey, she has made significant contributions to improving population safety through response to outbreaks, surveillance activities, and impactful research initiatives. Before the fellowship, she worked with the World Health Organization as an epidemiologist during the COVID-19 response.

During the fellowship program, Jane was attached to the National Malaria Control Division (NMCD), Uganda Ministry of Health whose mandate is to provide quality assured services for malaria prevention and treatment to all people In Uganda. While at NMCD, she monitored and evaluated malaria indicators and led the editing of the weekly malaria bulletin.

As a fellow, Jane led and participated in a number of outbreaks and projects including the 2022 Sudan Virus disease outbreak, evaluating surveillance systems, conducting operational research for program improvements, conducting root cause analyses, and implementing quality improvement projects among others. From this experience, she has improved her skills in outbreak detection and response, scientific writing, grant writing and management, and oral presentation. Aditionally, she has developed leadership skills over the last two years.

Routine surveillance data analysis sharpened her skills in using electronic data collection tools such as ODK and Kobo Collect, statistical software such as STATA, EpiInfo, and QGIS.

Host Site Achievements:

- Led the writing and dissemination of the weekly malaria bulletin which informs the Ministry of Health and its partners about the country's malaria situation and guides the necessary response.
- Consultant on the Presidential Malaria Initiative Uganda Malaria Reduction Activity (PUMRA) under USAID during the baseline assessment in northern Uganda a key activity to improve the malaria response in high burdened districts.
- Won a TEPHINET grant to pilot a study focusing on understanding the etiopathogenesis of Blackwater fever-a complication of severe malaria that is increasingly reported in Uganda.
- As part of the malaria vaccine introduction secretariat, I participated in the drafting the strategic plan for malaria vaccine introduction that was the basis for the GAVI vaccine introduction grant application. This was approved in April 2023 and the vaccine is due for introduction in 2024.
- Trained health workers on drawing malaria normal channels for disease surveillance.
- I conducted numerous studies whose findings have contributed to improving

service delivery within the division.

- 'Analysis of trends of stockouts of malaria diagnosis and treatment commodities, 2017-2022.'
- A quality improvement project to improve artesunate management in Namutumba District that reduced periods of stockouts of the drug and improved severe case management.
- Participated in conducting malaria death audits at facilities.
- Participated in the review and development of a score card system for key malaria indicators, as well as routine data analysis to generate quarterly indicator score cards for key malaria indicators for monitoring.
- Participated in the preparation and execution of the national malaria day colloquiums in 2022 and 2023.

Program-Specific Achievements:

- Led one outbreak investigation: Crimean Congo Hemorrhagic Fever outbreak in Rakai District.
- Participated in other outbreak responses and public health emergencies
  - 2022 Sudan Virus disease outbreak in Mubende.
  - Blackwater fever outbreak in Kakumiro District.
  - Malaria outbreak in Namutumba District.
  - COVID-19 outbreak in Nyakabande Transit centre
  - Rapid health assessment in Kisoro District following a refugee influx.
- Trained and mentored two cohorts of FETP-Frontline.
- Conducted a descriptive analysis of surveillance data on "Trends and spatial distribution of stockouts of malaria diagnosis and treatment commodities in public health facilities in Uganda, 2017–2022".
- Conducted an epidemiological study on factors associated with adherence to seasonal malaria chemoprevention in Moroto District, Uganda, 2023
- Conducted a study on understanding the gaps in surveillance that led to the delayed detection of Sudan Virus disease outbreak.
- Wrote 4 manuscripts as a lead author 3 of which are under peer-review in reputable journals and 1 under internal peer-review. I co-authored more than 10 manuscripts several of which are under peer review in journals.
- Presented my work at 6 conferences (3 national and 3 international) including:
  - 8th African Field Epidemiology Network conference in Mombasa.
  - 3rd international conference on Public health in Africa held in Lusaka.
  - 2023 Crimean Congo Hemorrhagic Fever Africa conference in Cape Town.
  - 8th and 9th NFEC Conferences in Kampala.
  - 17th JASHC conference in Entebbe.
- Published 2 articles in the UNIPH quarterly bulletin and was an editor of volume 7, issue 4 of the Uganda National Institute of Public health bulletin
- Wrote and published one newspaper article title "Antibiotic resistance: Is COVID-19 pandemic fueling this 'silent epidemic'?

Key lessons learned during the fellowship

- Leadership and team management skills
- Outbreak investigation and institution of effective control measures.
- Best practice approaches to public health emergencies.
- Scientific writing and communication skills: abstracts, manuscripts, newspaper articles, editing of bulletins.
- Data management, analysis (using Epi info, STATA, QGIS) and interpretation.
- Oral presentation skills: dissemination of findings, scientific conferences (national and international), colloquiums.
- Designing and implementing of projects.
- Networking and lobbying
- Community engagement
- Capacity building

Next Steps

I hope to further my career as an epidemiologist within an organization that provides a conducive environment for improving my skills and enhancing my overall contribution to the Global Health Security Agenda, ultimately contributing to population safety. I am excited to put my newly acquired skills and expertise to work in contributing to Uganda's health security objectives. Along with this, I will continue to support the program's other tiers in order to strengthen Uganda's workforce capacity.

Summary of Epidemiological Study

Understanding the delay in identifying Ebola Virus Disease: gaps in integrated disease surveillance and response and community-based surveillance to detect viral hemorrhagic fever outbreaks in Uganda, September 2022

Background: Early detection of outbreaks requires robust surveillance and reporting at both community and health facility levels. Uganda implements Integrated Disease Surveillance and Response (IDSR) for priority diseases and uses the national District Health Information System (DHIS2) for reporting. However, investigations after the first case in the 2022 Uganda Sudan virus outbreak was confirmed on September 20, 2022 revealed many community deaths among persons with Ebola-like symptoms as far back as July. Most had sought care at private facilities. We explored possible gaps in surveillance that may have resulted in late detection of the Sudan virus disease (SVD) outbreak in Uganda.

Methods: Using a standardized tool, we evaluated core surveillance capacities at public and private health facilities at the hospital level and below in three sub-counties reporting the earliest SVD cases in the outbreak. Key informant interviews (KIIs) were conducted with 12 purposively-selected participants from the district local government. Focus group discussions (FGDs) were conducted with community members from six villages where early probable SVD cases were identified. KIIs and FGDs focused on experiences with SVD and Viral Hemorrhagic Fever (VHF) surveillance in the district. Thematic data analysis was used for qualitative data.

Results: Forty-six (85%) of 54 health facilities surveyed were privately-owned, among which 42 (91%) did not report to DHIS2 and 39 (85%) had no health worker trained on IDSR; both metrics were 100% in the eight public facilities. Weak community-based surveillance, poor private facility engagement, low suspicion index for VHF among health workers, inability of facilities to analyze and utilize surveillance data, lack of knowledge about to whom to report, funding constraints for surveillance activities, lack of IDSR training, and lack of all-cause mortality surveillance were identified as gaps potentially contributing to delayed outbreak detection.

Conclusion: Both systemic and knowledge-related gaps in IDSR surveillance in SVD-affected districts contributed to the delayed detection of the 2022 Uganda SVD outbreak. Targeted interventions to address these gaps in both public and private facilities across Uganda could help avert similar situations in the future.

PICTORIAL NARRATIVE

Jane Frances Zalwango (standing) conducting training of FETP Frontline trainees in Mbale District, 2023

Jane Frances (grey jacket) conducting a review of the malaria commodities stock cards at Nsinze HC IV, 2023.

Meeting with all response partners during the Ebola outbreak in Kassanda District, 2022

Conducting case investigations and contact tracing in Kassanda District during the 2022 Sudan Virus disease outbreak

Jane Frances (Standing in grey jacket) conducting a community sensitization session on malaria and Blackwater fever, 2023

Brenda Ssimbwa

BSc. CS, MSc. CEB, Fellowship in Field Epidemiology

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Host Institution: Uganda National Expanded Program on Immunization

Host Mentor: Dr. Fred Nsubuga

Brenda Ssimbwa's Profile

Brenda is an Epidemiologist and Biostatistician. She holds a Bachelor's degree in Computer Science, a Master's of Science in Clinical Epidemiology and Biostatistics, and a fellowship in Field Epidemiology.

Prior to joining the fellowship, Brenda worked as a health management information officer at Ndejje University, a biostatistician in several projects in college of health science, Makerere University and an epidemiologist in the ministry of health.

During the fellowship, Brenda was hosted at the Uganda National Expanded Program on Immunization (UNEPI) of the Ministry of Health (MoH). Her time at the host site gave her deeper understanding and appreciation of infection prevention through vaccination of children and high-risk populations

Brenda possesses competences in several areas of public health/ epidemiology such as: disease outbreak investigation and control, evaluation of surveillance systems, research, scientific writing and communication, grant and proposal writing, grant management, data analysis, program design and management, quality improvement and assurance. In addition, Brenda has excellent communication and leadership skills.

The fellowship has exposed her to both clinical diseases investigation skills that have made her adequately prepared to contribute to the advancement of public health on international platforms.

Fellowship Program-Specific Achievements:

- Led a rapid health assessment in a refugee hosting community in Kisoro District, Uganda, July 2023.
- Co-investigated several outbreaks and public health emergencies including: Malaria deaths in Namutumba District, COVID-19 outbreak in refugee communities, Anthrax outbreak in Ibanda District, Measles outbreak in five refugee communities, POPCAB in Kampala District, and the 2022 Ebola Disease outbreak in Uganda.
- Conducted a descriptive analysis of surveillance data on trends of routine immunization and incidence of vaccine-preventable diseases among infants, Uganda, 1980–2020
- Conducted a Knowledge, attitude, and practice study of traditional healers on Sudan Virus Disease in affected communities, Uganda, September 2022
- Conducted an epidemiological study on HPV vaccination uptake, drop-out rate and associated factors in out of school girls in Kisoro District, Uganda 2018-2022.
- Implemented a quality improvement project on improving the integration of non-communicable diseases (Hypertension and Diabetes) and HIV treatment in Kayunga Uganda January – July 2023.
- Authored 3 manuscripts that are under review in peer-reviewed journals.
- Presented at several national and international conferences including:
  - 8th African Field Epidemiology Network conference.

- 3rd international conference on Public health in Africa held.
- 8th and 9th NFEC Conferences
- 17th JASHC conference.

- Published two articles in the Uganda National Institute of Public Health (UNIPH) quarterly public health bulletin.
- Co-editor of the April-June 2023 edition of the UNIPH quarterly public health bulletin.

Published 2 newspaper articles in the local newspaper, "New vision titled enforce restriction of access to drugs without a prescription" and "Join the fight against Yellow fever".

- Trained and mentored the Field Epidemiology Training Program (FETP) intermediate tier.

Summary of Epidemiological Study

Knowledge, attitudes, and practices of traditional healers regarding management of Ebola virus disease (EBOD) in Kassanda and Mubende districts, Uganda, September 2022.

Background: Traditional healers (TH) often serve as initial healthcare providers in Uganda. During September to November 2022, 164 Sudan virus disease cases were registered in Uganda. We assessed knowledge, attitudes, and practices (KAP) of TH regarding Ebola Virus Disease (EBOD) among affected communities in Mubende and Kassanda Districts.

Methods: We surveyed TH in Mubende and Kassanda Districts during April–May 2023. We randomly sampled 62 TH registered with an official association and used snowballing to identify 103 additional unregistered TH. We assessed socio-demographics; knowledge of EBOD symptoms and transmission; attitudes towards using recommended IPC measures and referral of suspected EBOD patients; and IPC practices during management of suspected EBOD patients. We scored participants' responses as ***"1" (correct) or "0" (incorrect); adequate knowledge was ≥8/16, positive attitude was ≥4/8, and good practices was ≥11/21.*** Logistic regression was used to identify factors associated with KAP.

Results: Among 165 respondents, 57% were male; the mean age was 53 years. In total, 62% had adequate knowledge, 40% had a positive attitude, and 4% had good practices. Having formal education (aOR=7.6, 95%CI: 3.6–11.8) and being registered with a TH association (aOR=3.4, 95%CI: 1.5–9.5) were associated with adequate knowledge. Being aged <40 years (aOR=3.8, 95%CI: 1.2–16.3) and female (aOR=4.3, 95%CI: 1.3–12.7) were associated with good practices. Having formal education (aOR=3.0, 95%CI:2.7-8.8) and being aged <40 years (aOR=4.5, 95%CI: 1.3–15.6) were associated with a positive attitude.

Conclusion: Practices of TH interviewed in Kassanda and Mubende put them at risk for EBOD during an outbreak. Younger, female TH were more likely to have good practices and those with formal education were more likely to have good knowledge and a positive attitude. Structured training programs by the Ministry of Health to address specific knowledge and practice gaps among TH could facilitate EBOD control.

Key words: Sudan virus, traditional healers, KAP, Uganda

PICTORIAL AND NARRATIVE

Brenda Simbwa (green) with the graduates of the FETP intermediate in Mbarara District, 2023

Brenda (fourth from right) with other epidemiologists and the team at Bunagana HCII during the rapid health assessment in Kisoro District, June 2022.

Brenda (in a mask) interviewing a father who lost a son to Ebola during the Sudan virus disease outbreak in Mubende, 2022.

Brenda presenting her work on Sudan virus diseases in the CPHIA conference in Lusaka, December 2023

Helen Nelly Naiga

BScN, MPH (MUSPH), Advanced Field Epidemiology Fellow (UPHFP)

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Host site: Nutrition Division, Community Health Department, Ministry of Health

Host Mentors: Ms. Samalie Namukose

Nelly's Profile

Nelly Helen Naiga is a field epidemiologist with a Masters of Public Health, and a background degree in Nursing science. Before the fellowship, she worked with the Uganda Ministry of Health as an Epidemiologist during the COVID-19 response.

During her time as a fellow, she was attached to the Nutrition division, under the community health department, Ministry of health. Time at the host site has helped to improve Nelly's understanding of nutrition health issues in the country through her participation in policy formulation; Setting standards & quality assurance of different food products (Nutrient profile model), leading teams in organizing different campaigns like improving breastfeeding among working mothers, Vit A supplementation and de-wormers among children among others.

During her two years tenure, Nelly has gained experience in advanced outbreak detection and investigation skills, improved her scientific writing skills, grant and proposal writing skills, grant management, and oral presentation skills. She has refined her skills in data management and analysis using statistical packages like STATA, Epi info and QGIS.

She has improved her leadership skills and gained immeasurable technical capacity through the various learning sessions, meetings, trainings and workshops attended. She has led and participated in several outbreaks in different districts like Blackwater Fever Outbreak, recent Ebola outbreak, Yellow fever, Anthrax and Rift valley Fever. She led and participated in other investigations of public health importance.

Nelly has skills in scientific communication both written and oral presentation. She has edited and published reports in the National Institute of Public Health (UNIPH) bulletins. She has authored manuscripts as led author and co-authored on others.

Achievements at the host site

- Participated in the development of the nutrient profile model (NPM) in Uganda.
- Participated in the preparation and implementation of the National extended integrated child health days (E-ICHDs) as national supervisor Ankole region, 2022.
- Supervised the Kitagwenda district health team in the Integrated child health days, Vitamin A and dewormer distribution in 2023.
- Participated in the harmonization of the BFHI assessment tools in Uganda.
- Led the team in the preparation and commemoration of the world breastfeeding day, 2022.
- Participated in the review and dissemination of the new guidelines of food fortification in the different districts in Uganda.
- Participated in the review and dissemination of the new guidelines of food safety in Uganda.
- Participated in the development and update of the nutrition score card.
- Updated the monthly nutrition dashboard performance report.

- Participated in the nutrition quarterly newsletter writing and editing.

Fellowship Program Specific Achievements

- Led one outbreak investigation: Blackwater Fever outbreak in Kakumiro District.
- Participated in other activities of public health importance including:
  - Ebola Virus Disease outbreak in Mubende, Kyegegwa, Kassanda and Kampala districts.
  - Yellow fever in Wakiso and Bundibugyo districts.
  - Anthrax in Bududa District
  - Rift valley Fever in Mbarara District.
- Designed and implemented studies:
  - Ebola; 'The impact of community beliefs and practices in the spread of ebola to other eight districts.'
  - Nutrition; 'To determine factors associated with food insecurity in Namutumba district.'
  - Continuous quality improvement; 'To improve anemia screening during pregnancy in Soroti regional referral hospital'
- Trained andmentored three cohorts of FETP-frontline.
- Conducted descriptive analysis of trends of anemia among pregnant in Uganda, 2017–2021 using data from the District Health Information System version 2 (DHIS2).
- Published two articles in the New Vision newspaper: 'Donating breast milk to save preterm babies' and 'Why children should be dewormed, given Vitamin A supplements.'
- Editor of UNIPH epidemiological bulletin volume7 issue 4 and published one article in the same bulletin: 'The role of community beliefs and practices in the spread of ebola, September 2022.'
- Conducted an HIV study on the Uptake of family planning among HIV- positive and HIV-negative women in PMTCT IMPACT study, 2017-2019 in Uganda, using Electronic Medical Records (EMR) data.
- Conducted an epidemiological study to determine factors associated with food insecurity in Namutumba district.
- Presented at National and International Conferences:
  - Nutrition Symposium
  - 8th and 9th National Field Epidemiology Conference
  - 8th African Field Epidemiology Network Conference
  - 19th JASH

Wrote fifteen manuscripts; lead author on five still under review and have co-authored more than ten others.

Key lessons learnt during the Fellowship

- Outbreak investigation and institution of control measures.
- Scientific communication: abstracts, manuscripts, newspaper articles.
- Editorial and writing skills for scientific articles.
- Data management, analysis and interpretation.
- Presentation skills and dissemination of findings
- Designing and management of scientific projects.
- Networking and lobbying
- Leadership and team management skills.

Next Steps

I hope to apply skills gained during the Public Health Fellowship Program to serve in relevant public health organizations. I am interested in applying my expertise and experience in surveillance and infectious diseases control, and activities that contribute to Uganda's health security objectives.

Summary of the Role of Community Beliefs and Practices on the Spread of Ebola in Uganda, September 2022

Background: Traditional community beliefs and cultural practices can facilitate the spread of ebola viruses during outbreaks. On September 20, 2022, Uganda declared a Sudan Virus Disease

(SVD) outbreak after a case was confirmed in Mubende District. During September–November 2022, the outbreak spread to eight additional districts. We investigated the role of community beliefs and practices in the spread of SUDV in Uganda in 2022.

Methods: A qualitative study was conducted in Mubende, Kassanda, and Kyegegwa districts in February 2023. We conducted nine focus group discussions (FGDs) and six key informant interviews (KIIs). FGDs included SVD survivors, household members of SVD patients, traditional healers, religious leaders, and community leaders. Key informants included community, political, and religious leaders, traditional healers, and health workers. We asked about community beliefs and practices to understand if and how they contributed to the spread of SUDV. Interviews were recorded, translated, transcribed, and analyzed thematically.

Results: Frequently-reported themes included beliefs that the community deaths, later found to be due to SVD, were the result of witchcraft or poisoning. Key informants reported that SVD patients frequently consulted traditional healers or spiritual leaders before seeking formal healthcare or visited them after formal healthcare failed to improve their health conditions. They also noted that traditional healers treated patients with signs and symptoms of SVD without protective measures. Additional themes included religious leaders conducting laying-on-of-hands prayers for SVD patients and symptomatic contacts, SVD patients and their symptomatic contacts hiding in friends' homes, and exhumation of SVD patients originally buried in safe and dignified burials, to enable traditional burials.

Conclusion: Varied community beliefs and cultural practices likely promoted SVD outbreak spread during the 2022 outbreak in Uganda. Controlling ebola virus outbreaks in Uganda could be aided by the involvement of formal public health systems, traditional healers, and religious leaders. Community engagement during inter-epidemic periods could aid in the effective management of future outbreaks in Uganda by identifying socially acceptable and scientifically supported alternatives for infection control.

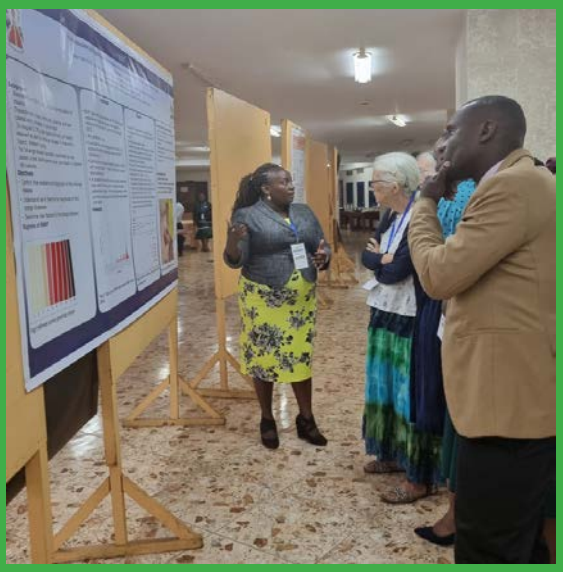
PICTORIAL NARRATIVE

Nelly Naiga (grey jacket) interacting with a mother of 8 children,who a child to malnutrition during the food insecurity assessment in Namutumba District.

Helen Nelly Naiga (standing in blue), Martha Nankya (PHFP Lab fellow) and district lab focal person collecting blood and milk samples during Rift Valley Fever outbreak

Helen Nelly Naiga (standing in black) facilitating a group session during an FETP-Frontline workshop.

Helen Nelly Naiga (left) mentoring FETP-Frontline trainees from Pallisa District.



Helen Nelly (yellow) presenting Blackwater fever outbreak findings at JASH conference, 2023

TEPHINET recognized the great work I did on International Women's day as an exceptional woman in the field of public health specifically maternal and women's health in Uganda.

Helen Nelly Naiga presenting during the Nutrition symposium, Uganda, 2023.

Helen Nelly Naiga presenting at the 8th AFENET conference in Mombasa, 2023.

Fellows and the supervisors shared some memorable moments during the AFENET conference

Dr. Namubiru Saudah Kizito

MBChB (MUK), MMed (MUK), Hospital and Health Care Management (UMI) & Advanced Field Epidemiology Fellow

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Host Institution: National Health Laboratory & Diagnostic Services Department (NHLDS), MOH.

Host Mentors: Dr. Susan Nabadda

Dr. Namubiru Saudah's Profile

Dr. Namubiru Saudah Kizito is a public health microbiologist seasoned epidemiologist, and an anti-microbial resistance (AMR) control advocate and steward. She holds a Bachelor of Medicine and Surgery (MBChB) Degree and a Master of Medicine (MMed Microbiology). She is an experienced health manager with a post-graduate diploma in Hospital and Healthcare Management.

During the fellowship Saudah was hosted at the National Health Laboratory and Diagnostic Services Department (NHLDS) of the Ministry of Health, Uganda.

She has evolved into a competent professional, making significant contributions to both epidemiology and public health microbiologist. While at the National Health Laboratory and Diagnostic Services Department (NHLDS) she played a significant role in AMR surveillance at both National and sub-national levels. She is a member of the National Coordination Centre for AMR Control and is very instrumental, in championing diagnostic stewardship of microbiology testing to improve AMR surveillance data quality and quantity.

Efforts in analyzing trends of resistance in antibiotic resistance, sensitizing health workers and the public about AMR, capacity-building sessions, and evaluating the drivers of AMR at the community level have advanced her career aspirations as a public health microbiologist and AMR advocate.

Dr. Saudah has served as a subject matter expert on several platforms both locally and on National and regional AMR communicable disease engagements. Bestowed with the unique skills and competencies of a clinician, infectious disease physician (clinical microbiologist) health system manager and now epidemiologist, she has utilized her potential always. My diverse experiences and skills showcase a well-rounded professional dedicated to advancing public health and addressing emerging challenges

Disease Surveillance and Response, rapid risk assessments of public health events, the Joint External Evaluation, After-Action Reviews, scientific writing.Similarly, I demonstrated commendable capacity in emergency response, notably during the suspected cholera outbreak in Luwero Island, Buvuma district, I coordinated both the epidemiology and laboratory teams and we managed to verify the alert despite the geographical barriers and beliefs of the locals that No woman has and will ever not visit the affected island. Due to this outstanding, and prompt response, I was nominated to represent Uganda to the Global Task Force on Cholera Meeting, in Maputo, Mozambique. While there, I made a presentation on molecular diagnostic journey in Uganda.

Host Site Achievements

- Supported the epidemic preparedness and response arm of the department.
- Participated in the following activities:
  - Antibiotic Trends analysis: I assessed the trends of antibiotic resistance in Uganda, 2018–2021.

- Support supervision and mentorships: I coordinated mentorships at the sub-national level on diagnostic stewardship for microbiology testing.
- Antimicrobial stewardship telementoring: Member of the steering committee and a lead mentor on the AMS -tele mentoring program.
- Represented Uganda at several meetings and symposium such as the first microbiology in Africa Summit, the Fleming fund consultative meeting on phase II funding.
- Revision of the Uganda Clinical Guidelines,2023 and the Essential Medicine and Supplies List,2023.
- Represented NHLDS on regional activities on AMR as an expert and resource person.

Fellowship Program Achievements

- Participated in several outbreak responses:
  - 2022 Sudan Virus disease outbreak in Mubende, Kyegegwa, Kassanda, Wakiso and Kampala City.
  - Measles outbreak in Kiryandongo, March 2023.
  - Scabies outbreak in Hoima, Uganda, 2022.
  - Malaria outbreak in Namutumba District.
- Supported capacity building activities:
  - Intermediate FETP training, Cohort 4.
  - Training of ambulance drivers and clinical teams in Rwenzori and Kampala Capital City on infection prevention and control.
- Presented at national and international conferences:
  - The 8th National field epidemiology conference
  - The Joint Annual Scientific Conference (JASH)
  - National AMR conference
  - AFENET
  - Conference on Public Health in Africa (CPHIA) where I won the best oral abstract.
- Editor of Volume 8 Issue 1 April–June 2023 Uganda National Institute of Public Health (UNIPH) Epidemiological bulletin
- Published bulletin articles
  - Measles outbreak propagated by visiting a health facility, in a refugee hosting community in Kiryandongo District, Western Uganda, August 2022–May 2023.
  - Increasing trends of antibiotic resistance in Uganda: analysis of the national antimicrobial resistance surveillance data, 2018–2021.
  - Celebrating a shared victory: Saudah's award-winning abstract
  - Authored 3 Manuscripts as lead author and co-authored 6 others
  - Increasing trends of antibiotic resistance in Uganda: an analysis of the national antimicrobial resistance surveillance data, 2018–2021.
  - Measles outbreak propagated by visiting a health facility, in a refugee hosting community in Kiryandongo District, Western Uganda, August 2022–May 2023.
  - Healthcare-associated infections during the 2022 Sudan Virus Disease Outbreak in Uganda

Key lessons learnt during the fellowship

- AMR control advocacy
- Response to public health emergencies
- Workforce development
- Data analysis and management
- Evidence-based decision-making
- Effective public communication

Summary of Descriptive Study

Increasing trends of antibiotic resistance in Uganda: an analysis of the National antimicrobial resistance surveillance data, 2018–2021

Background: Continuous monitoring of antimicrobial resistance (AMR) among isolates from clinical samples can inform effective drug selection for patients. In Uganda, human AMR surveillance occurs at national and regional referral hospitals and in selected public universities. Bacterial isolates from patients are subjected to drug susceptibility testing; the results are used in real-time for patient care. Isolates are then sent to the National Microbiology Reference Laboratory (NMRL) for reanalysis to generate national

AMR surveillance data and for global reporting. Although isolated analysis results from NMRL are considered official AMR surveillance data, there is limited utilization of these data to inform public health planning. We valuated the trends and spatial distribution of AMR to common antibiotics used in Uganda.

Methods: We analyzed data from pathogenic bacterial isolates from blood,

cerebrospinal, peritoneal, and pleural fluid from AMR surveillance data for from 2018–2021. We calculated the proportions of isolates that were resistant to common

antimicrobial classes. We use the chi-square test for trends to evaluate changes in AMR resistance over the study period.

Results: Out of 537 isolates with 15 pathogenic bacteria, 478 (89%) were from blood, 34 (6.3%) were from pleural fluid, 21 (4%) were from cerebrospinal fluid, and 4 (0.7%) were from peritoneal fluid. The most common pathogen was Staphylococcus aureus (20.1%), followed by Salmonella species (18.8%). The overall change in resistance over the four years was 63–84% for sulfonamides, fluoroquinolones macrolides (46–76%), phenicols (48–71%), penicillins (42–97%), ß-lactamase inhibitors (20–92%), aminoglycosides (17–53%), cephalosporins (8.3–90%), carbapenems (5.3-–26%), and glycopeptides (0–20%). Annual resistance rates to ciprofloxacin increased from 2018-2021 for gram-positive organisms (26-–45% p=0.02). Among gram-negative organisms, there were increases in resistance to tetracycline (29-78% p<0.001), ciprofloxacin (17-43%, p=0.004), ceftriaxone (8-–72%, p=0.003), imipenem (6-26%, p=0.004), and meropenem (7-18, p=0.03).

Conclusions: There was a significant increase in the trends of drug resistance to

antibiotics such as ciprofloxacin, ceftriaxone, meropenem, imipenem, and tetracycline (among gram-negative organisms) in Uganda. Continuous monitoring of AMR trends at the national level to improve efforts to reduce the AMR problem in Uganda through public health policy and planning is crucial**.**

PICTORIAL NARRATIVE

Saudah Namubiru presenting to the Global task force on Cholera meeting Maputo, Mozambique

Saudah Namubiru (blue shirt) interviewing a care giver during a measles outbreak in Luwero district

Saudah Namubiru holding out the award for best oral abstract, CPHIA, 2023

Saudah Namubiru mesmerized after being announced the winner of the 2023, CPHIA, best oral abstract

Saudah Namubiru (extreme end ,sitting row) among the delegates from East African region during the Fleming fund consultative meeting

Rebecca Akunzirwe

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Host Site: AIDS Control Program, Ministry of Health.

Host Site Mentor: Dr. Elena Magongo/Dr. Miriam Nakanwagi

Rebecca Akunzirwe's Profile

Now equipped as a certified field epidemiologist, Rebecca holds a master's degree in Clinical Epidemiology and Biostatistics. Her specific focus lies in enhancing service delivery for children and adolescents living with HIV.

During her training, Rebecca was attached to the pediatric and adolescent HIV care and treatment branch of the AIDS Control Program, Ministry of Health.

Thanks to the in-service training, Rebecca has acquired significant expertise in leadership, mentorship, scientific communication, quality improvement projects, and outbreak investigation and response, encompassing data analysis, interpretation, and utilization. Leading one outbreak and participating in four others, she gained hands-on experience. Additionally, she played a role in organizing both national and international conferences on HIV and AIDS.

Achievements at the Host Site

- Participated in the production of the quarterly HIV/AIDS reports/ bulletin.
- Participated in the drafting of the new national HIV guidelines on differentiated service delivery for children and adolescents living with HIV.
- She was part of the organizing committee for the paediatric and adolescent HIV learning collaborative for Africa which was aimed at providing an opportunity for HIV program managers from African countries to engage, share best practices and foster south to south evidenced-based learning among countries on the African continent on pediatric and adolescent HIV care and treatment.
- She was a part of the external assessors for health facilities on a baby-friendly health facility initiative in Uganda with a particular focus on the baby-friendliness of health facilities for HIV-exposed infants
- She was a part of the national team that reviewed and revised Family Connect Program health messages and promotional materials.
- She carried out four studies: 'Adherence to the Early infant diagnosis study among HIV-exposed infants in Uganda, 2017–2019', 'Improving HIV index testing among children and adolescents living with HIV at Fort Portal Regional Referral Hospital, 2023', 'Performance, challenges, and opportunities to EID testing among facilities using Point of Care technologies in Uganda, 2023' and 'impact of Ebola Outbreak on utilization of differentiated service delivery model utilization in Mubende and Kassanda Districts' and 'Trends in differentiated service delivery model utilization among children and adolescents living with HIV'.

Fellowship Program-Specific Achievements

- Led an outbreak investigation:
  - Outbreak of scabies in a Hoima District, 2022
- Participated in four other outbreak investigations:
  - Malaria deaths among children with severe malaria, Namutumba District
  - EVD outbreak in Kassanda and Mubende District
  - Meningitis in Obongi District
  - Yellow fever in Masaka District
- Analyzed surveillance data from DHIS on trends in differentiated service delivery model utilization in Uganda, 2020-2022.
- Presented at three local conferences and two international conferences

Local Conferences

- 2022 PEPFAR HIV science summit
- 2022 National Field Epidemiology Conference
- 2023 National Field Epidemiology Conference at the national level

International Conferences

- International workshop on HIV and Paediatrics
- 8th Africa Field Epidemiology Conference

- Wrote and published three newspaper articles:
  - What you need to know about cervical cancer screening
  - Get your COVID-19 shot
  - Violence against adolescent girls is a driver of HIV/AIDS
- Editor for the Issue 2 Volume 7 NIPH Epibulletin.
- Designed and implemented a quality improvement study on the improvement of index testing among children and adolescents living with HIV in Fort Portal Regional Referral Hospital.
- Conducted an HIV epidemiological study on the factors associated with adherence to the Early Infant Diagnosis among HIV-exposed infants in Uganda.
- Submitted 2 manuscripts for publication to peer reviewed journals titled 'Scabies Outbreak Investigation in a Fishing Community in Uganda' and 'Time to Care Seeking and Associated Factors among Sudan Virus Disease patients in Uganda, Sep–Nov, 2022'
- Authored 31 manuscripts; first author on 7 manuscripts and co-authored 24 manuscripts including 3 case studies.
- Wrote and submitted a grant to the Royal Society of Hygiene and Tropical Medicine to launch a pilot surveillance system for scabies.

Key lessons learned during the fellowship

During the fellowship, she developed the following skill sets:

- Outbreak Investigation and response including the institution of interventions
- Evaluation of surveillance systems
- Designing and implementing Quality Improvement Projects
- Data management, analysis, and interpretation using such software as STATA, EpiInfo, and QGIS
- Scientific writing (for Abstracts, Manuscripts, case studies)
- Presentation skills and dissemination of findings
- Networking and lobbying skills
- Grant writing

Next Steps

Armed with the acquired skills, Rebecca aspires to contribute further within the Ministry of Health or a related organization, working towards enhanced global health, swift responses to public health emergencies, and the improved delivery of services to children and adolescents living with HIV.

Summary of Epidemiological Study:

Adherence to the early infant diagnosis alogarithm among infants exposed to HIV in Uganda, 2017-2019

Background: Early infant diagnosis (EID) facilitates early initiation into HIV care and treatment for identified HIV-positive infants. According to the Uganda Ministry of Health (MOH) EID testing algorithm, testing for HIV-exposed infants (HEI) should occur at <6 weeks, 9 and 18 months of age, and 6 weeks after stopping breastfeeding. Uganda has faced challenges with loss to follow-up (LTFU) for EID. We assessed adherence to the EID algorithm for HEI and associated factors.

Methods: We analyzed data from the 'Impact of the National Program for Prevention of Mother-to-Child Transmission of HIV in Uganda (2017–2019)' study. HIV-positive mothers and their infants enrolled in a prospective cohort (2017–2018) were followed until the HEI tested positive, died, was LTFU, or reached 18 months of age. Of the infants who didn't die before each timepoint, we calculated the proportion that adhered to the EID algorithm (having HIV tests at all four appropriate timepoints, using 15 months of age as a proxy for 6 weeks after cessation of breastfeeding).

We evaluated factors associated with adherence using modified Poisson regression.

Results: Among 1,804 HEI, 912 (51%) were male. At baseline, 1,605 (89%) were HIV-negative, 37 (2%) were HIV-positive, and 162 (9%) had indeterminate or missing results. Among baseline-negative HEI, 1,212 (76%) remained negative at 9 months, 1 (0.06%) tested positive, 18 (1%) died, and 374 (23%) did not test. Of those negative at 9 months, 1,066 (88%) remained negative at 15 months, 2 (0.2%) tested positive, 4 (0.3%) died, and 140 (12%) did not test. Of those negative at 15 months, 793 (74%) were negative at 18 months, 5 (0.5%) died, and 268 (25%) did not test. Overall, 164 (10%) of 1,605 HEI who were HIV-negative at baseline were tested only at baseline. Overall adherence to the complete EID algorithm timeframe was 46% (833/1,777). Perceived discrimination due to HIV status [RR=0.80, 95%CI (0.66-0.97)], having fewer pregnancies [RR=0.96, 95%CI (0.94-0.99)] and reporting sexual violence [RR=0.74, 95%CI (0.65-0.88)] were associated with non-adherence.

Conclusion: Fewer than half of HEI received the recommended HIV tests at the recommended timepoints. Interventions to address stigma may improve adherence to the EID algorithm. Investigations are needed to explore associations between sexual violence, parity, and adherence to the EID algorithm.

PICTORIAL NARRATIVE

Rebecca (maroon top) taking the Ferry to investigate meningitis in Obongi District

Rebecca (2nd from left) conducting in-depth interviews with parent of deceased patient in Namutumba District

Rebecca (standing) conducting an interview during the Ebola outbreak investigation, Kassanda District, 2022

Marie Gorreti Zalwango

BSN, MPH, Advanced Field Epidemiology Fellow (UNIPH)

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Host site: National Malaria control Division, Ministry of health

Host Mentor: Dr. Opigo Jimmy/Dr. Gerald Rukundo

Marie Gorreti 's Profile

Marie Gorreti Zalwango is a field epidemiology fellow with special interest in Malaria surveillance and disease emergency preparedness and response. She holds a Master of Public Health and a Bachelor of Science in Nursing. Before joining the fellowship programme, she worked with Baylor Uganda and Mildmay Uganda where she implemented projects in HIV prevention and Maternal, Neonatal and Child Health.

During the fellowship, she was attached to the National Malaria control Division, Ministry of health. where she conducted weekly surveillance for malaria, reviewed data and made recommendations to improve malaria control and treatment interventions, conducted mentorships and support supervisions, contributed to writing of weekly malaria bulletins and review of malaria epidemic surveillance and response guidelines. She has further responded to a number of public health emergencies and authored several documents that demonstrate her advanced scientific writing skills, including bulletin articles, newspaper articles, and manuscripts which enhanced her writing skills.

Achievements at the Host Site

- I supported publication of weekly and quarterly malaria bulletins which are used as information sources for decision making at national and subnational levels for malaria control and response interventions.
- I have been involved in supporting the routine weekly analysis of malaria epidemic surveillance to monitor upsurges in malaria cases through the construction of district malaria normal channels using weekly reported DHIS2 data. Information from this analysis was disseminated through weekly malaria status update bulletins to all international and national malaria stakeholders to guide decision making for malaria control in the country.
- I provided consultancy services to the USAID during the baseline assessment for the PMI Uganda-malaria reduction activity (PUMRA) where I led the team in Eastern Uganda. The assessment provided the current status of malaria control strategies in the supported regions and guidance for improved implementation of the activity.
- As part of the malaria incident management team, I attended daily meetings with the incident management team (IMT) to improve malaria epidemic response in the country.
- I conducted a review of malaria epidemic detection methods in Uganda which revealed granularity in district malaria transmission levels from the assigned regional transmission levels requiring stratification of malaria transmission to the lowest level possible. Furthermore, the analysis revealed that the 75th percentile method was as sensitive as the C-SUM method in low and very low transmission levels an indication that there was no need to use a different method for those regions from the nationally adopted 75th percentile method that was previously discouraged for low and very low transmission areas. Additionally, epidemic weeks detected by the 75th percentile were significantly different from those detected by the mean+2SD in medium and high transmission areas with the 75th percentile detecting more outbreaks. We

recommended use of the 75th percentile method for all transmission areas to detect malaria outbreaks and use of the mean+2SD to guide prioritization of epidemic districts for response in absence of adequate resources.

- This analysis triggered the review of malaria epidemic surveillance and response guidelines an activity I fully participated in as a rapporteur. The review team included WHO regional and national officials, Ministry of Health – National malaria control Division team, Incident management team and other malaria stakeholders in the country. Following review of the guidelines, I participated in the drafting of standard operating procedures for the implementation of the revised manual which are to be disseminated to all districts and malaria stakeholders in the country.
- I further conducted a descriptive study on trends and distribution of severe malaria trends in Uganda from 2017-2021. Findings revealed a non-significant reducing trend in the proportion of malaria cases that are severe. This finding threatens achievement of near zero malaria deaths target by 2030 hence the need to rethink current strategies. However, some regions like Tooro and Karamoja had significant decreases; studies in these regions could provide factors associated with the decline for scaleup to other regions.
- I led a team that investigated severe malaria deaths in Namutumba District in 2022. This activity revealed under-reporting of malaria deaths in the DHIS2 system. Furthermore, we conducted a case control study to identify risk factors for deaths among children with severe malaria. Findings showed that failure to receive blood transfusion among anaemic children, failure to reach a high-level health facility referred and stock outs of antimalarials were associated with severe malaria deaths.
- Following the study on severe malaria deaths and the observed underreporting in the national health information system, I Implemented a quality improvement project to improve malaria mortality reporting in Namutumba District. The project was implemented at Nsinze HCIV and Namutumba HCIII. Basic interventions for this change were: training, mentorship and supervision of staff and frequent data reviews. The project improved accuracy of malaria mortality data (malaria deaths recorded and reported in DHIS2) from 0% in October 2022 to 100% in March 2023.

Following study findings of blood shortage as a factor for severe malaria deaths, I published a newspaper article to create awareness on the need for blood products and to sensitize communities to donate blood. This was titled:' Donate blood: contribute to reduction of malaria deaths in the country". I also published a newspaper article titled: "Malaria prevention and treatment should be taken more seriously" and this was aimed at creating awareness of the seriousness of malaria infection.

As part of the response and surveillance team at the host site, I supported a team that investigated black water fever in Kakumiro District. The team revealed that black water fever was associated with self-medication for malaria and use of multiple drugs for malaria management.

Following the black water fever investigation, I conducted an epidemiological study to identify risk factors for self-medication for malaria in Kakumiro District. This was a household survey conducted in 8 randomly selected villages. Of the 592 participants interviewed, 368 (62%) had self-medicated for malaria in the past 6 months. Self-medication for malaria was significantly associated with being ≥35years AOR: 1.77; 95%CI: 1.04-3.01; long distance to the health facility AOR: 3.05; 95%CI: 2.09-4.47 and storage of antimalaria drugs at home AOR: 2.21; 95%CI: 1.36-3.59. Experiencing ≥6 malaria episodes in the household was protective AOR: 0.39; 95%CI: 0.23-0.65.

I further conducted a study to describe trends and social demographic factors for malaria mortality in a population-based cohort in Eastern Uganda, 2007-2022. This was conducted in Iganga and Mayuge health demographic surveillance system site.

Fellowship Program Specific Achievements

Surveillance data analysis

- Reviewed data and conducted descriptive studies:
  - Severe malaria trends in Uganda, a descriptive analysis for 2017-2021
  - Evaluation of malaria outbreak detection methods, Uganda, 2022
  - Trends and social demographic factors for malaria mortality in a population-based cohort in Eastern Uganda, 2007-2022

- **Quality improvement project**
  - Implemented a quality improvement project to improve malaria mortality reporting in Namutumba District. The project was implemented at Nsinze HCIV and Namutumba HCIII from October 2022 to March 2023.

- **HIV Project**
  - Compare medical electronic records (MER) data and individual-level data from facilities to determine the correlation between Antiretrovirals (ARVs) dispensed and the number of patients in HIV chronic care in Luwero District, Central Uganda. The study revealed variations between MER and facility data across quarters with major discrepancies observed for Bombo H/C III. There were notable differences in the ARV drugs dispensed at facility level and those captured in MER data ranging from -100% to 325,256%. All health facilities had over stock with more than 100 months of stock for 1 or more drugs. Expired ARV drugs were observed at private not for private health facilities. We recommend accurate reporting of HIV positive patients in care (TX-CURR) and antiretrovirals (ARVs) dispensed data for the MER system to better inform decision making and regular stock monitoring and ARV drug and timely redistribution to ensure easy access to clients and to prevent expiries.

- **Epidemiological studies**
  - Did an epidemiological study to determine risk factors for death among children with severe malaria in Namutumba District, Eastern Uganda, September 2021 - February 2022
  - Factors associated with self-medication for malaria among communities in Kakumiro District, Western Uganda, 2023

- **Response to public health emergencies**
  - Team lead for the investigation of severe malaria deaths in Namutumba District, Eastern Uganda in April 2022. Investigation findings were presented to the district health Office, Incident Management Team (IMT) and National Task Force (NTF) meetings

- **Co-investigated**
  - Black water fever investigation in Kakumiro District, August 2022
  - Crimean–Congo hemorrhagic fever outbreak investigation in Rakai and Lwengo districts, Uganda, July 2022
  - Ebola outbreak investigation in Mubende, Kassanda and Jinja districts, Uganda in October and December 2022. Following response, I conducted a study to assess stigma among Sudan Ebola Virus Disease survivors in Mubende and Kassanda Districts, Uganda, 2022. This was aimed to improve the well-being of Ebola survivors and to identify strategies for prevention of stigma among Ebola survivors in future outbreaks.

- **Trainings/workshops participated in/ facilitated**
  - During the AFENET 2023 conference in Mombasa-Kenya, I supported the training of participants on 7-1-7 agenda during the pre-conference workshops. This training was aimed to strengthen improved disease detection, notification and response in Africa
  - I participated in the dissemination of findings on the for the EVD population connectivity across boarders (PopCAB) conducted at Lwakhakha boarder in Namisindwa District. The event was organised by the Ministry of Health Uganda (MoH) with support from CDC and Baylor Uganda, however, data collected during POPCAB activities had never been analysed and reported on by the ministry of heath team
  - I participated in the training and mentorship of frontline tier trainees cohort 19 and 22.

The trainings were held in Jinja and Lira
  - Participated in scientific writing workshop held in Jinja from 5th – 9th December where I attained skills on scientific writing most especially manuscript writing
  - On November 25th 2022, I presented findings from my descriptive project on malaria epidemic surveillance to the malaria scientific advisory committee to inform improved epidemic surveillance, preparedness and response. Findings informed critical questions on malaria epidemic detection in Uganda

- **Conference presentations and awards**
  - Oral presentation: 2nd Conference on public health in Africa held in Kigali, Rwanda from December 12th-15th, 2022. I presented: "Risk factors for death among children with severe malaria in Namutumba District, Eastern Uganda, September 2021 - February 2022". I was privileged to win the best oral abstract presentation award.
  - Oral presentation: Participation during the 17th JASHC conference that took place at Entebbe Resort Hotel from 20th – 22nd September 2023. At this conference I presented 2 abstracts through oral presentation
  - Oral Presentation: 8th AFENET Conference held in Mombasa Kenya from 5th-10th November, 2023. I presented; "Super-spreaders as drivers of the Sudan ebolavirus disease outbreak, Uganda, 2022
  - Oral Presentation: 8th and 9th NFEC Conferences held at Hotel Africana, Kampala, Uganda 2022 and 2023. I presented 3 abstracts in both conferences
  - Poster presentation: 8th AFENET Conference held in Mombasa Kenya from 5th-10th November, 2023. I presented 2 abstracts; "Severe malaria trends in Uganda, a descriptive analysis for 2017-2021" and "Evaluation of malaria outbreak detection methods, Uganda, 2022".
  - Poster presentation: 3rd Conference on public health in Africa held in Lusaka, Zambia from November 27th-30th, 2023. I presented, "Stigma among EVD survivors in Mubende and Kassanda districts Uganda, 2022".

- **Written Communication**
- **Newspaper articles**
  - "Donate blood: contribute to reduction of malaria deaths in the country". This article aimed to create awareness on the need for blood products and to sensitize communities to donate blood
  - "Malaria prevention and treatment should be taken more seriously". This was aimed at creating awareness of the seriousness of malaria infection
  - "Your role in elimination of mother to child HIV transmission" aimed to increase awareness on personal and community responsibility to the achievement of zero new malaria infections in the country.

- **Bulletin articles**
  - Editor of Uganda Public Health Bulletin (UPHB) Quarterly Epidemiological bulletin, Volume 7/Issue 3/ July- September, 2022 and also published the following articles:
  - Risk factors for death among children with severe malaria in Namutumba District, Eastern Uganda, September 2021 - February 2022: UNIPH Quarterly Epidemiological Bulletin, volume 7, issue 4, 2022
  - Trends and Distribution of Severe Malaria Cases, Uganda, 2017-2021: A Descriptive Analysis of the Health Management Information System Data: UNIPH Quarterly Epidemiological Bulletin, Volume 8 issue 2, 2023
  - Stigma among Sudan Ebola Virus Disease survivors in Mubende and Kassanda Districts, Uganda, 2022: UNIPH Quarterly Epidemiological Bulletin, Volume 8 issue 3, 2023
  - Evaluation of malaria outbreak detection methods, Uganda, 2022: UNIPH Quarterly Epidemiological Bulletin, Volume 8 issue 4, 2023
  - Improving the reporting for malaria deaths through quality improvement approaches in Namutumba District, Uganda, 2022—2023: UNIPH Quarterly Epidemiological Bulletin, Volume 8 issue 4, 2023

- **Bulletin highlights and events**
  - Uganda PHFP Shines at the 2nd International Conference on Public Health in Africa (CPHIA) held at Kigali Convention Centre in Rwanda on 13th – 15th December 2022

- The Launch of indoor residual spraying in west Nile region, Uganda, 8th September 2022
- Regional Population Connectivity Across Boarders (PopCAB) training of trainers Uganda, Kenya and Rwanda, 19th-23rd September 2022
- Training on incident management system for malaria epidemics in Uganda, Golf Course Hotel, Kampala, 7th-10th February, 2023
- 16th Joint Annual Scientific Health (JASH) Conference held at Munyonyo Hotel on 21st—23rd September 2022
- World AIDS Day, 1st December 2022

Manuscripts

- **Lead author**
  - Risk factors for severe malaria deaths among children in Ivukula Subcounty, Namutumba District
  - Severe malaria trends in Uganda, a descriptive analysis for 2017-2021
  - Evaluation of malaria outbreak detection methods, Uganda, 2022
  - Stigma among EVD survivors in Mubende and Kassanda districts
  - Improving the reporting for malaria deaths through quality improvement approaches in Namutumba District, Uganda, 2022—2023
  - Factors associated with self-medication for malaria among communities in Kakumiro District, Western Uganda, 2023
- **Co-author on 14 other manuscripts.**
- **Other fellowship activities**
  - Participated in the population connectivity across boarders (PopCAB) Ebola virus disease activity conducted at Lwakhakha boarder in Namisindwa District to inform ebola response.
  - Participated in the review of malaria epidemics surveillance and response guidelines and the drafting and finalisation of the malaria epidemic surveillance and response SOPs for dissemination to all stakeholders.

Key Skills Learnt

- Outbreak detection, response and control
- Project designing and proposal writing
- Grant writing
- Designing and implementation of quality improvement projects
- Scientific writing (abstracts, manuscripts, policy briefs)
- Newspaper article writing
- Scientific reviewing
- Editorial Skills
- Data analysis using Epi-info, STATA, QGIS and interpretation of results
- Public speaking
- Scientific communication
- Mentorship and training

Next Steps

- Finalize and publish all research manuscripts drafted during the fellowship and engage further in global health security interventions and research
- Furthermore, I intend to continue supporting the field epidemiology training program whenever called upon.

Summary of Epidemiological Study

Risk factors for death among children with severe malaria, Namutumba District, Eastern Uganda, September 2021 - February 2022

Background: In February 2022, a high number of deaths among children was reported to the Ministry of Health from Namutumba District. The cause was later confirmed as severe malaria. We investigated the scope of severe malaria deaths, identified associated factors, and recommended evidence-based control measures to inform malaria-prevention programming in Namutumba District.

Methods: We conducted an unmatched case-control study in March 2022 in the most affected subcounty (Ivukula Subcounty). We defined a case as death with a history of fever and any of the following: convulsions, difficulty breathing, yellow eyes, tea-colored urine, anemia, loss of consciousness, or reduced urine output in a child ≤12 years from September 2021 to February 2022 in Ivukula Subcounty, Namutumba District. Controls were survivors with the same signs and symptoms, recruited in a 2:1 ratio with cases. We actively searched for cases and controls door-to-

door with the help of community health workers. We interviewed caretakers for cases and controls to obtain socio-demographic and clinical data, including health-seeking behavior and health systems risk factors. Drugs and bloodstock status information was obtained from health workers using an interview guide. We identified factors associated with death using multivariate logistic regression and thematic analysis for qualitative data.

Results: Among 46 cases, 29 (63%) were <5 years, and 23 (50%) were female. Death among children with severe malaria was significantly associated with treatment non-completion (aOR=9.7, 95%CI: 1.8–53) and failure to receive blood transfusion for anemic patients (aOR=7.1, (95%CI: 1.4–36). Healthcare workers reported that failure to reach intended referral sites due to transport costs, stockouts of antimalarials and blood products at health facilities, and absence of integrated community case management of childhood illnesses (iCCM) were likely contributors to deaths among children with severe malaria.

Conclusion: Incomplete or insufficient treatment due to lack of patient resources and drug stockouts contributed to malaria mortality among children ≤12 years in Ivukula Subcounty in Uganda. We recommend accurate quantification of antimalarials for health facilities, offering transport support to severe patients referred to higher-level facilities, and increasing access to blood products. Activation of iCCM could facilitate public health efforts against severe malaria in the district.

PICTORIAL NARRATIVE

Gorreti M. Zalwango receiving an award for best oral presentation from the then Ag Director Africa CDC DR. Ahmed Ogwell Ouma during the CPHIA conference in Kigali Rwanda, Dec 15, 2022

Gorreti M. Zalwango (Center), UNIPH Director Dr. Alex Ario (R), and Dr. Migisha Richard (L) after receipt of an award during the CPHIA 2022 conference in Kigali Rwanda on Dec15, 2022

Gorreti M. Zalwango (Red Top) with other participants from WHO, MoH and Malaria stakeholders during review of the malaria epidemic surveillance and response guidelines at Nile Village Hotel in Jinja, Uganda, July, 2023

Gorreti M. Zalwango (arrow on head) posing with the Minister of Health Hon. Dr. Jane Ruth Achieng, the WHO Representative to Uganda, Director General Health Services and other participants during the training and launch of incident management system for malaria epidemics at Golf course hotel in Kampala, August, 2023

Gorreti M. Zalwango interviewing one of the Ebola patients at the Ebola treatment Unit in Mubende District, September, 2022

Gorreti M. Zalwango during training of frontline epidemiologists in Jinja City, March 2023

Gorreti M. Zalwango conducting a 7-1-7 training during the AFENET 2023 pre-conference workshop in Mombasa, Kenya

Gorreti M. Zalwango (R) and Namutumba District health officials (Malaria focal person (2nd Right), DHO (L) and the Assistant DHO (2nd Left) during an exit meeting following investigation of severe malaria deaths in the district in April 2022

Dr. Peter Chris Kawungezi

MBChB (MUK), MPH (MUST)

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Host Site: The AIDS control program (ACP), Ministry of Health

Host Mentor: Dr. Peter Mudiope

Dr. Peter Chris's Profile

Now an accomplished field epidemiologist, Peter Chris holds a Master's degree in Public health and a Bachelors degree in Human Medicine and Surgery. Peter has interest in HIV, maternal, and child health, global security and One Health.

During the fellowship, he was attached to the AIDS control program (ACP) under the department of National disease control, Ministry of Health. Through the in-service training he has attained skills in programming, monitoring and evaluation, support supervision and mentorship, reporting performance against targets, media reporting, outbreak investigation, and response, conducting quality improvement projects, budgeting and accountability, financial lobbying skills, surveillance data analysis, interpretation, and utilization.

Achievements at the Host site

- Participated in the national evaluation of the uptake and effectiveness of the PMTCT retention strategies for mother-baby pairs in North Acholi region
- Participated in the national rollout of Viral load testing of pregnant and breastfeeding mothers at Point of Care (POC)
- Participated in the national dissemination of 2017-2019 Uganda's national PMTCT Impact evaluation findings.
- Analysed data from the PMTCT impact evaluation to assess predictors of exclusive breastfeeding among HIV-exposed infants in Uganda, 2017–2019.
- Participated in developing a protocol for maternal HIV retesting in late pregnancy and during postnatal care.
- Participated in peer learning sessions that guided implementation, and scale-up of the group antenatal/postnatal (GANC-PNC) intervention.
- Designed and implemented a continuous quality improvement (CQI) project to improve pre-exposure prophylaxis (PrEP) screening and initiation among AGYW enrolled in G-ANC/PNC in Mubende regional referral hospital.
- Participated in the development of national maternal HIV retesting tools to be used during late ANC, labor & delivery, and PNC.
- Supported the PMTCT monitoring and evaluation (M&E) team
- Participated in the rollout, national mentorship, and support supervision of point of care (POC) testing for viral load and early infant diagnosis (EID) using gene xpert and m-pima machines to ensure same-day sampling, testing, and provision of results.
- Participated in the national rollout of maternal HIV retesting tools
- Participated in support supervision and mentorship for multi-disease testing in the Ankole region in order to scale up TB, EID, Viral Load, COVID-19, HPV, and other diagnostic services to ensure optimization of laboratory testing through increasing access to POC integrated testing.
- Participated in planning, resource mobilization, publicity, coordination, and implementation of the pioneer 2023 pre-world AIDS Day activities, especially 2023 Adolescent and Young People (AYP) conference, 2023 interuniversity HIV awareness conference, 2023 HIV awareness run, HIV bodaboda street ride.

- Developed, and administered HIV-related questions, and judged responses of the contestants at the 2023 interuniversity HIV Awareness Quiz (was a QUIZ master)
- Participated in the launch of the condom strategic initiative 'get it on, stay safe'

Fellowship Program-Specific Achievements

Surveillance Data Analysis

- Analyzed DHIS 2 surveillance data on trend and spatial distribution of HIV yield from partners ≥ 15 years from Assisted Partner Notification (APN), Uganda, 2020–2022.

Epidemiological Study

- Secondary data analysis from the national PMTCT impact evaluation to assess predictors of exclusive breastfeeding among HIV-exposed infants in Uganda, 2017–2019.

HIV-Study

- Conducted an HIV study to assess the impact of integrated HIV, diabetes, and hypertension management in Uganda: a time-use study using before and after approach, 2023

Quality Improvement Project

- Designed and implemented a continuous quality improvement (CQI) project to improve pre-exposure prophylaxis (PrEP) eligibility screening and initiation among pregnant and breastfeeding mothers aged <25 years enrolled in group antenatal/postnatal care (G-ANC/PNC) in Mubende regional referral hospital, May–October 2023.

Newspaper Articles (03)

- In addition to HIV, pay attention to Hepatitis, and syphilis infections during ANC. It was aimed at awareness and demand creation to contribute towards the global triple elimination agenda of the three diseases
- Invest to End Tuberculosis (TB): What Is Your Role? It was aimed at mobilizing resources towards the fight against Tuberculosis during the 2022 World TB day
- Together we can kick polio out of Uganda. It was aimed at increasing the acceptability of the oral polio vaccine during the national mass campaign

Response to Public Health Emergencies

- Led four investigations of public health events
  - COVID-19 outbreak among refugees in Nyakabande Transit Centre, Kisoro district, Southwestern Uganda, June–July, 2022
  - Monkeypox (MPX) alert verification in Tororo District, Eastern Uganda, February 2023
  - Tracing traditional healer linked to an Ebola case in Luweero District, November 2022
  - Contact tracing for SUDV in Nakasongola District, November 2022
- Participated in six other outbreak investigations:
  - Risk factors for death among children with severe malaria in Namutumba District, April 2022
  - Rapid health assessment in the refugee host communities in Kisoro District, South Western Uganda, June–July 2022
  - Gastrointestinal Anthrax outbreak, Ibanda District, August 2022
  - SUDV outbreak in Mubende, Jinja Districts, September–December 2022. Following this outbreak, I conducted a study to assess the impact of the outbreak on access to HIV/care services among known HIV clients in Mubende and Kassanda Districts

Conference Presentations

Presented at five local conferences and four international conferences

- 8th National Field Epidemiology Conference (NFEC), 2022- 1 oral
- 7th Joint Annual Scientific Conference (JASH), 2023- 1 oral, 1 poster
- 9th NFEC, 2023- 1 oral
- 2nd National HIV and AIDS symposium, 2023 (NHAS) - 1 oral
- 9th East African Health and Scientific Conference (EAHSC), Kigali, Rwanda, 2023 - 1 oral
- 8th AFENET Scientific Conference, Mombasa, Kenya, 2023- I oral, 1 poster
- 2nd International Pediatric HIV Symposium in Africa (IPHASA), Zimbabwe, Virtually, 2023 - 1 poster

Workshop facilitator

- Facilitator of a pre-conference workshop on Early Action Reviews: Planning and Implementation of the 7-1-7 Target for Timely Detection, Notification, and Response to Outbreaks, 8th AFENET Scientific Conference, Mombasa, Kenya

Bulletin Articles

- Was part of the editorial team for Volume 7, issue 2 of the Uganda Public Health Bulletin (UPHB)Quarterly Epidemiological Bulletin, April-June 2022
- Wrote and published three articles in the UNIHP bulletin
- COVID-19 outbreak among refugees, Nyakabande transit center, June–July 2022
- HIV yield from assisted partner notification (APN) in Uganda, 2020-2022
- Predictors of EBF among HIV-exposed infants, 2017–2019

Mentorship of FETP-Frontline Tier Trainees

- Mentored six Frontline FETP trainees in Eastern Uganda: Mbale District (03), Mbale City (01), and Sironko District (02).

Publication in Peer-Reviewed Journals

- Lead author on 3 manuscripts:
  - One is submitted to a peer-reviewed journal titled 'Investigation of COVID-19 Outbreak at a Refugee Transit Centre, Kisoro District, Uganda, June–July 2022'
  - One to CDC clearance titled 'predictors of exclusive breastfeeding among HIV-exposed infants in Uganda, 2017–2019'.
  - One under internal review titled 'HIV testing yield from assisted partner notification (APN) in Uganda: 2020-2022'
  - Co-Author on More than 20 Manuscripts

Ebola Handbook Writing

- Lead in risk communication and community engagement (RCCE) and psychosocial support. This enables real-time exchange of information, opinions, and advice between frontline responders and affected communities. During an EBOD outbreak, RCCE must be integrated in nearly all pillars of the response.

Key lessons learned during the fellowship

- Outbreak Investigation and response.
- Utilization of surveillance data.
- Evaluation of surveillance systems.
- Designing and implementing Quality Improvement Projects
- Data management, analysis, and interpretation using data management software such as STATA, and EpiInfo.
- Generating informative maps using a quantum geographic information system (QGIS)to guide, decisions on action, planning, and policy.
- Scientific writing and presentation skills.
- Grant management skills
- Financial accountability skills
- Networking and lobbying skills
- Coordination skills and teamwork.
- Multisectoral collaboration.
- Media communication skills

Next Steps

- With the competencies gained, I hope to continue serving within the Ministry of Health or related organizations and programs in the realization of improved global health security and prompt response to public health emergencies and threats.

Summary of Epidemiological Study:

Predictors of exclusive breastfeeding for six months among HIV-exposed infants in Uganda: Insights from a prospective cohort study, 2017–2019

Background: Exclusive breastfeeding is recommended for HIV-exposed infants (HEIs) for six months to lower the risk of mother-to-child HIV transmission and enhance HIV-free survival. We estimated the predictors of exclusive breastfeeding (EBF) for 6 months in mothers receiving routine prevention of mother-to-child HIV transmission (PMTCT) care in Uganda.

Methods: We analyzed secondary data from a prospective cohort study of Uganda's PMTCT impact evaluation, conducted at 152 randomly-selected public and private facilities during 2017-2019. Health facilities offering PMTCT services are stratified into higher-level (Level IV centers and hospitals, which deliver comprehensive health care), and lower-level (Level I to III centers, which offer more limited

services). HEIs were defined as infants born to HIV-positive mothers who tested HIV-negative at baseline. Mother-HEI pairs were recruited ≤3 months postpartum and followed at 6, 9, 12, 15, and 18 months. Baseline data included the HEIs' and mothers' HIV status; follow-up data included infant feeding practices. We excluded HEIs with missing feeding data at 6 months. Multivariate modified Poison regression was used to determine predictors of EBF for six months.

Results: Among 1,527 eligible HEIs, 767 (50%, 95%CI 48-53%) were male, 464 (30%, 95%CI 28-32%) were exclusively breastfed for six months, and 310 (20%, 95%CI 18-22%) of their mothers received PMTCT services at a higher-level facility. Among 1,013 mothers with data, 890 (88%, 95%CI 86-90%) were virally suppressed at baseline. Of 1,278 mothers with data, 205 (16%, 95%CI 14-18%) disclosed their HIV status to their spouses. Having a mother who was virally suppressed (aRR=2.1, 95%CI 1.2-3.8), disclosed her HIV status to her spouse (aRR=1.4, 95%CI 1.0-2.0), and received PMTCT at a higher-level health facility (aRR=1.4, 95%CI 1.1-1.9) were associated with increased likelihood of receiving EBF for 6 months among HEIs.

Conclusion: HEI six-month EBF rates were low. Factors that have been previously associated with adherence to ART (viral suppression, disclosing status to spouses) were also associated with EBF for 6 months. Further investigation is needed to understand the reasons for the higher likelihood of EBF among mothers who are virally suppressed, disclose HIV status to spouses, as well as attend PMTCT at higher-level facilities.

PICTORIAL NARRATIVE

PPeter Chris (wearing mask) interviewing a mother by the garden side during his first field experience in Namutumba District, April 2022.

Peter Chris (grey jacket) reviewing registers during the Anthrax outbreak investigation in the Ibanda District, in August 2022.

Peter Chris making a presentation at the 2nd national HIV and AIDS symposium.

Peter Chris (with microphone) giving his verdict as a judge at the 2023 inter-university HIV awareness quiz.

Mackline Ninsiima

BScN (BSU), MHSR (MUK) & Advanced Field Epidemiology Fellow (UNIPH)

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Tel: +256 787 819 496/+256 700 759 777

Host Institution: Kampala Capital City Authority (KCCA)

Host Mentors: Dr. Daniel Okello Ayen/Dr. Alex Ndyabakira

Mackline's Profile

Mackline Ninsiima is an experienced epidemiologist and air quality scientist, holding a Bachelor of Nursing Science (BScN) and Master of Health Services Research (MHSR).

During the fellowship, she was hosted at Kampala Capital City Authority (KCCA) where she played a significant role in the operational aspects of air quality management, an opportunity that has been a game-changer for her career. She represented KCCA on various international platforms, including the launch of Clean Air Africa Network, East African air quality stakeholder workshop, air quality and health symposiums in Kenya, CAMS-Net and AfriqAir conference in Rwanda, and Air Sensors International Community (AISC) conference in Ghana.

She has demonstrated exceptional capabilities in emergency response, notably during the Sudan ebolavirus outbreak in Kampala City. Due to this outstanding performance, she was nominated among the key stakeholders engaged in drafting guidelines for responding to Ebola/ Marburg Virus disease outbreaks in Uganda. Additionally, she served as a secretariat member for various public health initiatives, including the COVID-19 Intra-Action Review, Ebola After-Action Review, Emergency Preparedness and Response flagship initiative's scoping mission, and Uganda Joint External Evaluation.

She participated in the 2023 Joint External Evaluation in Zambia, demonstrating my commitment to evaluating and enhancing public health responses at both local and international levels.

Mackline's expertise spans a diverse range of areas, including field epidemiology, Incident Management System, Integrated Disease Surveillance and Response, rapid risk assessments of public health events, Joint External Evaluation, After-Action Reviews, scientific writing, and air quality management. This diversity showcases a well-rounded professional dedicated to advancing public health and addressing emerging challenges.

Host Site Achievements

- Participated in the following activities:
  - Air quality monitoring using PM2.5 concentrations generated by Clarity© Node Solar–Powered air quality monitors.
  - Public awareness and sensitization on air quality
- Coordinated the collaborative initiatives between Kampala Capital City Authority (KCCA) and Makerere University Lung Institute (MLI) to conduct source apportionment and emission inventory.
- Coordinated the air quality collaborative training for staff engaged in air quality management at National Environment Management Authority (NEMA), Kampala Capital City Authority (KCCA), AirQo Project, and Makerere University Lung Institute (MLI).
- Represented Kampala Capital City Authority (KCCA) as a technical delegate during several air quality meetings:
  - East African air quality stakeholder workshop organized by United Nations Environment Programme (UNEP).

- Represented KCCA at the Air Quality and Health symposium organized by GEOHealth Hub.
- Attended the air quality and health symposium organized by Health Effects Institute in partnership with the Stockholm Environment Institute – Africa Centre (SEI Africa), World Resources Institute (WRI Africa), Eastern Africa GEO Health Hub (Kenya) and AirQo.
- Participated in formulation of a policy brief for air quality in Uganda organized by National Environmental Management Authority (NEMA) in December 2023.
- Presented at local and international conferences:
  - 8th and 9th National Field epidemiology conference (NFEC)
  - 17th Joint Annual Scientific Health Conference (JASHC).
  - CAMS-Net and AfriqAir Conference, Kigali, Rwanda (won Best Poster Award).
  - Air Sensors International Community (AISC) Conference, Accra, Ghana.
  - 8th African Field Epidemiology Network (AFENET) Scientific Conference, Mombasa, Kenya
- Chief editor of Volume 1 Issue 4 June 2022 Kampala Capital City Authority (KCCA) Public Health and Environment bulletin.
- Authored air quality quarterly technical reports.
- Participated in the Ebola response:
  - Participated in drafting the KCCA Preparedness and Response Plan
  - Mobilizing resources from implementing partners
  - Authoring daily situation reports, and crafting the recovery plan.
- Developed a signal/alert management algorithm for streamlining alert management at Kampala Metropolitan Area (KMA) Emergency Operations Centre.

Fellowship Program Achievements

- International deployment by World Health Organization Regional Office for Africa (WHO AFRO) as a member of the external team tasked with conducting the Joint External Evaluation in Livingstone, Zambia.
- Served as a secretariat member for pivotal public health initiatives including the COVID-19 Intra Action Review, Ebola After Action Review, Emergency Preparedness and Response flagship initiatives' scoping mission, and Uganda Joint External Evaluation.
- Participated in capacity building activities:
  - Trained and mentored 4th Cohort of Intermediate FETP tier.
  - Trained Rapid Response Teams in Soroti, Rwenzori and Hoima sub regions.
  - Participated in the Integrated Disease Surveillance and Response (IDSR) training in Kampala Metropolitan Area.
  - Facilitated Chain Checker training sessions among laboratory personnel at the Uganda Virus Research Institute (UVRI).
- Participated in various rapid assessments and outbreak responses:
  - Syndromic Surveillance during the 2022 Uganda Martyrs' Commemoration.
  - Sudan Virus Disease outbreak response, Kampala City, Uganda, 2022–2023
  - Methanol poisoning outbreak in Northwestern Uganda, August 2022.
  - COVID-19 outbreak at a Refugee Transit Centre, Kisoro District, Southwestern Uganda, June–July 2022.
  - Malaria outbreak in Namutumba District, Eastern Uganda, September 2021–February 2022
  - Editor of Volume 7 Issue 2 April–June 2022 Uganda National Institute of Public Health (UNIPH) Epidemiological bulletin.
- Published bulletin articles:
  - Spatio–temporal trends of air quality, Kampala City, Uganda, 2020–2022.
  - Effect of air pollution on preterm birth in Kampala City, Uganda, October 2021–September 2022.
  - Syndromic surveillance during 2022 Uganda martyrs' commemoration.

- Air quality; the opportune sphere worth pursuit.
- 8th National Field Epidemiology Conference, Africana Hotel, Kampala, Uganda, February 12, 2023.
- 2022 Sudan Virus Disease outbreak, After Action Review, Speke Resort Munyonyo, Uganda, February 13–16, 2023
- Written 14 manuscripts; five as Lead author (listed below) and co-author on nine others.
  - Spatio–temporal trends of air quality, Kampala City, Uganda, 2020–2022" "Effect of air pollution on preterm birth in Kampala City, Uganda, October 2021–September 2022.
  - Syndromic surveillance during 2022 Uganda martyrs' commemoration.
  - Cost analysis of integrating hypertension and diabetes management into routine HIV care in Mbarara and Ibanda districts, Uganda.
  - Strategies utilized during Sudan virus disease response in Kampala City, Uganda, 2022–2023.
  - Evaluation of alert management system during Sudan virus disease response in Kampala Metropolitan Area, Uganda, September, 2022–January, 2023.

Key lessons learnt during the fellowship

- Air quality management.
- Response to public health emergencies.
- Evidence-based decision-making.
- Effective public communication.
- Workforce development.
- Healthcare systems strengthening.
- Manuscript writing

Next Steps

Presently, I am seeking an opportunity to pursue a Doctor of Philosophy (PhD) in Public Health, with a specific focus on evaluating the health implications of air pollution, particularly within the Ugandan context.

Leveraging on the expertise attained in field epidemiology, I am committed to strengthening public health systems and ensuring implementation of effective emergency preparedness and response strategies to public health emergencies.

Summary of Descriptive Study

Spatio–temporal trends of air quality, Kampala City, Uganda, 2020–2022

Background: Fine particulate matter ($PM_{2.5}$) is among the health damaging air pollutants; levels exceeding 15 µg/m^3 are associated with adverse health effects. We assessed spatio–temporal trends of air quality based on $PM_{2.5}$ concentration in Kampala City during January 2020–June 2022.

Methods: We abstracted PM2.5 concentrations generated by twenty–four Clarity© Node Solar–Powered monitors from January 1, 2020, to June 30, 2022, from the Clarity© dashboard. We computed 24-hour average PM2.5 concentrations by combining data from all monitors. Average PM2.5 concentrations per hour were compared by hour of the day. Seasonal Mann–Kendall statistical test was applied to assess significance of observed trends.

Results: Overall, the 24-hour average PM2.5 concentration from January 1, 2020, to June 30, 2022, was 59 µg/m3 (range: 18–182 µg/m3). A statistically significant decline in PM2.5 occurred throughout the assessment period from January 2020 to June 2022 ($r = -0.27$, $p < 0.001$). PM2.5 increased from April to June each year [2020 (55 µg/m3, r=0.56, p=0.006), 2021 (45 µg/m3, r=0.26, p=0.030), and 2022 (37 µg/m3, r=0.37, p=0.030)] and declined from July to September in 2021 (57 µg/m3, r=–0.43, p=0.008) and January to March in 2022 (60 µg/m3, r=–0.41, p=0.011). PM2.5 concentration peaked from 10am–midday (74–73 µg/m3) and 8pm–9pm (73–77 µg/m3).

Conclusion: PM2.5 concentrations in Kampala City exceeded the WHO targeted safe levels even during times of less vehicle traffic and economic activity. Studies are needed to identify sources of pollution in Kampala City to develop interventions to improve air quality.

Keywords: Particulate Matter, Fine Particulate Matter (PM2.5), Air Pollutants, Cities, Uganda

PICTORIAL NARRATIVE

Mackline Ninsiima presenting the Air Quality Management in Kampala City during the East African stakeholder workshop organized by United Nations Environment Programme (UNEP).

Mackline Ninsiima (seated in black shirt) among the delegates from Kampala, Nairobi, Addis Ababa, Kigali and Burundi during the air quality stakeholder workshop

Mackline Ninsiima explaining to Engineer Bainomugisha on Air quality in Kampala City, Uganda

Dr. Robert Zavuga

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Host Site: Public Health Emergency Operations Center (PHEOC)

Host Site Mentors: 1. Dr. Issa Makumbi, 2. Joshua Kayiwa

Dr. Zavuga Roberts' Profile

Robert is an accomplished epidemiologist. He is a holder of a Master of Public Health with a medical background. He has particular interests in global health security, statistical modeling, and artificial intelligence.

During the fellowship, he was attached to the Public Health Emergency Operations Center (PHEOC) which acts as a central coordinating unit of all public health emergencies in Uganda. The PHEOC is responsible for preparedness coordination, response, and recovery from public health emergencies.

The training has empowered Robert with great knowledge and skills in public emergency coordination and response. He has attained astute leadership skills, worked with big data sets, and interpreted them for proper use. He also supported the event-based surveillance (EBS) unit at the PHEOC where he monitored and triaged public health signals in the communities thereby contributing to early detection, preparedness, and response to public health emergencies.

Achievements at the Host Site

- Participated in the Ebola Sudan virus disease outbreak response in Mubende and Kassanda districts (20th September to 30th November 2022).
- Participated in drafting the concept for the National Simulation Exercise to assess Uganda's readiness capacity for EVD.
- Trained Village Health Teams in the event-based system (EBS) in Mukono, Kampala, and Wakiso districts.
- Participated in Integrated Disease Surveillance and Response training in Kabarole District to build capacity of district surveillance focal persons.
- Participated in data quality assessment (DQA) exercise in Kasese, Bundibugyo, Kyenjojo, Kabarole districts, and Fort Portal City.
- Facilitated health worker training in Kasese District in enhanced surveillance and reporting.
- Designed and implemented Quality Improvement Projects on the improvement of data quality in Kagando Hospital, Kasese District.

Fellowship Achievements

- Led two outbreak investigations:
  - Methanol poisoning outbreak in Arua City and Madi Okollo District, 2022
  - Chicken pox outbreak in Kampala District, 2023
- Participated in seven other outbreak investigations:
  - Ebola Sudan virus disease outbreak in Mubende and Kassanda districts
  - Scabies outbreak in Tororo District
  - Severe malaria outbreak in Namutumba District
  - Anthrax outbreak in Baduda District
  - Covid-19 outbreak in Nyakabande refugee transit center
  - Yellow fever outbreak in Masaka, Bundibugyo and Wakiso districts
- Analyzed DHSI2 surveillance data:
  - On timeliness and completeness of reporting of monthly surveillance data in Uganda from 2020/2022
  - On organophosphate poising trends and spatial distribution in Uganda 2016/2022
- Participated in training and mentorship of the FETP-Frontline health workers across the country.

Written Communication

- Authored 5 manuscripts as lead author and 14 others as co-author:
  - Timeliness and completeness of monthly disease surveillance data reporting, Uganda, 2020–2021, published in the Pan African Medical Journal
  - Assessment of healthcare worker resilience at the epicenter of the 2022 Sudan virus disease outbreak in Uganda: implications for future preparedness- Under review
  - Factors associated with Loss to Follow-Up among adults aged 40 years and above living with HIV in Mid-Western Uganda 2020 - 2022-Under review
  - Assessment of Factors Influencing Reporting of Public Health Signals by Village Health Team members in the Event Based Surveillance System in Kabarole district, Uganda- Under review
  - Methanol poisoning caused by adulteration of alcohol at the production stage in a factory in northwestern Uganda, August 2022- Under review
  - Organophosphate poisoning distribution, temporal and spatial trends, Uganda, 2017-2022- Under review

Edited the Uganda National Institute Public Health (UNIPH) epidemiological bulletin issue 1 volume 8, 2023, and also published 6 articles in the same.

- Timeliness and completeness of monthly disease surveillance data reporting, Uganda, 2020 – 2021
- Factors associated with Loss to Follow-Up among adults aged 40 years and above living with HIV in Mid-Western Uganda 2020 - 2022
- Assessment of Factors Influencing Reporting of Public Health Signals by Village Health Team members in the Event Based Surveillance System in Kabarole district, Uganda
- Determinants of workplace resilience among healthcare workers at the epicenter of the Sudan virus disease outbreak response in Uganda, 2022
- Methanol poisoning caused by adulteration of alcohol at the production stage in a factory in northwestern Uganda, August 2022- Under review
- Organophosphate poisoning distribution, temporal and spatial trends, Uganda, 2017 - 2022

- Conference presentations (4 national and 2 international):
  - 22nd annual Scientific Uganda Society for Health Scientists (USHS), Kampala, July 2023. won an award for best abstract presenter
  - 8th and 9th National Field Epidemiology Conference (NFEC), Kampala, January 2023
  - 17th Joint Annual Scientific Health (JASH) Conference, Kampala, September 2023
  - 12th annual East African Health and Scientific Conference (EAHSC), Kigali, Rwanda, September 2023
  - 3rd International Conference on Public Health in Africa (CPHIA), Lusaka, Zambia, November 2023

Key skills and competencies learned during the fellowship

- Conduct outbreak investigation and response activities
- Design and implementation of interventional projects
- Big data analytics and interpretation
- Scientific writing and presentation
- Leadership
- Training and mentorship skills
- Evaluation and strengthening of disease surveillance systems

Next Steps:

- With the skills and competencies I have gained, I hope to further my career in the field of epidemiology, disease surveillance, and data analytics in order to strengthen the global health security agenda.

Summary of Epidemiological Study

Assessment of healthcare worker resilience at the epicenter of the 2022 Sudan virus disease outbreak in Uganda: implications for future preparedness

- **Background:** Healthcare workers' (HCWs) mental resilience can be challenged during times of adversity, including outbreaks. On

September 20, 2022, the Uganda Ministry of Health declared a Sudan virus disease (SVD) outbreak. We assessed the level and determinants of resilience at the workplace among HCWs in the most affected districts (Mubende and Kassanda districts) in Uganda.

- **Methods:** During March 2023, we conducted a cross-sectional survey among all HCWs (clinical and non-clinical) working during September 20, 2022 - January 23, 2023 (the outbreak period) in the three health facilities with Ebola treatment units (ETUs) in Mubende and Kassanda districts. Risk perception was assessed using 12 statements with a 4-point Likert-type scale. We assessed resilience using the Connor-Davidson Resilience Scale (CD-RISC-10). Resilience was dichotomized into 'not resilient' (score 1-29) and 'resilient' (score 30-40). Logistic regression was used to identify factors associated with resilience.
- **Results:** Of 429 eligible HCWs, 400 (93%) were interviewed. Mean age was 35 (range: 20-58) years; 222 (56%) were male and median work experience was 8 years (range:1-38). One hundred and ten (28%) were support staff and 72 (18%) were nurses; 344 (86%) worked >40 hours per week. Overall, 93 (23%; 95%CI: 19-25%) were resilient. Three hundred and fifty-six (89%) expressed fear of contracting SVD and 356 (89%) expressed concern about stigma at their workplace if they became infected. Resilience was associated with age >40 years (adjusted odds ratio [AOR]=2.1; CI=1.3-3.5), work experience >10 years (AOR=2.2; CI=1.1-4.7), working >40 hours per week (AOR=6.8; CI=2.1-23), and receiving Ebolavirus-specific counselling (AOR=3.3; CI=1.7-6.5).
- **Conclusion:** Most HCWs at SVD ETUs in highly-affected districts in Uganda faced resiliency challenges during the outbreak, related to their infection risk and treatment by others if they became infected. Counseling and mental health support to HCWs and addressing concerns that bring them a high risk of infection could improve on their resilience during future outbreaks.
- **Key words:** Resilience, Heath care workers, stress, Ebola

PICTORIAL NARRATIVE

Dr. Robert Zavuga (center pointing) conducting a household sensitization session during the yellow fever outbreak investigation in Masaka District, 2022

Dr. Zavuga looking at a bottle containing adulterated alcohol at the factory's production site during the methanol poisoning investigation in Arua City and Madi-Okollo District, 2022.

Dr. Zavuga (on the right) washing his hands during a severe malaria field outbreak investigation in Namutumba District, 2022.

Dr. Robert Zavuga (on the Right) reviewing surveillance health information files with FETP-Frontline trainees during a data quality assessment and mentorship exercise in Bwera Hospital, Kasese District, 2023.

Patrick King

BLT, IDM, Field Epidemiology

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Host Institution: Department of Integrated Epidemiology, Surveillance and Public Health Emergencies

Host mentor: Dr. Michael Mwanga/ Harriet Mayinja

Patrick King's Profile

Mr. Patrick King is a field epidemiologist with a background in biomedical laboratory technology and a masters in International Infectious Diseases management from Makerere University. In his previous role as a medicine's regulator, Patrick played a pivotal role in ensuring the safety, efficacy, and quality of public health products entering the market. The fusion of regulatory expertise and epidemiological insights positions him as a versatile professional dedicated to advancing the well-being of communities through a multidimensional approach to healthcare.

For the fellowship training he was attached to the Department of Integrated Epidemiology, Surveillance and Public Health Emergencies, whose mission is to strengthen surveillance for early detection of priority conditions, streamline reporting mechanisms, and timely investigation of disease outbreaks at all levels to ensure timely initiation of appropriate public health response

During his attachment, he acquired a robust set of competences that significantly enhanced his professional skill set. Through active participation in the monitoring and analysis of weekly disease trends, he refined his abilities in data interpretation and presentation. He also utilized various surveillance tools toimproved his proficiency in identifying potential outbreaks and assessing their impact on public health.

Patrick wrote reports, demonstrating his capacity to convey complex epidemiological information to diverse audiences. This attachment not only deepened his knowledge of epidemiological principles but also fostered a proactive and analytical approach to addressing public health challenges.

Host Site Contributions

- Contributed to the compilation and dissemination of the departmental weekly epidemiology bulletin, providing crucial support in conveying essential information related to public health trends and epidemiological updates.
- Provided effective oversight of various entry points in Uganda.
- Participated in the quarterly one health meeting, fostering collaboration and information exchange among multidisciplinary stakeholders.
- Led a team to Eastern Uganda, overseeing an assessment of capacity in detection, reporting, and responding to international public health events at Points of Entry.
- Trained screeners at unofficial ports of entry by on Infection Prevention and Control measures.
- Led a team to Southwestern Uganda, to evaluate and enhance preparedness and response measures for public health emergencies at points of entry.
- Participated in reviewing indicators and implementing IDSR 3 (Integrated Disease Surveillance and Response).
- Regularly took the lead in weekly border health sub-pillar meetings.

Fellowship Program Specific Achievements

- Conducted analysis on data from DHIS2 to evaluate "COVID-19 Vaccine uptake and coverage in Uganda, March 2021- June 2022.
- Team lead/Principal investigator in an outbreak investigation of Anthrax in Kagongo, Ibanda District in August 2022.
- Published two newspapers in the New vision about Public awareness of Monkeypox and a call on the community to engage in blood donation to save lives.

- Team lead in an assessment on Population movements across Lwakhakha Uganda-Kenya and Cyanika Uganda-Rwanda borders, Nov 2022.
- Participated in the Following Outbreaks:
  - Severe malaria in Namutumba District, Uganda, September 2021 - February 2022
  - Crimean Congo hemorrhagic fever outbreak in Masaka, Rakai and Lwengo districts.
  - Sudan Ebola outbreak in Mubende, Kasanda and Kampala, September 2022.
  - COVID-19 resurgence in Kisoro District.
- Led a quality improvement project on "Improving linkages within the TB care cascade among travelers at Malaba one-stop border point, Tororo District, June- November 2023."
- Conducted an epidemiological study on "Unfavorable TB treatment outcomes and associated factors among TB/HIV co-infected patients in Teso Region, 2015–2021"
- Editor of the Uganda National Institute of Public Health (UNIPH) bulletin and he one Health epidemiological bulletin.
- Published three articles in different volumes of the Uganda public health bulletin.
- Conducted an HIV study: Incidence and factors associated with TB recurrence and all-cause mortality among People Living with HIV in Teso sub-region, Uganda, 2015-2020

Prospects

I hope to work with health agencies at the national and international levels in roles of surveillance, response to international health emergencies, situation assessments, mentoring and training, contributing to global health research, and supporting public health initiatives worldwide. I plan to publish all the work I was involved in during the fellowship and continue to disseminate the work I will do through peer review journals in order to impact public health.

Summary of Epidemiological Study

Cross Border Population Movement Patterns, Kenya, Uganda, and Rwanda, November 2022

- **Background:** The frequent population movement across the five East African Countries poses risk of disease spread in the region. A clear understanding of population movement patterns is critical for informing cross-border disease control interventions. We assessed population mobility patterns across the borders of the East African states of Kenya, Uganda, and Rwanda.
- **Methods:** In November 2022, we conducted focus group discussions (FGDs), key informant interviews (KIIs), and participatory mapping. Participants were selected using purposive sampling and a topic guide used during interviews. Key informants included border districts (Uganda and Rwanda) and county health officials (Kenya). FGD participants were identified from border communities and travelers and these included truck drivers, commercial motorcyclists, and businesspersons. During KIIs and FGDs, we conducted participatory mapping using Population Connectivity Across Borders toolkits. Data were analyzed using a grounded theory approach using Atlas ti 7 software.
- **Results:** Different age groups traveled across borders for various reasons. Younger age groups traveled across the border for education, trade, social reasons, employment opportunities, agriculture and mining. While older age groups mainly traveled for healthcare and social reasons. Other common reasons for crossing the borders included religious and cultural matters. Respondents reported seasonal variations in the volume of travelers. Respondents reported using both official (4 Kenya-Uganda, 5 Rwanda-Uganda borders) and unofficial Points of Entry (PoEs) (14 Kenya-Uganda, 20 Uganda-Rwanda) for exit and entry movements on borders. Unofficial PoEs were preferred because they had fewer restrictions like the absence of screening, and immigration and customs checks.
- **Key Destination Points** (points of interest) included: markets, health facilities, places of worship, education institutions, recreational facilities and business towns. Twenty-eight health facilities (10- Lwakhakha, Uganda, 10- Lwakhakha, Kenya, and 8- Cyanika, Uganda) along the borders were the most commonly visited by the travelers and border communities.
- **Conclusion:** Complex population movement and connectivity patterns were identified along the borders. These were used to guide cross-border disease surveillance

and other border health strategies in the three countries. Findings were used to revise district response and preparedness plans by strengthening community-based surveillance in border communities.

- **Key words:** PopCAB, Border crossings, Points of Entry, Uganda, Kenya, Rwanda

PICTORIAL NARRATIVE

Patrick (in a kaki jacket) giving a debrief to village health teams, local leaders and Ibanda District health team before community case search, this was during an Anthrax outbreak in Ibanda, August 2022.

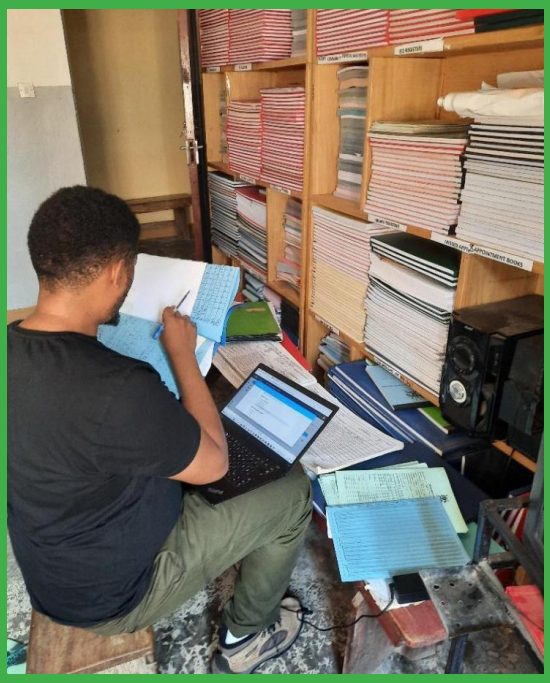
Patrick (on the podium) presenting findings from the Anthrax outbreak investigation at the 8th AFNET scientific conference. This presentation went on to be rated as one of the best presentations at the conference in Mombasa 2022. Picture standing alone is Patrick posing with the Award.

Patrick (black t-shirt) giving a lecture to intermediate trainees on 'the role of the laboratory during an outbreak investigation' in Masaka in 2023.

Patrick (green shirt) training village health teams (VHTs) on viral hemorrhagic fever preparedness and response at Katuna border and surrounding communities. This was to heighten surveillance at border points during the 2022 ebola outbreak.

Patrick (center) prepares to don before conducting an interview with a contact of an ebola case at the isolation unit in Mulago, this was during case investigation using Popcab toolkit during the ebola outbreak in Kampala, Kampala, 2022

Patrick (green shirt) briefs Entebbe border health staff during the pre- Joint External Evaluation (JEE) 2023 at the airport border health unit, he represented border health desk.



Patrick reviewing records at Princess Diana Memorial Health Center IV, Soroti during data collection epidemiological study in 2022.

Thomas Kiggundu

MMed-Internal Medicine (MAK), MBChB (MAK)

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Host Institution: Directorate of Public Health and Environment, Kampala Capital City Authority (KCCA)

Host Mentors: Dr. Okello Daniel / Dr. Ndyabakira Alex

Dr. Thomas Kiggundu's Profile

I am a certified Advanced Field Epidemiology Fellowship graduate. I hold a master's degree of Medicine in Internal Medicine (MMed) from Makerere University (School of Medicine), and bachelors of Medicine and Surgery (MBChB) from Makerere University (School of Medicine).

As an epidemiologist, I have interest in disease outbreak investigations and response, non-communicable diseases, and global health security.

During my time as an advanced field epidemiology fellow, I was attached to the Directorate of Public Health and Environment, Kampala Capital City Authority (KCCA). Through the in-service training, I have networked and attained skills and competencies in interpersonal and effective communication, teamwork, management and leadership, and support supervision, outbreak investigation and response including data analysis, interpretation and use.

Achievements at the host site

- Participated in routine supervision of health facilities within Kampala city.
- Participated in the 2022 Ebola outbreak in Uganda, Kampala response team in the case finding, and later on in the active case finding (surveillance and coordination pillar).
- Participated in the one-day engagement with traditional healers under their umbrella body, Traditional and Modern Health Practitioners Against AIDS and other diseases (THETA) on Ebola.

Fellowship Program-Specific Achievements

- Led two outbreak investigations
  - Ebola outbreak in September 2022, Mubende District
  - Investigation of a cluster of cases of an unknown disease characterized by haematuria in Kiboga District, April 202.
- Participated in 5 outbreaks and other public health emergency investigations
  - Ebola outbreak Investigation and response in Kampala October–December 2022.
  - Measles outbreak investigation in Kiryandongo District, February 2023.
  - Methanol poisoning outbreak investigation in Arua and Madi-Okollo districts, August 2022.
  - Rapid health assessment in Kisoro District following an influx of refugees from the Democratic Republic of Congo,June 2022.
  - Malaria outbreak in Namutumba District, March 2022
- Syndromic surveillance, rapid responses, and missed opportunities during the Uganda martyrs' commemoration mass gathering, June 2022
- Presented at the 7th and 8th Uganda National Field Epidemiology Conference (NFEC) 2022 and 2023, and at the 17th Joint Annual Scientific Health Conference (JASH) 2023.
- Conducted an epidemiological study: Prevalence of hypertension and associated factors in patients attending selected public health facilities in Kampala, Uganda, 2023.
- Conducted a descriptive Study: Trends and distribution of hypertension in Uganda, 2016–2021.
- Lead author to two manuscripts
  - ***Manuscript 1:*** Notes from the Field: Outbreak of Ebola Virus Disease Caused by Sudan ebolavirus — Uganda, August–October 2022, published in the CDC Morbidity and Mortality Weekly Report (MMWR), November 11, 2022

- ***Manuscript 2:*** Trends and distribution of hypertension in Uganda, 2016–2021

- Conducted quality improvement project: Improving identification and diagnosis of hypertension among patients seeking care at Kisenyi Health Centre IV, May-November 2023
- Published Newspaper Article : One newspaper article titled "Regulate energy drink consumption to reduce premature health complications" in the New Vision, July 2022.
- Submitted two articles for publication in the quarterly UNIPH ep bulletin

Key lessons learnt during the fellowship

During the fellowship, I learnt and developed the following skill sets:

- Outbreak Investigation and response
- Evaluation of surveillnace systems
- Designing and implementing Quality Improvement projects
- Data management, analysis and interpretation
- Scientific writing
- Effective teamwork and networking
- Public communication skills

Next Steps

With the competencies gained, I hope to be able to continue to serve within the Ministry of Health or related organization in the area of non-communicable diseases which are emerging health threats in Uganda.

Summary of Epidemiological Study:

Prevalence of hypertension and associated factors in patients attending selected public health facilities in Kampala, Uganda, 2023

Background: Hypertension is a risk factor for cardiovascular and cerebrovascular diseases. It affects approximately 22% of the global adult population. In 2014, a national survey found that the regional prevalence of hypertension was highest (29%) in the Central Region of Uganda, which includes the capital city of Kampala. However, in 2017, a survey at a large-volume health facility in Kampala revealed that only 42% of adult outpatients are screened for hypertension. We determined the prevalence of hypertension and its associated factors among adults in selected public health facilities in Kampala, Uganda.

Methods: This cross-sectional study was conducted during August to October 2023 in outpatient departments in the high-volume Kisugu, Kawaala, and Kisenyi Health Center IVs in Kampala District. We selected consecutive consenting participants from the facility triage who were not pregnant and did not require admission. We interviewed participants aged ≥18 years on their socio-demographic and clinical characteristics using a modified stepwise approach to noncommunicable risk factor surveillance (STEPS) questionnaire. Pre-hypertension was defined as systolic blood pressure 120-139 mmHg or diastolic blood pressure ≥80-89 mmHg. Grade 1 hypertension was systolic blood pressure 140-159 mmHg or diastolic blood pressure 90-99mmHg, and grade 2 hypertension was systolic blood pressure ≥160 mmHg or diastolic blood pressure ≥100 mmHg. Factors associated with hypertension were assessed using logistic regression.

Results: Of 786 participants, 490 (62%) were female; the mean age was 45 years, and 102 (18%) were pre-hypertensive. The overall prevalence of hypertension was 65% (95% CI: 62-68). Of the hypertensive patients, 37% were newly diagnosed, 37% grade 1, and 45% grade 2. Having hypertension was associated with each 10-year increase in age group (aOR=3.8, 95% CI 2.9–5.0), being female (aOR=2.0, 95% CI: 1.2-3.4), overweight (aOR=1.9, 95% CI: 1.1–3.3), obese (aOR=2.8, 95% CI: 1.3–5.5), and having a history of heart disease (aOR=4.9, 95% CI: 2.6–9.3).

Conclusions: Two-thirds of adults attending selected public health facilities in Kampala, Uganda were hypertensive, associated with increasing age, overweight/obesity, being female, and having a history of heart disease. There is a need to raise awareness about hypertension and promote preventive measures.

Keywords: Prevalence, Hypertension, Uganda

PICTORIAL NARRATIVE

Thomas interviewing a caretaker during a Measles outbreak investigation, Kiryandongo district, February, 2023

Thomas (orange shirt) interviewing family with a victim during a methanol poisoning outbreak investigation in Arua and Madi-Okollo districts, August, 2022.

Thomas Kigundu(blue trouser) interviewing a father who had lost a son to Ebola during the Ebola outbreak investigation in Mubende, September, 2022.

Thomas Kiggundu (blue shirt) together with Brenda Nakafeero Simbwa, a fellow, and the Kisoro health surveillance officers reviewing medical records at Bunagana HCIII during the rapid health assessment in Kisoro, June 2022.

Dr. Brian Agaba

MBChB, MMed (Obs & Gyn), MPH, Fellowship in Field Epidemiology

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Host Institution: Reproductive and Infant Health Division, Ministry of Health

Host Mentor: Dr. Robert Mutumba

Dr. Brian Agaba's Profile

Brian is a medical doctor with specialisation in Obstetrics and Gynecology, a public health specialist and an epidemiologist. He holds a Bachelor's degree in Medicine and Surgery (MBChB), a Masters of Medicine in Obstetrics and Gynecology, a Masters of Public Health and a fellowship in Field Epidemiology.

Prior to joining the fellowship, Brian worked as a clinician for a decade and rose through the ranks to serve as the head of department of Obstetrics and Gynecology at a large not-for-profit hospital in Kampala. Desiring to have a greater impact on health outcomes of both individuals and populations, he decided to transition his career into the public health domain.

During the fellowship, Brian was attached to the Reproductive and Infant Health Division (RHD) of the Ministry of Health (MoH). His time at the host site helped improve his understanding of maternal, child health and adolescent health programming and policy environment.

Brian possesses competences in several areas of public health/ epidemiology such as: disease outbreak investigation and control, evaluation of surveillance systems, research, scientific writing and communication, grant and proposal writing, grant management, data analysis, program design and management, quality improvement and assurance. In addition, Brian has excellent communication and leadership skills.

The fellowship has broadened his view of health services beyond the clinical/ hospital based. It has taught him to combine and develop synergies between both his clinical and public health backgrounds. Brian is adequately prepared to contribute to the advancement of health in a holistic way.

Program-Specific Achievements:

- Led an investigation of a bacterial meningitis outbreak in a Palorinya Refugee Settlement, Obongi District, Uganda, March, 2023.
- Co-investigated several outbreaks and public health emergencies including: Malaria deaths in Namutumba District, March 2022, Anthrax outbreak in Bududa District, May 2022, Scabies outbreak in Hoima District, June 2022, Food poisoning in Packwach District, September 2022, Ebola Disease outbreak in Uganda, September–November 2022.
- Conducted a descriptive analysis of surveillance data on trends and spatial distribution of perinatal deaths in Uganda, 2017–2021.
- Conducted a study on impact of male involvement in antenatal care on maternal and infant outcomes among participants in the prevention of mother to child transmission of HIV impact evaluation study, Uganda, 2017–2019.
- Conducted an epidemiological study on prevalence of and factors associated with anxiety, depression and post-traumatic stress disorder among Sudan ebolavirus disease survivors and family members, Uganda, January 2023.
- Conducted an epidemiological study on prevalence of and factors associated with depression among pregnant women attending antenatal care at Kawempe National Referral Hospital, Uganda.
- Implemented a quality improvement project on improving reporting of perinatal and maternal deaths at Kawempe National Referral Hospital, June – November 2023.

- Authored 3 manuscripts which are under peer-review in journals.
- Presented at several national and international conferences including: the national field epidemiology conference, the joint annual scientific conference and the AFENET conference.
- Published two articles in the Uganda National Institute of Public Health (UNIPH) quarterly public health bulletin.
- Co-editor of the July-September 2022 edition of the UNIPH quarterly public health bulletin.
- Published a newspaper article in the local newspaper, New vision titled mental health disorders in pregnancy: women are suffering silently.
- Mentor and trainer of the Field Epidemiology Training Program (FETP) intermediate tier.

Next Steps

Brian hopes to develop a career in field epidemiology through roles in national and international organisations. He is particularly interested in roles with components of disease surveillance and response, global health security and maternal and newborn health system strengthening. Brian will always be an advocate for women's and children's health.

Summary of epidemiological study

Prevalence of and factors associated with anxiety, depression and post-traumatic stress disorder among Sudan ebolavirus disease survivors and family members, Uganda, January 2023: a cross-sectional study

Background: Communities affected by Ebola disease (EBOD) may face resulting increases in mental health disorders. We evaluated the prevalence of and factors associated with mental health disorders among persons affected by the 2022 Sudan virus disease (SVD) outbreak in Uganda.

Methods: We conducted a cross-sectional study among SVD survivors and family members of survivors and fatal cases from 15–31 January 2023 (six weeks after the last case was discharged). We included only laboratory-confirmed, consenting SVD survivors and family members who lived with or cared for confirmed SVD patients during their illness and who were home at the time of our visits. The Hospital Anxiety and Depression Scale was used to evaluate anxiety and depression. The post-traumatic stress disorder (PTSD) checklist for the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition was used to evaluate PTSD. We used modified Poisson regression (adjusted for clustering by household) to determine factors associated with each mental health disorder.

Results: We enrolled 54 survivors and 82 family members from 96 households; median participant age was 30 years (range, 15-73), and 54% were female. The prevalence of anxiety (55%) and depression (50%) was higher than PTSD (17%); 64% had ≥1 mental health disorder. The prevalence of anxiety among persons from households with 2-4 members (aPR=0.54, 95%CI:0.31-0.92) was lower than among persons who lived alone. The prevalence of PTSD was lower in persons from households with 2-4 members (aPR=0.24, 95%CI:0.08-0.66) and >4 members (aPR=0.32, 95%CI:0.13-0.78) compared to persons who lived alone. Persons from households with ≥1 SVD death had a higher prevalence of depression (aPR=1.8, 95%CI:1.1-3.3) and anxiety (aPR=1.9, 95%CI:1.1-3.5) compared to households with no EBOD deaths. The prevalence of all mental health disorders was similar between survivors and family members.

Conclusion: Approximately two-thirds of SVD survivors and family members of patients in the 2022 outbreak in Uganda had ≥1 mental health disorder shortly after the outbreak ended. Strengthening mental health services during and after Ebola virus outbreaks for survivors and family members of patients may enhance the quality of outbreak response.

PICTORIAL NARRATIVE

Dr. Brian Agaba (yellow shirt) interviewing health workers inside the Meningitis Treatment Unit at Belameling Health Centre three during the bacterial meningitis outbreak in Palorinya Refugee Settlement, Obongi District, March 2023

Dr. Brian Agaba (with notebook) interviewing an Ebola Disease survivor during a study on mental health disorders associated with Ebola disease, Mubende District, January 2023

Dr. Brian Agaba (at head of the table) providing mentorship to doctors and nurses on utilizing the quality improvement approach to improving patient outcomes, Mbale Regional Referral Hospital July, 2023

Mercy Wendy Wanyana

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Host site: Department of Integrated Epidemiology, Surveillance and Public Health Emergencies (IES and PHE), Ministry of Health.

Host mentor:

Fellow's Profile

Mercy Wanyana is now a field epidemiologist. She holds a Masters degree in Public Health, Postgraduate Diploma in Monitoring and Evaluation and a Bachelors in Environmental Health. Mercy has an interest in disease surveillance and response. During the fellowship, she was attached to the Division of Surveillance, Information and Knowledge Management (SIKM) in the Department of Integrated Epidemiology, Surveillance and Public Health Emergencies (IES and PHE), Ministry of Health.

During the in-service training, she has developed skills and competencies in the design, implementation and evaluation of surveillance systems, outbreak investigation, applying epidemiological concepts in complex emergencies, advanced statistical skills and public health communication.

During the fellowship, she led one outbreak investigation and participated in four others including the 2022 Ebola outbreak. She conceptualised and designed projects utilising routinely collected surveillance data and primary data collected. These experiences built her competencies in conducting operational research. She evaluated the yellow fever surveillance system and the performance of contact tracing cascade during the Ebola Disease outbreak, gaining experience in health surveillance systems evaluation.

Additionally, she worked on various border health projects that built her competencies in global health diplomacy. Working on these various projects with multiple stakeholders and multidisciplinary teams in the Ministry of Health has developed her skills in teamwork, collaboration and public health leadership.

Achievements at the Host site

- Participated in the drafting of the National Framework for Multi-hazard Preparedness and Response.
- Participated in drafting of the Weekly Epidemiological Bulletin.
- Technical supervisor for the quarterly support supervision in disease detection and response at Points of Entry.
- Trained and mentored port health staff in West Nile and Northern Regions in electronic-based reporting of surveillance data.
- Led the orientation of port health staff on developing and reviewing public health emergency response plans.
- Led the organising of cross-border meetings to strengthen cross-border surveillance between the Republic of Uganda and the United Republic of Tanzania in June 2023.
- Participated in organizing the Annual National Point of Entry Stakeholder's meeting.
- Participated in the Annual Point of Entry capacity assessment at designated Points of Entry in Uganda.
- Led the Marburg preparedness at Points of Entry training along the Uganda-Tanzania border during the Marburg Outbreak in Tanzania, 2023.
- Routinely analysed Point of Entry data to inform the Point of Entry surveillance sub-pillar.

Fellowship program-specific achievements

- Led one outbreak investigation; 'Yellow fever outbreak in Masaka, Wakiso and Bundibugyo.'
- Participated in four other outbreak/public health events investigations:
  - Severe malaria in Namutumba District
  - Ebola disease outbreak in Mubende, Kassanda and Jinja Districts

- Syndromic surveillance during the Namugongo Matyrs day pilgrimage
- Typhoid in Kampala Metropolitan area

- Analysed surveillance data from District Health Information System on:
  - Pneumonia cases and deaths among children <5 years in Uganda between 2013 to 2021.
  - Visceral Leishmaniasis in the Karamoja Region between 2015 to 2022.
  - The capacity in detection, reporting and responding to Public Health events of International Concern at Points of Entry, Uganda, July–October 2022.
- Evaluated the Yellow Fever sentinel surveillance system in Uganda,2017-2022.
  - Presented at two local conferences and one international
  - 8th and 9th National Field Epidemiology Conference
  - 8th AFNET Conference in Mombasa, Kenya
- Wrote and published two newspaper articles like 'Why the COVID-19 vaccine is still relevant.'
- Editor of the Uganda Public Health Bulletin; Volume 7 issue 2.
  - Published four articles in the NIHP bulletin:
  - Trends and spatial distribution of pneumonia admissions and deaths among children <5 years
  - Rapid assessment of knowledge and perceptions regarding Ebola Disease and infection prevention and control among health workers in Uganda, November–December 2022
  - Yellow fever surveillance system in Uganda,2012–2022:strengths and weaknesses
  - Factors associated with severe pneumonia among children <5 years, Kasese District, Uganda, 2023
- Designed and implemented a quality improvement project on improving disease surveillance at Busia One Stop Border point using Integrated Disease Surveillance and Response (IDSR) approaches.
- Designed an epidemiological study on factors associated with severe pneumonia among children <5 years in Kasese, 2023.
- Evaluated the role of Audio Computer-Assisted Self-Interview, a digital health intervention in facility-based identification and uptake of HIV prevention services among key populations in Uganda, 2020-2022
- Submitted four manuscripts to peer-reviewed journals
  - Evaluation of the sentinel yellow fever surveillance system in Uganda, 2017–2022: strengths and weaknesses
  - Factors associated with severe pneumonia among children <5 years, Kasese District, Uganda, 2023
  - Assessment of capacity and performance in detection, reporting and responding to Public Health Events of International Concern at Points of Entry, Uganda, July–October 2022
  - Performance and impact of contact tracing in the Sudan Virus Outbreak in Uganda, September 2022–January 2023

Key lessons learnt during the fellowship

During the fellowship, I have developed the following skills and competencies

- Outbreak investigation
- Design and evaluation of disease surveillance systems
- Collection, analysis and interpretation of epidemiological data
- Application of epidemiological concepts on complex emergency
- Conceptualising and implementing quality improvement projects
- Applied operational research
- Public health communication: oral presentations, newspaper articles and policy briefs
- Scientific communication: manuscript writing
- Teamwork and collaboration
- Teaching, training and mentorship

Next Steps

After successfully completing the fellowship, I plan to continue my career in field epidemiology in the government or private sector contributing to disease surveillance, outbreak response and health promotion. I plan on publishing all the work done during the fellowship period in peer review journals. In addition, I plan to engage in research activities, working on studies advancing understanding diseases, risk factors and interventions.

Abstract of one of your main projects

Assessment of capacity in ditection, reporting and responding to Public Health Events of international concern at points of entry Uganda, 5th October 2022

Introduction: Expanded human mobility has increasingly led to the spread of disease outside of the areas in which it first occurs. Consequently, there is an enhanced focus on building capacity to detect disease at points of entry (PoEs). We assessed capacity and performance in detection, reporting, and responding to public health events of international concern (PHEIC) and public health emergencies at PoEs in Uganda.

Methods: We conducted a cross-sectional assessment from June 27 to September 12, 2022, at official PoEs in Uganda. We adopted a standardised assessment tool for the World Health Organisation's (WHO) PoE capacity requirements. Capacity areas included coordination and communication, routine prevention and control measures expected at all times, and response to PHEIC. We abstracted and analysed surveillance data on performance of PoEs including completeness of PoE reporting, proportion of travellers screened and proportion of suspected ill travellers isolated, investigated and referred for further care if necessary.

Results: We assessed all 53 gazetted PoEs (4 airports, 16 inland ports, and 33 ground crossings). Most (94%) reported communication capacities with national and sub-health authorities with 88% completeness of reporting. Forty-two per cent provided access to appropriate medical services for assessment and care of ill travellers, 42% had access to sanitary facilities, 21% had access to safe water, and 23% had appropriate waste management and vector control. Regarding capacity to respond to PHEIC and public health emergencies, all designated PoEs had a public health emergency contingency plan,74% provided screening of all travellers but screened 56% of the travellers, 38% had the capacity to quarantine and isolate suspected human cases, and 15% had the capacity to transport suspected cases to referral health facilities. Twenty three percent of the suspected ill travellers were isolated, investigated and referred for further care if necessary. Only 8% assessed animals being transported through PoEs for priority animal transboundary diseases.

Conclusion: Existing capacity and performance gaps in detection and response to PHEICs and public health emergencies may limit the ability to effectively respond to potential public health emergencies. There is a need to establish infrastructure, equipment and personnel for and assessment, isolation and quarantine of humans and animals.

PICTORIAL NARRATIVE

Mercy (navy blue shirt) conducting an interview with a mother who had lost a child to severe malaria in Namutumba.

Mercy (navy blue shirt)Mentoring Port Health Volunteers on electronic-based reporting into the District Health Information System Version 2 using mobile phone applications

Mercy (purple shirt)Conducting hypothesis generating interview with a case-patient's family during a yellow fever outbreak

Mercy (green dress)training of port health stakeholders on disease surveillance for viral heamorrhagic fevers at Points of Entry

Mercy(black jump suit) Preparing to conduct case investigations at Mubende Regional Referral Hospital

Zainah Kabami

BSc, MPH, FETP

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Host Institution: National Public Health Emergency Operations Centre

Host Mentor: Joshua Kayiwa

Zainah's Profile

Zainah holds a Health Care Assistant Diploma, Bachelor's in Public Health and Master's in Public Health with a particular interest in zoonotic diseases. Prior to joining the fellowship, she worked as an Epidemiologist with the COVID-19 Incident Management Team. During the fellowship, she was attached to the National Public Health Emergency Operations Centre, the central coordination unit for preparedness and response to public health emergencies in the country. Through the fellowship, she has developed great skills in leadership, outbreak investigation and response, data analysis, interpretation and use. She led two outbreaks and participated in four others. She participated in national document formulations including the Monkeypox preparedness and response plan, Ebola preparedness and response plan, and the Joint External Evaluation reports.

Achievements at the Host site

- Supported Event Based surveillance
- IDSR training and support supervision
- ArcGIS training of trainers in Jinja District
- Participated in capacity building for Regional Public Health Emergency Operation Centers.
- Participated in the conceptualization of the National Simulation Exercise to assess Uganda's readiness capacity for Ebola.
- Participated in the Joint External Evaluation, both as a subject matter expert (internal assessment) and a report writer for both the internal and external assessments.
- Supported the development of the Monkeypox and Ebola preparedness and response plans.
- Editorial team member for the Ebola national situation report.

Fellowship Program Specific Achievements

- Led two outbreak investigations.
  - Anthrax in Bududa District.
  - Rift Valley Fever in Mbarara District
- Participated in four other outbreak investigations
  - Severe Malaria in Namutumba District
  - Food poisoning in Pakwach District
  - Nodding syndrome in Kitgum District
  - Sudan Virus Disease in Mubende District
- Conducted a descriptive analysis of the trends and spatial distribution of Measles cases reported through the case-based surveillance system between 2016 and 2020.
- Designed and implemented an HIV quality improvement project to improve integration of Non-Communicable Diseases (Hypertension and Diabetes) and HIV treatment in Bwizibwera HC IV, Mbarara District.
- Authored and published three manuscripts in peer reviewed journals:
  - "Rift Valley Fever Outbreak, Mbarara District, Western Uganda".
  - "Epidemiology of cases of Sudan Virus Disease in Uganda, August – November 2022" in Lancet Global Health" - Under review
  - "Investigation of an Anthrax Outbreak in Bududa District, Eastern Uganda, January-May 2022: Implications for prevention and control" in PAMJ.
- Published two newspaper articles:
  - Awareness of the bird flu pandemic.
  - Public sensitization on the EVD outbreak in DRC at the time
- Edited and published in the for the National quarterly public health bulletin Issue 3 Volume 7.

- 'The first ever reported anthrax outbreak in Bududa District, Eastern Uganda, February – May 2022.'
- 'Epidemiological characteristics and trends of measles cases reported through the case-based surveillance system in Uganda, 2016 – 2020.'
- 'US CDC Director's visit to the NIPH, July 2022.'
- 'UPHFP shines at the Uganda Society's of Health Scientists Conference, August 11-12 2022.'

Key skills obtained from the fellowship

- Outbreak investigation and response
- Designing and implementing Quality Improvement Projects
- Data management, analysis and interpretation using EpiInfo, STATA and QGIS
- Scientific writing (Abstracts, Manuscripts, and Policy Briefs)
- Presentation skills
- Networking and lobbying skills
- Multi-tasking (Simultaneously working on several projects)
- Next Steps
- Zainah hopes to continue to contribute to the reduction of disease burden in Uganda through active engagement in research, surveillance and application of epidemiological principles within a national or international organization.

Summary of Sudan Virus Disease study

Epidemiology of Cases of Sudan Virus Disease in Uganda, August - November, 2022.

Background: The Sudan Virus is one of four Ebola viruses pathogenic for humans, and has the potential to cause a devastating pandemic. On September 20, 2022, the Uganda Ministry of Health (MoH) declared an outbreak of Sudan virus disease (SVD), representing the eighth SVD outbreak, and the 52nd Ebola Disease outbreak globally. We describe the epidemiological characteristics, transmission dynamics, and progression of disease among cases.

Methods: We classified cases as suspected, probable, or confirmed using the standardized MoH case definitions. We identified cases through community case search, contact tracing, medical records review, and the alert management system. We collected data on patient demographics, exposures, clinical characteristics, and outcomes. We conducted descriptive epidemiology and estimated the basic reproduction number (Ro).

Results: Among 164 cases (142 confirmed, 22 probable) from nine districts, median age was 29 years (IQR: 20-38), 95 (58%) were male, and 77 (47%) died. Symptom onsets ranged from August 8-November 27, 2022, and the outbreak officially ended on January 11, 2023. The highest proportion of patients were peasant farmers (44%). Symptom data were available for 160 (98%) patients; Fever (135, 84%), vomiting (93, 60%), and weakness (89, 56%) were the commonest symptoms. Bleeding was uncommon (13, 8%). Case-fatality rate was higher in females (54%) than males (42%), and highest in children <10 years (74%). Median incubation was 6 days (IQR: 5-8), median time from onset to discharge was 17 days (IQR: 10-21), and onset to death was 10 days (IQR: 7-23). Mubende (14/100,000) and Kassanda Districts (16/100,000) had the highest attack rates. Most cases represented household (66%) and healthcare-associated transmission (25%). Overall Ro was 1·25.

Conclusion: Despite delayed detection, the outbreak was rapidly controlled, possibly potentiated by a low Ro. Females and children were at highest risk of death. Household and healthcare-associated transmission drove the largest part of the outbreak.

PICTORIAL NARRATIVE

Zainah (standing), presenting findings from the Rift Valley Fever outbreak investigation to the Mbarara District leadership

Zainah (blue shirt) interviewing the District Veterinary Officer, Bududa District during the Anthrax outbreak (2022)

Zainah (standing) conducting a session during the ArcGIS training in Jinja District