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Dear Reader,

Happy New year! We are pleased to share with you Issue 4, Volume 4 of the Uganda National Institute Public Health (UNIPH) Quarterly Epidemiological Bulletin.

This issue aims to inform stakeholders at different levels including district, national, and global on disease outbreak investigations, public health surveillance and interventions undertaken in detecting, preventing , and responding to public health events in the country in the recent past.

In this issue, we present a variety of issues including: Articles on the most recent conferences, the successful completion of 2019 mass measles-rubella and polio campaign, Epidemiological characteristics and trends of suspected measles in Uganda from 2011 to 2018, Malaria outbreak investigations in Kole District, Malaria upsurge situation as of early January 2020, Using the BABIES Matrix to determine patterns of New-born birth outcomes in Naguru Regional Referral Hospital, and Patterns of Malnutrition among Pregnant and Lactating Women in Uganda.

We also highlight the Public Health Emergency Training of Field Epidemiology graduates from Africa.

For further information on anything in this publication please contact us on: gbahizi@musph.ac.ug, mkatusiime@musph.ac.ug, jkamulegeya@musph.ac.ug OR lbulage@musph.ac.ug

We hope this will be an informative and enjoyable read and we shall appreciate hearing feedback from you.

Thank You.

Inside this issue:

UGANDA WELCOMES DR. JULIE R. HARRIS, THE NEW U.S CDC RESIDENT ADVISOR FOR PHFP

Allow us introduce her to you! We are excited to have her here and look forward to learning a lot from her.

Julie Harris, PhD, MPH, is the Resident Advisor for the Uganda Public Health Fellowship Program at the U.S. Centers for Disease Control and Prevention (CDC). Before joining the team in Uganda, she worked at CDC headquarters in Atlanta, where she supported FETPs throughout East Africa. She brings expertise in teaching and epidemiologic methods, as well as previous experience working on a wide variety of infectious disease outbreaks, program implementation, and policy. Before working with FETP, Dr. Harris was an epidemiologist with the Mycotic Diseases Branch and Parasitic Diseases Branch at CDC, and taught Field Epidemiology at Emory University. Dr. Harris completed Epidemic Intelligence Service (EIS) program with the Foodborne and Waterborne Diseases Branch at CDC. She graduated with a degree in biology from Rensselaer Polytechnic Institute, received her PhD in microbiology from Columbia University, and completed a Masters of Public Health in epidemiology and biostatistics at the John Hopkins School of Public Health. Dr. Harris has published more than 50 scientific papers in the fields of epidemiology, virology, and mathematical modelling. She enjoys teaching and mentoring, as well as art and travel.

Isn't she the coolest? Looking forward to an excellent time with you Dr. Harris. Welcome to Uganda and to the Public Health Fellowship Program.

UGANDA HOSTS THE FIRST PILOT TRAINING OF EPIDEMIOLOGY IN HUMANITARIAN EMERGENCIES FOR ALUMNI OF FIELD EPIDEMIOLOGY TRAINING PROGRAMS

By Maureen Katusiime, Fellow PHFP

Humanitarian emergencies mainly caused by natural disasters and armed conflicts usually involve displacement of large numbers of people. People affected are often settled in temporary locations where resources are limited; inadequate food and shelter, unsafe water, poor sanitation, and lack of infrastructure. These factors increase risk of transmission of communicable diseases among other conditions and can lead to increased mortality (death) especially from epidemic-prone diseases. In such crisis, rapid detection and prompt response to epidemics among the affected population is a key priority but is constrained by the few skilled personnel to manage such humanitarian emergencies. Therefore, Uganda hosted the first pilot training of 19 FETP graduate epidemiologists from seven African countries in Field Epidemiology in Humanitarian Settings at Sheraton Hotel, Kampala from November 11-16, 2019. These graduates were from Kenya, Tanzania, Uganda, Ethiopia, South Africa, Mozambique, and Zimbabwe.

This training was organized by the African Field Epidemiology Network (AFENET), US Centers for Disease Control and Prevention (CDC), World Health Organization (WHO), and Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET). Trainers were experts from CDC and WHO. The training objectives were; to equip FETP graduate epidemiologists with unique skills of conducting field epidemiology in humanitarian emergencies, increase their knowledge and understanding of additional epidemiologic methods and information management services required in an emergency context and to develop a roster of epidemiol-

THE 5th UGANDA FIELD EPIDEMIOLOGY CONFERENCE WAS A SUCCESS

By Peter Muwereza, Fellow PHFP

On 24th October 2019, the Uganda Public Health Fellowship Program (PHFP), Ministry of Health with support from US Centers for Disease Control and Prevention (CDC) successfully held the 5th Annual Uganda National Field Epidemiology Conference. The conference held under the theme "Years of protecting Uganda and the World through Field Epidemiology and Service" was attended by delegates from Uganda and around the world. Representatives from the World Health Organisation (WHO), US CDC (both in-country and Atlanta), African Field Epidemiology Network (AFENET), different Ministries (Uganda), policy makers and academia among others were in attendance. At this annual event, Fellows share their findings from various projects they worked on over the past year. The projects presented this year were in various domains including; Zoonotic diseases, Food and water borne illnesses, Vector borne diseases, Tuberculosis, HIV/AIDS, and Disease Surveillance. Representatives from US CDC, WHO, AFENET, MoH and Makerere University recognized Uganda Public Health Fellowship Program for the excellent efforts in ensuring that outbreaks were investigated in a timely and comprehensive manner. The PHFP was also commended for consistently adding useful scientific information to current knowledge that has informed public health actions and policies in Uganda.

Left to right; Prof. Makumbi Fredrick, Makerere University, School of Public Health, Kampala, Uganda, Dr. Yonas Tegegn, WHO Representative, Uganda, Dr. Lisa Nielson U.S CDC Director, Uganda, Dr. Patrick Tusiime, Commissioner National Disease Control, Ministry of Health, Uganda, Dr. Ben Masiira, Epidemiologist AFENET, and Dr. Alex Riolexus Ario (speaking), Coordinator, PHFP, Ministry of Health Uganda

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FETP graduate epidemiologists receiving feedback from trainers during a SIMEX at Sheraton Gardens

FETP graduate epidemiologists and trainers during a group photo outside the training room at Sheraton Gardens

ogists trained in humanitarian and emergency epidemiology for future deployment through national and international mechanisms. This training involved both didactic and Simulation exercises (SIMEX). This training had 4 participants from the Uganda Public Health Fellowship Program (PHFP) and 10 observers from PHFP, CDC Uganda, AFENET, and WHO Uganda Office. The training will eventually be rolled out to other regions of the world overtime. Uganda is blessed to have these newly acquired skills added to the health workforce. Ministry of Health, Office of the Prime Minister, and Humanitarian agencies need to embrace and reach out to these skilled personnel in the event of any humanitarian emergency for proper response. Congratulations to the team that attended diligently and for the newly acquired skills!

Upcoming Events

WORLD TB DAY ON 24 Mar 2020

World TB Day, which is observed on 24 March every year, is designed to raise public awareness regarding the epidemic of TB (tuberculosis) and efforts of eliminating the disease.

WORLD IMMUNIZATION WEEK 24-30 APRIL 2020

Celebrated in the last week of April – aims to promote the use of vaccines to protect people of all ages against disease. Immunization saves millions of lives every year and is widely recognized as one of the world's most successful and cost-effective health interventions.

INTERNATIONAL EPILEPSY DAY: FEBRUARY 10, 2020

The aim is to promote awareness about epilepsy, what it is, how it can be treated, and what is needed to bring treatment to all people who need it. It highlights problems faced by people with epilepsy, support patients and their families and improve medical services in terms of prevention, diagnosis and treatment.

INTERNATIONAL CHILDHOOD CANCER DAY: FEBRUARY 15, 2020

The aim is to raise awareness about childhood cancer, provide cancer treatment to child victims and improve access to healthcare, enhance palliative care and support children with cancer and their families.

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UGANDA PHFP AT THE 10TH TEPHINET GLOBAL SCIENTIFIC CONFERENCE IN ATLANTA

By Phoebe Nabunya, Fellow PHFP

The TEPHINET Secretariat held the TEPHINET Global Scientific Conference from October 28 to November 1, 2019, in Atlanta, Georgia, United States. Despite being based in Atlanta, this was the first time the Global TEPHINET conference was held in this city. This was an exciting conference as many got to travel to Atlanta which is also home to TEPHINET's parent organization, The Task Force for Global Health, as well as the primary funder, US Centers for Disease Control and Prevention. The TEPHINET Global conference is held every two years with the aim of creating opportunities for members and partners of the field epidemiology training programs as well as other public health experts to convene and share knowledge and experiences related to public health. This year, the theme for the conference was "The Global FETP Enterprise: Applied Epidemiology in the 21st Century" picked from an Enterprise launched on the opening ceremony of the conference. It is aimed at creating a strategic leadership group involving the leaders, funders, implementing partners, government agencies, workforce competency targets, standards, agreements, and technologies that are the back-bone for FETPS.

A total of 213 abstracts were accepted for oral and poster presentations under eleven thematic areas. The PHFP had 2 oral and one poster presentations under animal health theme and another poster under the Public Health Surveillance theme. A PHFP graduate, Lydia Nakiire (currently at the Infectious Diseases Institute, Uganda) was also invited as a panelist in one of the plenary sessions. She made a presentation on "Emergency Response initiatives to Address Natural disasters and cross border connectivity, Uganda" where she highlighted how Uganda has applied the International Health Regulations and the Global Health Security Agenda to ensure activities at the DRC-Uganda border continue without any interruptions.

The conference was graced by over 500 participants from 82 countries around the world. Apart from the presentations, the conference arranged for pre-conference Interactive Learning Sessions aimed at equipping learners with the skills in outbreak detection, response, and reporting as well as creating opportunities for learner engagement with the current material, key note speeches, a photo gallery, TEPHINET's traditional International Night cultural celebration, and an evening dinner for FETP alumni.

The Uganda Public Health Fellowship Program Fellows with their supervisors in Atlanta

THE 6TH NATIONAL HEALTH CARE QUALITY IMPROVEMENT CONFERENCE, 3RD-5TH, DEC 2019

By Peter Muwereza, Fellow PHFP

The ministry of health through the department for standards, Compliance, Accreditation, and Patient Protection is mandated to coordinate the implementation of Quality Improvement (QI) initiatives in the Health sector. The QI conference marks the climax of QI initiatives in Uganda each year. The 6th National Health care QI Conference was held under the theme "Integrating Quality Improvement Approaches in All Service Delivery Areas to Improve Accountability for Health Outcomes" at Speke Resort Munyonyo from 3rd to 5th December 2019. The conference was officiated by the Minister of Health, Hon. Jane Ruth Aceng, who also launched the Patient Rights and Responsibilities Charter, the 5S-Continuous Quality Improvement, and Total Quality Management Implementation Guidelines for Uganda. This annual conference provides a platform for peer learning through showcasing QI work from across the country, coupled with QI work presentations from national and international experts. Researchers, Practitioners, Health Service Mangers, Policy Makers, and Academia take stock of what has worked and what has not worked during the year of implementing innovative and evidence based models of care in Uganda. Appropriate models of care in areas of service delivery, Human Resources for Health, Health Financing, Medicines, and Health Supplies Management, Governance, Health Information Management, Health Infrastructure, Community Based Care, and Patient Safety in the Uganda context were shared. To improve the quality of health services, some models will be scaled up in the health facilities across the country. The director General of Health Services noted that Quality improvement Initiatives in Uganda have led to provision of safer, effective, efficient, accessible, equitable, and patient-centred care services with optimal professional performance, with the available resources and achieving consumer acceptability and satisfaction. Over 600 delegates came together from all levels of the health sector including; development and implementing partners, Health Care Service Providers, and Health Consumer Organizations. President's Emergency Plan For AIDS Relief, Japan International Cooperation Agency, United States Agency for International Development, Centers for Disease Control and Prevention, Makerere University, Districts' staff and facility mangers, and Regional referral Hospitals were particularly recognized by the Minister of Health for making important contributions that led to the success of this Conference

Dr. Rashad Massoud, Key Note speaker (extreme left), Dr. Henry Mwebesa, Director General of Health Services (Second Left), Hon. Dr. Jane Ruth Aceng, Minister of Health (Middle), Mr. Uchiyama Takayuki from JICA, (second right) Dr. Joseph Okware, Commissioner, MoH

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MALARIA SITUATION UPDATE AS OF 7TH JANUARY 2020

By Phoebe Nabunya, Fellow PHFP

Through routine analysis of malaria surveillance data in the district health Information system (DHIS2) using malaria normal channels, the National Malaria Control Division (NMCD) identified malaria upsurges in 17 districts in march 2019 (Figure 1). Despite responses by the NMCP and implementing partners (Malaria Action Plan for Districts (MAPD), Presidential Malaria Initiative (PMI), Regional Health Integration to Enhance Services (RHITES), Malaria consortium, Strengthening Uganda's Response to Malaria (SURMa) including outbreak investigations, redistribution of ACTs, mosquito net distribution in schools, clinical and death audits, and sensitization on prevention measures through mass-media more districts reported increasing malaria cases and by August 2019, 88 out of 138 (64%) districts in Uganda were affected leading the national task force to declare a malaria outbreak in the country. The increase in cases also led to shortages in malaria commodities including RDTS in 40 (34%) districts, ACTs in 45 (33%) districts in the 3rd quarter of 2019 when cases peaked, creating challenges in case management. By the December 2019, the malaria cases registered per week had decreased from 295,000 at the peak of the epidemic in July to 199,000 in December. This decrease has happened across all 88 districts that had the upsurge. The districts affected by the malaria upsurge decreased from a peak of 88 registered in July to 41 districts as of January 2020 following intensified responses including delivery of emergency stock to affected districts, redistribution of malaria commodities to stocked out facilities, clinical and death audits, distributing nets, holding mass media campaigns to sensitize the public about the outbreak, and the effective control measures alongside increased vigilance in routine activities including case management and Intermittent Preventive Therapy (IPT) distribution in Antenatal clinics (Figure 2 &3). The National Malaria Control Division is closely observing Kumi, Nakasongola, and Kisoro that have shown stagnation. The malaria deaths have also decreased from 80 deaths per week at the peak of the epidemic to an average of 40 deaths per week at the end of December 2019. West Nile and Acholi region continue to register the majority of the reported deaths.

22/135 districts in Uganda reported understock (stock <2 months) by the end of December. These are Abim, Amudat, Bukomansimbi, Buliisa, Busia, Buvuma, Buyende, Dokolo, Gomba, Jinja, Kagadi, Kaliro, Kampala, Kamwenge, Kassanda, Kazo, Kikuube, Kumi, Kyankwanzi, Manafwa, Mubende, and Soroti.

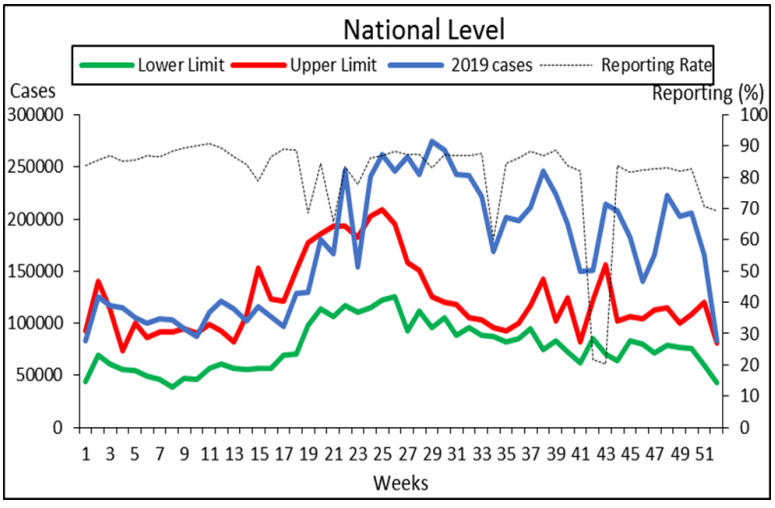

Figure 1: Malaria channel showing the national malaria situation in 2019

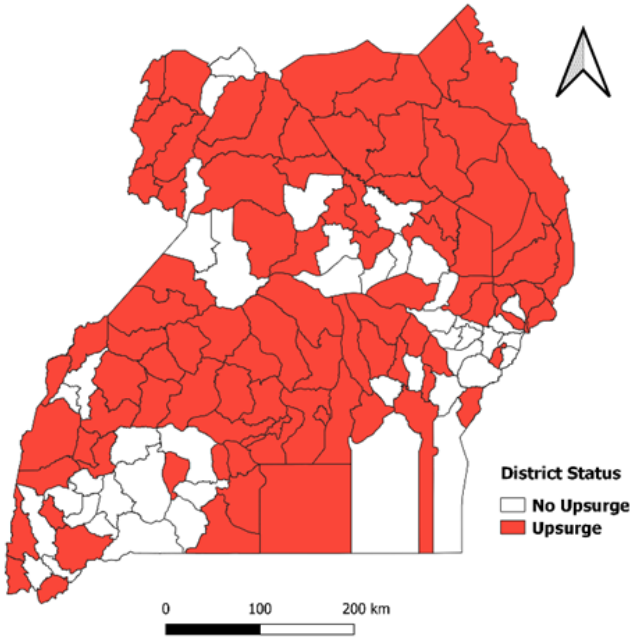

Figure 2: Map showing the malaria district situation, July 2019

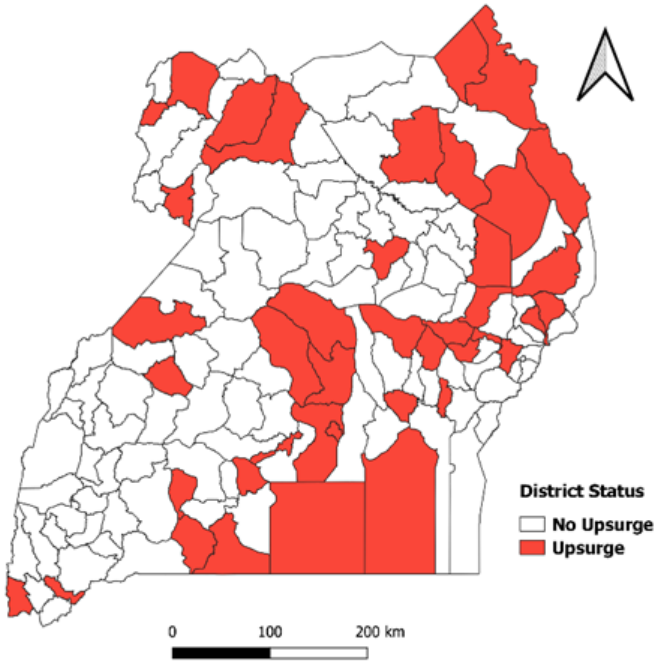

Figure 3: Map showing the malaria district situation, December 2019

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The 2020 Universal Long Lasting Insecticidal Nets Campaign Will Contribute to the Reduction of Current Malaria Upsurges

By Gerald Rukundo, Fellow PHFP

Uganda's Vice President H.E Edward Ssekandi and Ministry of Health officials launching LLIN Distribution.

Universal coverage with Long Lasting Insecticidal Nets (LLINs) is a key pillar of Uganda's Malaria Reduction Strategic Plan (UMRSP). In this plan, the country commits to reducing annual malaria deaths from 3 deaths per 100,000 population of year 2013 to near zero malaria deaths (implying less than 1 death per 100,000 population); Malaria morbidity from 150 cases per 1,000 population of 2013 to 30 cases per 1,000 population; and malaria parasite prevalence from 45% of 2010 to less than 7% by 2020.

Long Lasting Insecticidal Nets reduce morbidity and mortality caused by malaria across a range of epidemiological settings and are the mostly used vector control tool in Africa. To achieve and maintain universal coverage with LLINs, the World Health Organization recommends the distribution of LLIN for every two individuals at risk of malaria through mass campaigns conducted every three years.

Currently, Uganda is experiencing malaria upsurges in over 50% of the districts. Some of the factors attributable to this upsurge include climatic change and reduced LLIN coverage. Indeed, according to the results from the malaria outbreak investigations carried out in selected districts like Oyam, Kole, and Zombo between the months of June and July 2019 (by the Uganda Public Health Fellowship Program), there was reduced LLIN coverage. Most LLINs were worn out.

In 2009 and 2014, Uganda held successful Universal LLIN campaigns which saw 22 million nets distributed across the country contributing to reduction in malaria parasite prevalence in Uganda from 42 to 19 percent. In 2017, a similar campaign was carried out and it is estimated that the current malaria parasite prevalence is 9.1%.

There is no doubt therefore that the upcoming 2020 LLIN campaign will contribute to the reduction of current malaria upsurges. It is therefore important to educate the public about the importance of this upcoming LLIN campaign. We encourage the public to embrace the upcoming 2020 LLIN campaign and proper usage of LLINs that will be distributed to protect themselves against malaria.

Uganda Successfully Completed the National Measles, Rubella, and Polio Mass Campaign, 16th-20th October 2019

By Sandra Nabatanzi, Fellow PHFP

Uganda has been experiencing measles outbreaks since 2017 across the country. According to the Uganda Demographic Survey, 2016 measles immunization coverage was reported at 80% nationwide which is below the recommended 95% coverage by WHO. Between 2017 and 2019, 300,000 cases, 46,000 admissions, and 587 deaths were reported in children ≤15yrs due to suspected measles in Uganda. The World Health Organization (WHO) recommends mass measles vaccination campaigns every 3 years in addition to the routine immunization in order to reduce measles cases and deaths. The last such campaign was conducted in 2015 which resulted in reduced measles incidence from 1.1/1,000 population in 2015 to 0.3/1,000 population in 2017 (Measles surveillance data). Additionally, Rubella outbreaks in over 14 districts were reported in 2017. Rubella has not been on the list of Expanded Programme for Immunization formulary in the past in Uganda.

Uganda also reported 8 Polio cases in 2009 and 4 cases in 2010. Since 2010, there have been no new cases that have been reported. However, Uganda is still at high risk of Polio importation from Democratic Republic of Congo (DRC) where new cases of Polio have been reported. This is mainly due to her close proximity to the DRC, refugee hosting status, and high population movement between the two countries. Uganda continues with heightened surveillance in order to quickly detect and respond to Polio outbreaks. Hence, vaccination against Polio is key in order to reduce the number of susceptible populations.

Based on the highlighted issues, the Ministry of Health Uganda conducted a nationwide Measles-Rubella and Polio mass vaccination campaign to interrupt transmission of measles, rubella, and polio in Uganda. The campaign was launched in Mayuge district on 16 October 2019 by the Hon. Minister of Health, Dr. Jane Ruth Aceng. The campaign was then rolled out to a national 5-day campaign from 16th to 20th October 2019. Three vaccines were administered including; Measles-Rubella which was administered to children between 9 months and 15 years of age while the Polio vaccine was administered to children 0 – 5 years.

Dr. Jane Ruth Aceng, Hon. Minster of Health and Dr. Yonas Woldemariam Tegegn, WHO Representative, Uganda, launching the mass immunization campaign on measles, rubella and polio in Mayuge District, 16 October 2019

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A total of 19.5 million children were vaccinated against Measles-Rubella out of the 18.1 million targeted, an achievement of 108%. While over 7.9 million children out of the 8.2 million targeted were vaccinated against Polio (97%). According the surveillance report, 212 suspected measles cases were reported in the week of 4th November 2019 compared to 733 cases reported in the week of 1st April 2019. The biggest challenge faced during the campaign was viral misinformation spread to the public on the potential adverse events related to the Measles- Rubella vaccine. This resulted in public resistance to the vaccination process. This rounds us about the need to adequately sensitize the public prior and during mass vaccination campaign to ensure full participation.

A h***ealth worker administering the measles, rubella and polio vaccine during the mass vaccination campaign***

Epidemiological Characteristics and Trend of Suspected Measles, Uganda, 2011 – 2018

Sandra Nabatanzi[1]*, Benon Kwesiga[1], Issa Makumbi[2], Lilian Bulage[1], Alex R. Ario[1]

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2Public Health Emergency Operations Center, Ministry of Health, Kampala, Uganda

Summary

Uganda is working towards measles elimination by 2020, measles elimination is the absence of endemic measles transmission or no more cases of measles caused by indigenous virus in a defined geographical area, for ≥12 months in the presence of a well-performing surveillance system. Though the WHO recommends measles vaccination coverage of 95%, Uganda's coverage was only 80% in 2016, and the country continues to experience measles outbreaks. We characterised suspected measles cases in Uganda during 2011-2018 to identify trends and inform programming. We analysed secondary data on suspected measles cases obtained from the District Health Information System (DHIS2), from 6455 2018. A *suspected measles case was any person with fever, maculopapular generalized rash, and cough, coryza, or conjunctivitis, or any person in whom a clinician suspected measles. We calculated the overall incidence of suspected measles during the study period and disaggregated it by year, age-group, sex, and region. We evaluated trends using logistic regression. The overall incidence of measles was 1.3/1,000. Females (1.1/1,000) and males (1.0/1,000) were similarly affected. Children <5 years (9.2/1,000) were more affected than persons ≥5 years (0.6/1,000). Overall, Kampala region was the most affected during the study period, with a cumulative incidence of 27/1,000; Karamoja region was least affected (2.3/1,000). Overall, incidence of suspected measles declined 70% (p<0.0001) from 2012-2013, and increased gradually over the subsequent years. Trend analysis identified 24% (p<0.0001) overall increase during the study period. Suspected measles incidence increased in Uganda during the last decade, with Kampala region and children <5 years being the most affected. Uganda is off track for measles elimination. We recommend intensification of regular mass measles-rubella vaccination and further studies to investigate factors affecting low vaccination rates and further identify hotspots for targeted interventions.*

Introduction

Measles is a highly contagious viral infectious disease that belongs to the family of paramyxovirus that is spread through air by droplets and direct contact with nasal or throat secretions of an infected person (1).

Measles is the leading cause of vaccine-preventable childhood deaths globally. According to World Health Organization (WHO), measles deaths decreased by 84% between 2000 and 2016. In 2016, 7 million people were infected with measles from developing countries in Africa and Asia (2). The WHO recommends 95% measles coverage vaccination in order to interrupt transmission and prevent outbreaks. The Measles vaccine is known to be highly effective, safe, and relatively cost effective (3, 4). In 2016, the measles vaccination coverage in Uganda was 80% (3).

In 2011, the African region adopted the measles elimination goal to be reached by 2020. The targets set for measles elimination were; measles incidence of less than 1 case per million population at national level, at least 95%. At least 95% measles immunization coverage at national level and in all districts; measles immunization coverage at national level and in all districts, minimum 95% coverage in all scheduled measles SIAs and outbreak response immunization activities, at least 80% of districts investigating one or more suspected measles cases within a year and non-measles febrile rash illness rate of at least 2 per 100,000 population at National level (6).The activities for measles control and elimination include Routine immunization (RI), supplemental immunization activities (SIA), management of cases, outbreak response and surveillance (7).

In Uganda, it is the mandate of Uganda National Expanded Program on Immunization (UNEPI), Ministry of Health's to conduct routine immunization of children. The Measles Vaccine is administered at 9 months and mass Measles vaccination campaigns are carried out every 3 years nationwide. Measles surveillance in Uganda is done through the Integrated disease surveillance and response (IDSR) platform. Measles is one of the priority diseases reported from health facilities in the country.

Maintaining adequate measles vaccination coverage in Uganda is still a challenge leading to several measles outbreaks in the country. In order to inform current progress towards the 2020 elimination goal, we characterised suspected measles cases in Uganda during 2011-2018 to identify trends and inform programming.

Methods

We analyzed secondary data on suspected measles cases obtained from the District Health Information System (DHIS2), from 2011-2018. A suspected measles case was any person with fever, maculopapular generalized rash, and cough, coryza, or conjunctivitis, or any person in whom a clinician suspected measles. We calculated the overall incidence of suspected measles during the study period and disaggregated

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it by year, age-group, sex, and region. We evaluated trends using logistic regression.

Results

From 2011 to 2018, a total of 294,770 patients with suspected measles were diagnosed across 7,155 health facilities in Uganda. The overall incidence of measles was 1.3/1,000. Females (Incidence=1.1/1,000) and males (Incidence=1.0/1,000) were similarly affected during the study period. Children under 5 years (9.2/1,000) were more affected than persons above 5 years (0.6/1,000).

Overall, Kampala region was the most affected out of the 15 regions during the study period, with a cumulative incidence of 27/1,000. Karamoja region was least affected (2.3/1,000). However, during 2016, Acholi region (3.3/1,000) was the most affected followed by Kampala (2.6/1,000). During 2017, Bukedi region (3.0/1,000) was the most affected, followed by Kampala (2.6/1,000) (Figure 1).

Discussion

Surveillance data between January 2011 and December 2018 showed an overall gradual increase in suspected measles incidence in Uganda. A sharp decline was recorded in 2013 in all regions. Kampala was the most affected and females were similarly affected compared to males. The gradual increase in suspected measles in Uganda suggests gaps in vaccination coverage which facilitates continued transmission.

In 2012, a mass measles vaccination was conducted country wide which could explain the drastic decline in suspected measles cases in 2013. However, the benefits of the vaccination lasted for a short period of time which was followed by surges in the subsequent years. Following the mass measles vaccination campaign in 1999-2000 in Uganda, a 39% reduction in measles cases was noted and the impact lasted 15-22 months(9). Similarly in West Africa and South Africa the numbers of measles cases reduced 6 months after mass measles vaccination and 12 months following the campaigns, however an increase in cases was noticed at 21 months (2).

Mass campaigns in Uganda are carried out every 5 years, the number of susceptible individuals builds up quickly hence transmission is sustained. The Ministry of Health conducted the last mass measles-rubella vaccination in October 2019, in order to maintain high and sustained coverage in the community, we recommend intensification of routine vaccination (3).

The most affected age-group was < 5 which is consistent with a study carried out in Kamwenge District, Uganda during a measles outbreak which found higher attack rates of 13% among 0-5 year children (4). In South Africa, measles incidence was highest among infants (61/10,000) and second highest among children 1 to 4 years (7.3/10,000) (10). We recommend catch up and follow up mass vaccination campaigns yearly and 3-5 years respectively to interrupt transmission.

Kampala was the most affected region during the study period. Kampala is an urban area and a capital City of Uganda with a great deal of trade and travel. The City has an area 189 km2 with an estimated population of 1,650,000 in 2019 with a 4% growth rate. High population density was associated with high measles incidence in South Africa. Geographical clustering of unvaccinated children in Texas, United Sates was associated with spread of measles (11). Kampala

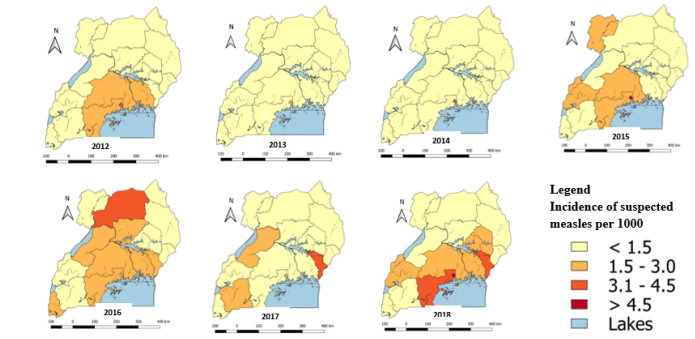

Figure 1. Geographical distribution of incidence of suspected measles in Uganda

Overall, incidence of suspected measles declined by 70% (p<0.0001) from 2012-2013, and increased gradually over the subsequent years. Trend analysis identified 24% (p<0.0001) overall increase during the study period (Figure 2).

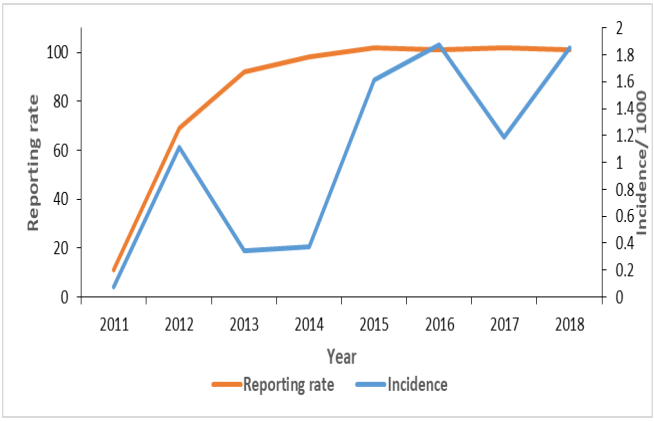

Figure 2: Overall trend of suspected measles incidence per 1000 population

being the capital city, there is close proximity of people travelling to and from other areas including neighbouring countries. The immigration of susceptible individuals may also lead to outbreaks. The coverage of measles in Kampala is 83%, (3). Areas with high population density need focused and more frequent follow on vaccination due to the quick build-up of susceptible cases (10).

Limitations and strengths

Data analyzed for this study was collected from a passive surveillance system hence the results are subject to reporting biases like under reporting caused by delays and failure to submit monthly reports by the health facilities. Some patients do not seek care at the health facilities leading to loss in reporting numbers hence possible underestimation of the burden of measles.

Conclusion

Suspected measles incidence increased in Uganda during the last decade, with Kampala region and children <5 years being the most affected. Uganda is off track for measles elimination. Measles elimination means absence of endemic measles transmission or no more cases of measles caused by indigenous virus in a defined geographical area, for ≥12 months in the presence of a well-performing surveillance system (12). We recommend intensification of regular mass measles-rubella vaccination and further studies to investigate factors affecting

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low vaccination rates and further identify hotspots for targeted interventions.

References

1. World Health Organization. WHO | Measles [Internet]. WHO. [cited 2019 Aug 9]. Available from: http://www.who.int/immunization/diseases/measles/en/

2. World Health Organization. Measles surveillance data [Internet]. www.who.int. [cited 2019 Aug 8]. Available from: http://www.who.int/immunization/newsroom/measles-data-2019/en/

3. Uganda Bureau of Statistics Kampala, Uganda. Uganda Demographic Health Survey 2019 [Internet]. Available from: https://www.ubos.org/onlinefiles/uploads/ubos/pdf%20documents/Uganda_DHS_2016_KIR.pdf

4. Fine PEM. Herd Immunity: History, Theory, Practice. Epidemiol Rev. 1993 Jan 1;15(2):265–302.

5. Gay NJ. The theory of measles elimination: implications for the design of elimination strategies. J Infect Dis. 2004 May 1;189 Suppl 1:S27-35.

6. Masresha BG, Fall A, Luce R, Shibeshi M, Kaiser R, Dosseh A, et al. Measles elimination in the African Region: Progress and challenges. Afr Health Monit. 2015 Mar 1;

7. Gastañaduy PA, Banerjee E, DeBolt C, Bravo-Alcántara P, Samad SA, Pastor D, et al. Public health responses during measles outbreaks in elimination settings: Strategies and challenges. Hum Vaccines Immunother. 2018 Jul 11;14(9):2222–38.

8. Ministry of Health, Uganda. National Technical Guidelines for Intergrated Disease Surveillance and Response [Internet]. [cited 2019 Aug 9]. Available from: https://health.go.ug/

9. Nanyunja M, Lewis RF, Makumbi I, Seruyange R, Kabwongera E, Mugyenyi P, et al. Impact of mass measles campaigns among children less than 5 years old in Uganda. J Infect Dis. 2003 May 15;187 Suppl 1:S63-68.

10. WHO | Identifying high-risk areas for sporadic measles outbreaks: lessons from South Africa [Internet]. [cited 2019 Oct 16]. Available from: https://www.who.int/bulletin/volumes/91/3/12-110726/en/

11. Sinclair DR, Grefenstette JJ, Krauland MG, Galloway DD, Frankeny RJ, Travis C, et al. Forecasted Size of Measles Outbreaks Associated With Vaccination Exemptions for Schoolchildren. JAMA Netw Open. 2019 Aug 21;2(8):e199768–e199768.

12. Vaidya SR. Commitment of measles elimination by 2020: Challenges in India. Indian Pediatr. 2015 Feb;52(2):103–6.

Malaria Outbreak Facilitated by Increased Mosquito Breeding Sites Near Homes and Cessation of Indoor Residual Spraying, Kole District, January-June 2019

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Summary

In June 2019, analysis of surveillance data showed that malaria cases in Kole District had exceeded the action thresholds since January 2019. We investigated to identify exposures and recommend interventions. We defined a confirmed case as a positive test by Malaria Rapid Diagnostic Test or microscopy in a resident of Kole District from 1 January-30 June 2019. We conducted active case search and assessed exposures in a 1:1 matched case-control study (n=282). We also conducted entomological and environmental assessments. Of 18,737 confirmed case-persons, residents of Aboke sub-county (AR=176/1,000) and children <5 years (AR=94/1,000) were most affected. Trends showed a sharp decline in malaria incidence from 2016-2017, after the district had an indoor residual spraying (IRS) campaign. Two malaria upsurges occurred 3-4 weeks after increases in rainfall. Twenty two (16%) case-persons and 4 (2.9%) controls had stagnant water in abandoned containers near their houses (ORMH=7.0, 95% CI=2.1-24); 27 (19%) case-persons and 11 (7.8%) controls had stagnant water near their houses (ORMH=3.0, 95% CI=1.4-6.7). One hundred and four (73%) case-persons and 89 (63%) controls farmed <500m from swamps (ORMH=2.3, 95% CI=1.1-4.4). Adult Anopheles mosquitoes, larvae, pupae, and shells were identified near affected houses; per 500ml scoop, 10 larvae and 4 pupae and shells were estimated. Over half (59%) of houses had a damaged bed net. We concluded that stagnant water near houses and farming in swamps likely facilitated this outbreak through increases in mosquito breeding sites following rains. Ecological assessment linked IRS to declines in malaria, and its cessation to increases. We recommended sensitizing communities about removal of mosquito breeding sites, re-introduction of IRS campaigns, and mass distribution of bed nets in Kole District.

Introduction

The transmission intensity of malaria largely depends on the vector density which is favored by the presence of breeding sites like small pools of water (1). In 2016, Kole District in Lango sub-region of Northern Uganda reported an incidence of 121 malaria cases per 1,000 population compared to the sub region incidence of 109 per 1,000 (2). In response, Ministry of Health (MoH) conducted in door residual spraying (IRS) in 11 districts in Eastern and mid-Northern Uganda including Kole in 2017 (2).

In June 2019, routine analysis of surveillance data showed that malaria cases exceeded the action thresholds from January 2019 (Figure 1). We investigated to determine the scope of the upsurge, identify exposures for transmission, and recommend evidence-based interventions.

Figure 1: Normal channel showing increase in weekly malaria cases in Kole District, 2019

Methods

We defined a confirmed case as a positive malaria Rapid Diagnostic Test (RDT) or microscopy in a resident or visitor of Kole from 1 January 2019 to 30 June 2019. We systematically searched for malaria cases by reviewing outpatient health records. We described case-persons by person, place and time. We interviewed 20 case persons in the most affected parish, Ogwangacuma on exposures to malaria. Exposures were assessed in a 1:1 matched case-control study (n=282) in Aboke sub-county. In the 2 most affected parishes Ogwangacuma and Akwirididi, we selected 10 villages and applied

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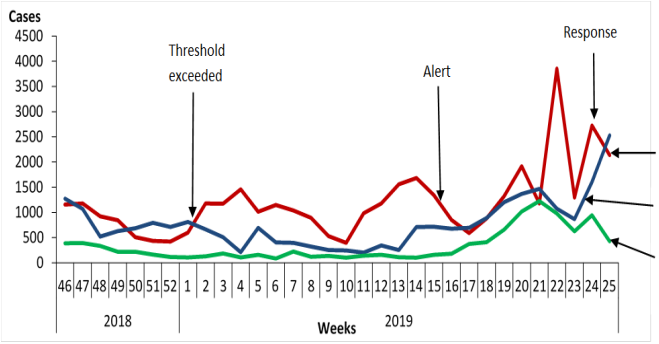


probability proportionate to size to determine number of cases per village. Selection of cases and their controls followed systematic sampling using a list of all households per village as the sampling frame and matched by village and age. We conducted entomological and environmental assessments to identify risk factors for mosquito breeding. We extracted confirmed malaria cases for the period 2016-2019 from the District Health Information System (DHIS2) to describe trends in relation to IRS.

Results

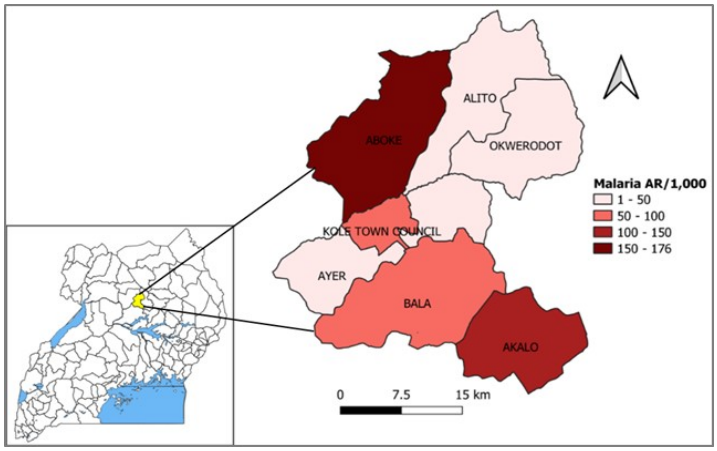
We line listed 18,737 confirmed case-persons of which 12,535 (67%) were females with an attack rate (AR) of 90 per 1,000 compared to the 6202 (33%) males, AR = 46/1,000. The median age was 12 years (Range = 0-98). Children less than 5 years were most affected (AR = 94/1,000) compared to children aged 5 to 18 years (71/1,000) and adults

Figure 2: Malaria attack rates by sub-county in Kole District, January-June 2019

(56/1,000). Residents of Aboke sub-county were the most affected (AR= 176/1000) followed by Akalo (AR = 106/1000) (Figure 2). Symptoms of case persons included: fever (98%), vomiting (42%) and headache (32%) among others.

Among the parishes of Aboke sub-county, residents of Ogwangacuma were the most affected (AR = 345/1,000), followed by Opeta (AR = 325/1,000). The epidemic curve showed a general increase in malaria cases in 2019 with upsurges on 9 April and 21 May that occurred 3-4 weeks after increases in rainfall (Figure 3).

Figure 3: Confirmed malaria cases and average rainfall in

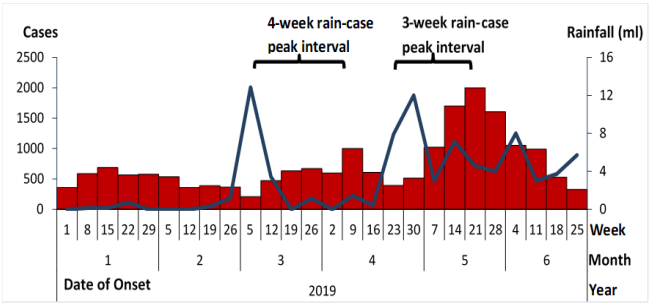


Kole District, January to June 2019

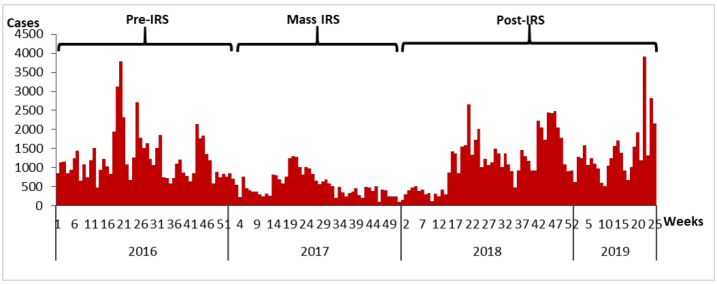
Trends showed a sharp decline in malaria incidence from 2016-2017, after the district had an indoor residual spraying (IRS) campaign. However, cases increased steadily from mid-2018 through the 2019 outbreak.

Figure 4: Confirmed malaria cases and timing of mass IRS in Kole District, 2016-2019

In Aboke sub-county, we identified rice farms in swampy areas. Swamps had stagnant water in which mosquitoes were breeding.



Anopheles gambiae and Anopheles funestus adult mosquitoes were identified at breeding sites near houses. Per 500ml scoop, larvae (10), pupae and shells (4) were estimated. Hypothesis generation interviews found that: 17 (85%) case-persons lived in houses within 500m of swamps, 15 (75%) reported human activities like rice farming within 500m of swamps, 11 (55%) had stagnant water near their houses either standing alone or in abandoned containers and 10 (50%) had a damaged net.



Case-control findings

Among 141 case-persons and 141 controls, 22 (16%) case-persons and four (2.9%) controls had stagnant water in abandoned containers near their houses (ORMH=7.0, 95% CI=2.1-24); 27 (19%) case-persons and 11 (7.8%) controls had stagnant water near their houses (ORMH=3.0, 95% CI=1.4-6.7); and 104(73%) case-persons and 89 (63%) controls farmed <500m from swamps (ORMH=2.3, 95% CI=1.1-4.4). Net use was 80% (113) among case-persons and 81% (114) among controls (ORMH=0.9, 95% CI=0.5-1.8) but 59% of all participants had at least one damaged net in their household.

Discussion

Trends showed a sharp decline in malaria incidence from 2016-2017, after an indoor residual spraying (IRS) campaign. In 2019, two malaria upsurges followed increases in rainfall. The outbreak was associated with stagnant water in abandoned containers or standing near houses, and farming near swamps.

In malaria endemic populations, vector densities fluctuate with seasonal changes in climatology. Similar to our findings, a positive correlation between rainfall and malaria was reported in Gulu

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District. This seasonal trend in malaria was only interrupted by the introduction of IRS (3). The IRS campaign conducted in Kole in 2017 could explain the lower reported cases that year. Stagnant water and flooding near houses favor vector breeding and increase the risk of malaria infection; this explains the positive association reported in our findings (4). Human activities like rice farming in swamps also led to creation of stagnant water turning the swamps into vector breeding sites.

In 2017, MoH conducted a routine bed net distribution that achieved 88% national coverage (2). In our study over half of net owners had at least one damaged bed net. This could explain why net use was not significantly protective. It is also argued that in areas with vector breeding favorable rainfall conditions like those in Kole, the use of bed nets alone in the absence of other malaria interventions like IRS is ineffective (3).

In 2017 to early 2018, the cases declined and this coincided with a mass IRS with Actellic 30S insecticide conducted in 11 mid-northern Uganda districts including Kole (2). Similarly, a study in Gulu District reported two major consecutive malaria epidemics nine months after discontinuation of IRS (3). These findings highlight the need to sustain IRS to reduce malaria cases.

Conclusions and recommendations: Stagnant water near houses and farming in swamps likely facilitated this outbreak through increases in mosquito breeding sites following rains and poor personal protection. Ecological assessment linked IRS to malaria declines, and its cessation to increases. We recommended sensitizing communities about removal of mosquito breeding sites, re-introduction of IRS, and mass distribution of bed nets in Kole District.

References

1. UBOS. Uganda Malaria Indicator Survey 2009. Kampala, Uganda: Uganda Bureau of Statistics and ICF Macro 2010.

2. MoH. National Malaria Annual Report 2017-2018. Kampala, Uganda: National Malaria Control Division, Surveillance Monitoring & Evaluation Unit, Division NMC; 2019.

3. Simple O, Mindra A, Obai G, Ovuga E, Odongo-Aginya EI. Influence of Climatic Factors on Malaria Epidemic in Gulu District, Northern Uganda: A 10-Year Retrospective Study. Malaria Research and Treatment. 2018;2018:8.

4. Hajison PL, Feresu SA, Mwakikunga BW. Malaria in children under-five: A comparison of risk factors in lakeshore and highland areas, Zomba district, Malawi. PLOS ONE. 2018;13(11):e0207207.

Using the BABIES Matrix to Determine Patterns of Newborn Birth Outcomes, Naguru Regional Referral Hospital, Kampala, Uganda, Nov 2018 - March 2019

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Summary

Uganda experiences high rates of perinatal mortality (PMR) (national PMR: 38/1,000 births), with most deaths occurring at or soon after birth. The BABIES matrix (Birthweight Age at Death Boxes for Intervention and Evaluation System) is a tool for data organization and analysis introduced in Western Uganda in 2014 to monitor and improve newborn outcomes data. We used the BABIES Matrix to determine the PMR in Naguru Regional Referral Hospital (NRRH), identify gaps in obstetric service quality, and recommend evidence-based improvement measures. We abstracted data from maternity registers at NRRH from November 2018-March 2019 and used it to fill the BABIES Matrix. We computed PMR by birthweight group, stage during pregnancy/birth/neonatal period when the death occurred, maternal age, referral status, and mode of delivery. We found 4,122 total births, 3,890 (94.4%) were alive at discharge, 54 (1.3%) were missing outcomes; overall PMR at NRRH was 43/1,000 births. Among 169 stillborn (rate: 41/1,000 births), 93 (55%) were fresh still births while 76 (45%) were macerated. Birthweight-specific PMR was highest among newborns <1500g (433/1,000 births), followed by 1500-2499g (199/1,000 births), and ≥2500g (18/1,000 births). Maternal age was unassociated with PMR. Referred mothers had a higher PMR than walk-in mothers (87 vs. 39/1,000 births, p<0.001), while vaginal births had a higher PMR than cesarean section births (49 vs. 28/1,000, p=0.002). We concluded that PMR at NRRH was higher than the national PMR. The reasons for this are unclear but may relate to the quality of obstetric and newborn care provided or potentially late presentation to NRRH or the hospital receives mostly high risk women in labour compared to other facilities. We recommended the need for a detailed investigation on factors associated with the high PMR at NRRH to help understand the causes of this elevated PMR and hence guide development of targeted interventions to reduce these deaths.

Introduction

Globally 8.2 million children under five die each year with 1.2 million of these deaths occurring in sub-Sahara Africa alone (1, 2) . Approximately 3.3 million of these deaths take place within the first four weeks of life (1). Improving maternal, fetal, and newborn health is one of the major public health concerns for developing countries. Uganda experiences high rates of perinatal mortality (PMR) (national PMR: 38/1,000 births), with most deaths occurring at or soon after birth (3). Nevertheless, two thirds of these deaths can be prevented if the right effective health measures are provided at the right time, in the right place, by the right person, and in the right way (5 rights), for both the mother and baby. It is also the right of the mother and newborn to have that system in place.

BABIES matrix (Birth weight Age at death boxes for Intervention and Evaluation System) is a method of data organization and analysis that accounts for mothers' and newborns' outcomes (4). It is designed for use in low income settings and was introduced in Western Uganda in 2014 to monitor and improve newborn outcomes data and guide targeted interventions. It

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uses a standardized table where minimum data on birth weight, outcome (alive or dead) and perinatal period of death (antepartum, intrapartum, postpartum/neonatal) is collected (4). Data collected allows decision makers to estimate major contributors to maternal and perinatal deaths (4).

Health facilities in Uganda weigh and record birth weight in the Health Management Information System (HMIS) registers at facility level. However, this data has not been comprehensively used to assess the performance of the health system both at facility and at national level. Moreover, the District Health Information Software (DHIS2) reports aggregated data rather than individualized which compromises the linkage between individualized birth weight and birth outcomes. Furthermore, there is scanty information at facility and national level on the use of BABIES to evaluate the performance of the health system. Yet having a continuous evaluation of surveillance data is essential to monitor maternal, fetal and newborn outcomes. Having accurate and up to date information on the number of perinatal deaths including stillbirths that occur, where and when they occur (Macerated Still Births (MSB) or Fresh Still Births (FSB)), and on the cause of and factors contributing to stillbirth is critical for successful interventions (5). We therefore used the BABIES Matrix to determine the magnitude of PMR in Naguru Regional Referral Hospital, identify gaps in obstetric service quality, and recommend evidence-based improvement measures.

Methods

We conducted a descriptive cross sectional analysis of surveillance data on newborn birth outcomes for the period November 2018 to March 2019 at Naguru RRH. Naguru RRH is located in Nakawa Division, Kampala District. We held discussions with facility staff and profiled pregnant women who visited the hospital into those that had complications vs. those that did not have complications which informed development of the tick table. We abstracted data from the maternity registers using the tick table (an adaptable assessment tool that allows one to collect, organize, analyze, and translate data into information for decision making). We cross-tabulated age at death categories (columns) and birth weight groups (rows) to form a matrix where each death (count) was plotted in the appropriate cell. We added the alive column to facilitate the count, divide and compare process during analysis (6).

We computed PMR by birthweight group (≤1500g, 1500-2449g, ≥2500g), time period at death (during pregnancy/MSB, labour /FSB, neonatal deaths within first 24 hours), maternal age (≥20yrs vs. <20yrs), referral status (walk in/no referral vs. referral), mode of delivery (vaginal vs. caesarean section) and LBW rate as the number of low birthweight births <2500g per 100 live births (7). Birth weight specific PMR (BWSPMR) was calculated by dividing the number of perinatal deaths among newborns of predetermined birthweight group by the total number of births in that weight group and Birth weight proportionate PMR (BWPPMR) was calculated by dividing the number of perinatal deaths among newborns of predetermined birth weight group by the total births (4).

Results

BABIES Count Table and Distribution of Perinatal Deaths at NRRH, November 2018-March 2019

Of 4,122 total births, 3,890 (94.4%) were alive at discharge, 178 (4.3%) were perinatal deaths (rate 43/1,000 births), and 54 (1.3%) were missing outcomes. One hundred sixty-nine newborns were stillborn (rate: 41/1,000 births); FSBs 93 (55%) were more than MSBs 76 (45%, p=0.06). Early neonatal mortality rate in the first 24 hours was (9/4122) 2/1,000 births (Table 1).

The BWPPMR was highest among newborns ≥2500g (16.0/1,000 births), followed by 1500-2499g (11.6/1,000 births), and <1500g (7.0/1,000 births) (Table 1).

LBW rate was 229/3899 (5.9%) among live births and 308/4122 (7.5%) among total births. Majority 91.4% (3564/3899) of live births had normal birth weight. More than half 31/54(57.4%) of missing birth outcomes had missing birth weights (Table 1)..

Distribution of PMR by Birth Weight Category and Maternal Status

The BWSPMR was highest among newborns <1500g (433/1,000 births), followed by 1500-2499g (199/1,000 births), and >2500g (18/1,000 births). Maternal age was unassociated with PMR; PMR was similar among mothers aged ≥20 years and those aged <20 (43/1,000 births, p=0.8). Referred mothers had a higher PMR than walk-in mothers (87 vs. 39/1,000 births, p<0.001), while vaginal births had a higher PMR than cesarean section births (49 vs. 28/1,000, p=0.002).

Table 1: BABIES Count Table; Distribution of Birth outcomes by Birth weight and Low birth Weight Rates at NRRH, Nov 2018-March 2019.

BABIES Count Table November 2018-March 2019								Birth weight Proportionate Mortality Rates (BWPMR)/1000 Total Births (TB)				Low birth weight Rates (LBWR) (%)	
Birth weight group(grams)	Time Period/ Age at Death			Alive at discharge	Live births (LB)	Missing outcome	Total Births	Time Period/ Age at Death			Total BWPMR	LBWR (LB)	LBWR (TB)
	MSB	FSB	NND					MSB	FSB	NND			
<1500	14	14	01	36	37	02	67	3.4	3.4	0.2	7.0	0.9	1.6
1500-2449	22	24	02	190	192	3	241	5.3	5.8	0.5	11.6	4.9	5.8
≥2500	23	38	05	3559	3564	18	3643	5.6	9.2	1.2	16.0		
Missing weight	17	17	01	105	106	31	171	4.2	4.2	0.2	8.6		
Total	**76**	**93**	**09**	**3890**	**3899**	**54**	**4122**	**18.5**	**22.6**	**2.1**	**43.2**	**5.9**	**7.5**

Discussion

Our analysis on using the BABIES matrix to determine patterns of newborn birth outcomes at NRRH for the period November 2018 to march 2019 highlights a high PMR than the national rate of 38/1000 births (3). This finding is consistent with results from a study conducted in Kabul, Afghanistan in four government hospitals with maternity services which had a PMR of 43.5/1000 births (8). Furthermore, our findings showed high PMR across all women groups; walk in vs. referred, vaginal deliveries vs. cesarean section

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deliveries, mothers of all age groups. Reasons for this are unclear but may relate to the quality of obstetric and newborn care provided or potentially late presentation to NRRH or this facility receives high risk women categories being a referral facility compared to other facilities. These findings show the need for a more detailed study to identify factors associated with the high PMR among pregnant women visiting NRRH for delivery to help understand the causes of this elevated PMR and hence guide development of targeted interventions to reduce these deaths.

Our study also revealed that over half of the still births in our study were FSBs/intrapartum deaths compared to MSBs/antepartum deaths similar to the World Health Organization estimates (WHO) 2019 which highlight that half of the still births in low and middle income countries occur during labour and birth (9). This finding further shows a possible gap in the quality of care and management provided to women during labour once admitted at this hospital. It also highlights the need for more interventions to focus on women during pregnancy and child birth.

Our study found high BWSPMR across all weight groups which is similar to findings of another study conducted at a women's hospital in Afghanistan (4). BWSPMR measures if we are doing things correctly. Hence indicates a possibility of not implementing interventions correctly at NRRH. Another possible explanation could be that women present late in labour at NRRH or that the hospital is only receives very high risk pregnancies compared to other facilities. However, this indicator is more informative if tracked over time to determine if implemented interventions are having desired effect in reducing mortality.

A high proportion of missing birth outcomes and missing birth weights in our analysis shows an issue of under-registration of birth outcomes and not weighing newborns hence leading to underreporting of birth outcomes. Our finding is similar to a high under-registration rate of neonatal deaths found in Chile 30 years ago and other developing countries that lack complete information on birth weight (10) and underreporting (11). Results from the Chile study informed the startup of numerous policies and practices aimed at eliminating non-registration of live births and neonatal deaths which can be emulated by the Naguru RRH and at country level to boost vital statistics registration efforts currently going on in the country (10).Our study also emphasizes the importance of organizing outcome data by birth weight groupings and age at death in a simple way to get indicators of underlying causes and to identify types of prevention interventions that can be considered for implementation (12)

Limitations

Our study was conducted in one hospital, and findings may not be generalized to the entire country due to the limited geographical scope. However, NRRH is a regional referral hospital that receives pregnant mothers from different locations across the country hence enriching the findings. We used secondary data using BABIES matrix which was not specifically collected for this study. This data might have had limitations such as incompleteness especially in tracking an admitted mother from admission to discharge after delivery. Hence, our results may be an underestimation or overestimation of the problem faced at NRRH. Determining the actual time of death especially monitoring the fetal heart rate and or condition is generally poorly performed during pregnancy and at the time of birth. Therefore obtaining accurate data on when fetal death occurred is often difficult. Hence contributing to misclassification of some of the fetal deaths (11).

Conclusion and Recommendation

PMR at NRRH was above the national rate. PMR was highest among newborns <1500g, suggesting poor maternal health in the area, while the high stillbirth rate indicates opportunities for improvements in maternal health and care. The high PMR may also relate to the quality of care or late presentation to NRRH. We recommended a detailed investigation into factors associated with the high PMR at NRRH to guide development of targeted interventions to reduce these deaths.

References

Matthews Z. World health report 2005: make every mother and child count. World Health. 2005;33:409–11.

Lawn JE, Kerber K, Enweronu-Laryea C, Massee Bateman O. Newborn survival in low resource settings–are we delivering? BJOG. 2009;116 Suppl:49–59.

Uganda Bureau of Statistics (UBOS) and ICF. 2018. Uganda Demographic and Health Survey 2016. Kampala, Uganda and Rockville, Maryland, USA: UBOS and ICF.

Dott M.M., Orakail N., Ebadi H., Hernandez. F., MacFarlane. K., Riley. P.L., Prepas.R., McCarthy. B.J (2006) Implementing a Facility Based Maternal and Perinatal Health Care Surveillance System in Afghanistan. Vol50, No 4, July/August 2005. Doi:10.1016.2005.02.013

World Health Organization (2002) The Health Newborn Manual: A Reference Manual for Program Managers. WHO Collaborating Center in Reproductive Health https://stacks.cdc.gov/view/cdc/6506

(18)30565-5

.World Health Organization (2006) Neonatal and Perinatal Mortality: Country, Regional and Global Estimates.

Patterns of Malnutrition among Pregnant and Lactating Women, Uganda, 2015-2018: Analysis of Nutrition Surveillance Data

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Summary

Maternal nutrition is closely linked to survival and development of children during the first 1000 days of life. Despite significant improvements in the last 5 years of implementation of the Uganda Nutrition Action Plan, malnutrition remains a major public health problem in Uganda. We described annual trends and distribution of malnutrition among pregnant and lactating women (PLW) to inform programming on targeted malnutrition interventions. We analyzed nutrition surveillance data from the District Health Information System (DHIS2) for all PLW in Uganda from 2015-2018. We used WHO standard for severity of malnutrition. We calculated prevalence of malnutrition among PLW and conducted logistic regression to assess trends. We drew line graphs to illustrate annual trends and choropleth maps to demonstrate geographic distribution. We found 268,636 (prevalence: 5.5%) PLW had acute malnutrition. Karamoja (prevalence: 21%), Lango (prevalence: 17%), and Acholi (prevalence: 11%) registered the highest prevalence. Kigezi (prevalence: 2%), Toro (prevalence: 2.7%), and Ankole (prevalence: 2.8%) regions registered the lowest overall prevalence. The annual national trend of malnutrition decreased by 31% (OR=0.69, p<0.001) over the evaluation period. Bugisu (OR=3.4, p<0.001), Lango (OR=1.6, p<0.001), Bukedi (OR=1.4, p<0.001), Busoga (1.3, p<0.001, and Acholi (OR=1.2, p<0.001) had an increasing trend of malnutrition while the remaining regions had declines. The Ministry of Health should reinforce interventions in place for malnutrition with special attention to Karamoja, Lango, Acholi, and Bugisu regions. Also, a nutrition causal analysis among PLW in these regions should be conducted.

Introduction

Malnutrition refers to deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients. It includes both - undernutrition which covers: stunting, wasting, and micronutrient deficiencies; and over nutrition which includes overweight, obesity, and diet-related non-communicable diseases (1). Maternal nutrition is crucial for the survival, health, and development of mothers and their children(3,4). During pregnancy and lactation, there is an increased demand for energy, protein, and essential micronutrients to maintain the mother and child's health and development in and out of the uterus (5–8). Maternal malnutrition predisposes mothers to maternal complications and children to fetal birth defects, low birth weight, restricted physical and mental potential; and fetal or newborn mortality (5). Maternal under nutrition accounts for approximately 20% of child hood stunting (9).

Uganda scaled up the Nutrition strategy in 2011 focusing on the first 1,000-days window of opportunity directed at women in reproductive age, newborns and children <2 years (10).This strategy was aimed at breaking the cycle of malnutrition and improving the livelihood of Ugandans. In spite of significant improvements in the 5 years of implementation of this strategy (2011-2016), under nutrition has remained a major public health problem in Uganda. Uganda demographic health survey (UDHS) 2016, reported 29% children stunted, 11% wasted, and at least 32% of women in reproductive age were anemic. However, little characterization of malnutrition specific among pregnant or lactating women has been done in Uganda.

A malnourished mother at any stage during her development is likely to deliver a malnourished baby due to her predisposition to the effects of malnutrition hence continuing the cycle (5). Therefore, ending malnutrition among pregnant and lactating women (PLW) is important in breaking this cycle. To inform targeted programming and break the cycle of malnutrition, we described the epidemiological trends and quantum geographical distribution of malnutrition among PLW in Uganda, 2015–2018.

Methods

We conducted a descriptive cross-sectional analysis of surveillance data from the district health information system 2 (DHIS2). We extracted data on malnutrition among PLW reported quarterly,2015–2018. We also, extracted data on the reporting rates of the HMIS 106 for the same period. We defined malnutrition as under nutrition (wasting). We calculated prevalence of malnutrition at national and regional levels disaggregated by year. Our denominator was PLW assessed for malnutrition. We classified regions using WHO classification of malnutrition severity which uses prevalence thresholds: <5% is acceptable, 5-9% poor, 10-14% serious and >15% critical (11). We generated trends nationally and regionally; and used logistic regression to test for significance of the trends. We used geographic information system (QGIS) version 2.8.2 to generate maps.

Results

Distribution of malnutrition among pregnant and lactating women in Uganda, 2015-2018.

Of 4,848,873 PLW assessed for malnutrition, 268,636 (5.5%) had malnutrition. Karamoja region had the highest overall prevalence of 21% (44,010/209,244) followed by: Lango 17% (13,242/80,356), Acholi 11% (21,229/199,085), and Kampala 10% (17,164/168,345).

Kigezi 2% (11,480/571,010), Toro 2.7% (15,776/59, 5237), and Ankole 2.8% (22,085/785,154) regions had the lowest overall prevalence. Karamoja and Lango were in the critical category (prevalence >15%) while Acholi was in the serious category of the WHO classification of malnutrition (Figure 1).

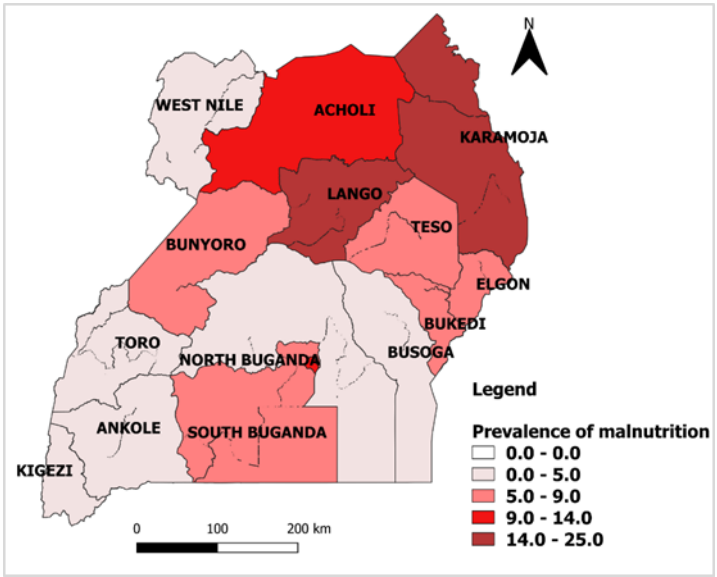

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Figure 1: Prevalence of malnutrition among pregnant and lactating women, Uganda, 2015-2018

Trends of malnutrition among pregnant and lactating women in Uganda, 2015-2018

During period 2015 to 2018, the annual prevalence of malnutrition among PLW at national level declined by 31% (OR= 0.69, p < 0.001) being highest in 2015, 17% (38,480/223,310) reducing to 6.4 % (52,945/830,624) in 2016, and the lowest in 2018, 4.5% (102,109/2,248,324). The reporting rate increased from 98.3% in 2015 to 100% in 2018 (Figure 2).

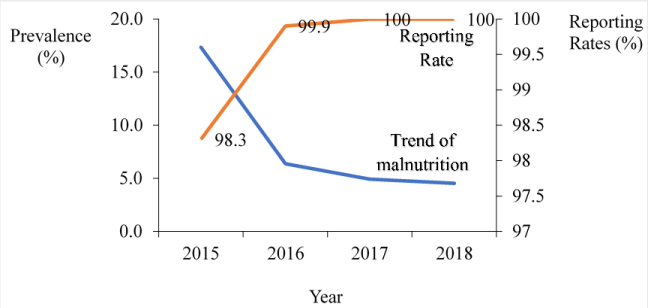

Figure 2: National trend of malnutrition among pregnant and lactating women and reporting rate of HMIS 106, Uganda, 2015-2018

Trends of malnutrition among pregnant and lactating women per region in Uganda, 2015-2018

The prevalence of malnutrition among PLW increased in Bugisu (OR=3.4, p<0.001), Lango (OR=1.6, p<0.001), Bukedi (1.4, p<0.001), Busoga (OR=1.3, p<0.001), and Acholi (OR=1.2, p<0.001) regions (Figure 2); while the rest of the regions had declining trend (Figure 3).

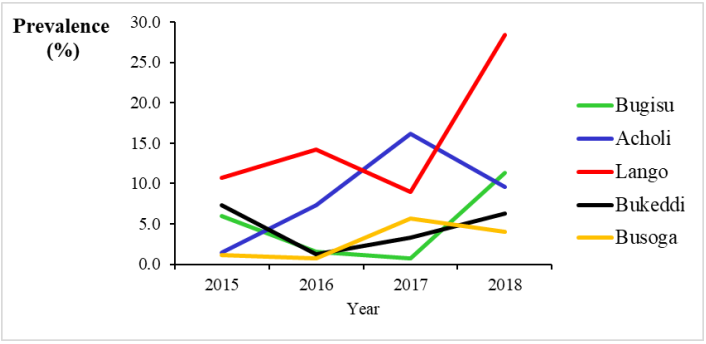

Figure 3: Trend of malnutrition among pregnant and lactating women increased in 5 regions, Uganda, 2015-2018

Kampala region had the highest rates of malnutrition in 2015, 77% (9,308/12,099) followed by Karamoja region 70% (19,723/28070) and 28.5% (282/989) in Bunyoro region. In 2018, Lango region had the highest prevalence 28% (6,919/24,403) followed by Karamoja region with prevalence of 16% (12,251/72,202) and Bugisu 11% (8,766/77,327). Kigezi region had the lowest prevalence 0.57% (1,264/221,334) (Figure 4)

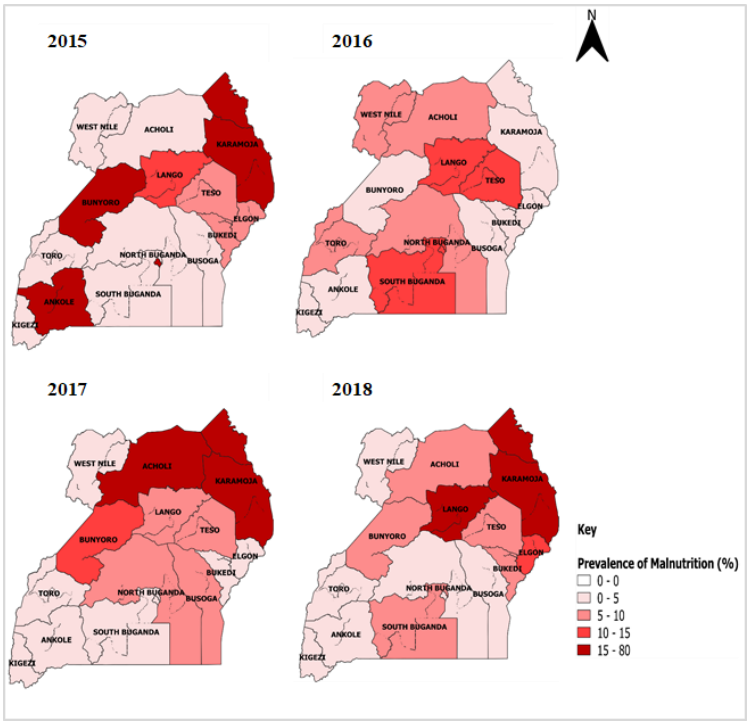

Figure 4: Regional trends in prevalence of malnutrition among pregnant and lactating women, Uganda 2015-2018

Discussion

This analysis of surveillance data showed a national decreasing trend in malnutrition among pregnant and lactating women. However, the trend of malnutrition declined in the Western and Southern regions while increases were registered in the Eastern and Northern regions. The Northern regions were in the critical and serious categories of the WHO classification of malnutrition.

Findings of this analysis revealed that the overall national trend of malnutrition among PLW declined. While the down ward trend in malnutrition is encouraging, there are regions with high levels of malnutrition and some have increasing trends. Similarly, findings from UDHS 2016 and an analysis by SPRING, 2014 showed that malnutrition among women in reproductive age was present in various regions. In 2014 a correlation between maternal under nutrition and low levels of the 4+ ANC, inadequate nutrition counselling, low level female control of income and limited access to a health facility were found in these regions (12). Providing nutrition education and ANC services in the community could improve the nutrition status among PLW in the regions (13,14). These interventions should however, be given in the Acholi, Bugisu, Bukedi, Busoga Karamoja, and Lango regions that have high or rising prevalence of malnutrition.

Our analysis also found that Karamoja, Lango, and Acholi regions had the highest prevalence though the trend declined in Karamoja. These regions have prolonged droughts, insecurity, livestock diseases, and flooding which cripple crop and livestock production (16). In addition, the pastoralists nature of these regions makes cultivating difficult further deepening the food insecurity and also hindering access to preventive and treatment of major illnesses that cause malnutrition (16). Establishment of sentinel sites to provide health and nutrition services within this region could reduce delay in seeking

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care and also provide the essential nutrition interventions. Moreover, intensifying supplementary and therapeutic feeding programs for pregnant and lactating women could reduce malnutrition in these regions (17). Programs targeting households rather than individuals would possibly be better since the food is shared in the household (18).

Bugisu region also demonstrated to have increasing trend of malnutrition reaching the serious WHO severity level in 2018. This could be explained by the recurrent disasters such as mudslides, floods among others that occur in this region(19,20). These cause loss of crops and sometimes lives rendering the affected population vulnerable to food insecurity, poverty hence malnutrition. Similarly a study in India found that children from flooded households had more malnutrition compared to those from households that had no flooding(21). Implementation of assistance in form of food or cash transfer, or both food and cash transfer could help in preventing malnutrition among PLW in such emergencies. However, these programs should focus on households rather than individuals since these individuals share the food with the entire household hence end up not getting adequate quantities as required (18).

Conclusion and recommendations

The national trend of malnutrition among pregnant and lactating women declined during the analysis period 2015-2018. Lango and Acholi regions had high and rising rates of malnutrition. Karamoja and Lango regions were in critical category while Acholi region was in serious category according to the WHO classification of malnutrition. We recommended that Ministry of Health sustains interventions for malnutrition in place with special attention to Karamoja, Lango, and Acholi regions. Also, a nutrition causal to clearly understand the factors underlying malnutrition among PLW in these regions should be conducted.

References

1. World Health Organization (WHO). Malnutrition [Internet]. 2018. p. 1. Available from: https://www.who.int/news-room/fact-sheets/detail/malnutrition

2. World Health Organization (WHO). Essential Nutrition Actions. 2013;

3. Wu G, Bazer F, Cudd T, Meininger C. Recent Advances in Nutritional Sciences-Maternal Nutrition and Fetal Development. Nutr [Internet]. 2004;(13):2169–72. Available from: http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Recent+Advances+in+Nutritional+Sciences+Maternal+Nutrition+and+Fetal#8

4. Vir SC. Improving women's nutrition imperative for rapid reduction of childhood stunting in South Asia: Coupling of nutrition specific interventions with nutrition sensitive measures essential. Matern Child Nutr. 2016;12:72–90.

5. WHO. ICD-10 Transition. Fam Pract Manag [Internet]. 2011;18:39. Available from: http://www.ncbi.nlm.nih.gov/pubmed/22184833

6. Health UMOF. Guidelines on Maternal Nutrition in Uganda. 2010; (December):1–37.

7. Government of Uganda. UGANDA NUTRITION ACTION PLAN Scaling Up Multi-Sectoral Efforts to Establish a Strong Nutrition Foundation for Uganda's Development. Republic Of Uganda. 2011.