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Dear Reader,

We are pleased to share with you Issue 1, Volume 5 of the Uganda National Institute of Public Health (UNIPH) Quarterly Epidemiological Bulletin.

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

In this issue, we present a variety of issues including: Articles on COVID-19, Uganda's preparedness for outbreaks, PHFP's role in COVID-19 response, and highlights of the proceedings from the COVID-19 public dialogue held on 14th March 2020. We also present an investigation of malaria outbreak in Zombo District, a policy brief on Yellow fever, declaration of TB as a public health emergency in Uganda, an article on whether Uganda is ready for the next epidemic, highlights from the cohort 2018 PHFP graduation ceremony and the new cohort of fellows (Cohort 2020).

For further information on anything in this bulletin please contact us on: pnabunya@musph.ac.ug, mutebi2r@musph.ac.ug, sandranabatanzi@musph.ac.ug, OR lbulage@musph.ac.ug

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

Thank You.

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Inside this issue:

Novel Virus hits the world

By Phoebe Nabunya, Uganda Public Health Fellowship Program

The World Health Organization (WHO) was informed of a cluster of 44 cases of pneumonia of unknown cause detected in Wuhan City, China, on 31 December 2019[1]. Shortly into 2020, news of the strange disease in China hit the world.

Investigations linked all the initial 425 cases to a Seafood Wholesale Market in Wuhan. The clinical presentation resembled that of viral pneumonia, suspected to be a novel corona virus and WHO temporarily named it 2019-nCoV. On 7th January 2020, the authorities in China isolated the virus confirming it to be a new strain of corona virus previously not identified in humans[2]. The novelty of the virus meant major gaps in our knowledge of the origin, epidemiology, duration of human transmission, epidemiology, and clinical spectrum of disease all of which needed to be fulfilled as the disease established itself. WHO later gave the virus its official name as COVID-19.

Despite the knowledge gaps, scientists have been able to sequence the virus coming up with test kits for the virus by 13th January. From the cases in China, studies found fever, tiredness, cough and sore throat as the most common presenting symptoms of the disease. In severe cases, the cases presented with severe pneumonia and acute respiratory distress with older people and those with underlying medical conditions like high blood pressure, heart problems or diabetes, found to be at a higher risk.

As, the disease continued to spread through cities and to health workers, human to human transmission was noted. The mode of transmission being aerosol droplets expelled when an infected individual coughs or sneezes within close range to a susceptible person. The virus can also contaminate surfaces like door handles or railings, staying viable on metal, glass or plastic for several days[5].

To contain the disease, health authorities in China imposed travel restrictions, quarantines, and outdoor restrictions[3]. Several countries issued warnings against travel to China and airports instituted body temperature checks, health declarations, and information signage in an attempt to identify carriers of the virus[2]. Despite these efforts, the disease rapidly spread to other countries in the world leading to its declaration as a public health emergency of international concern (PHEIC) on 30th January 2020 and a pandemic on 13th March 2020. As of 17th March 2020, over 140 countries were affected with a total of 179,112 cases and 7,426 deaths.

This is the 3rd Coronaviruses (CoV) to emerge in the past 2 decades, the other two being severe acute respiratory syndrome coronavirus (SARS-CoV) in 2003 and the Middle East respiratory syndrome coronavirus (MERS-CoV) in 2012[3].

To prevent further spread of the disease, emphasis has been put on interrupting human-to-human transmission including reducing secondary infections among close contacts and health care workers, preventing transmission amplification events, and preventing further international spread. This can be achieved through a combination of public health measures, such as rapid identification, diagnosis and management of the cases, identification and follow up of the contacts, infection prevention and control in healthcare settings, implementation of health measures for travelers, awareness-raising in the population and risk communication.

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Uganda Public Health Fellowship Program Supports COVID-19 Screening at Points of Entry

By Nabunya Phoebe

On Jan 30, 2020, WHO declared the current novel coronavirus disease 2019 (COVID-19) epidemic a Public Health Emergency of International Concern and on 13th March 2020, it was declared a pandemic following an increase in cases in multiple countries outside China. In response, several measures were implemented to prevent and control possible case importations from China. These measures include heightened surveillance for rapid identification of suspected cases, patient transfer and isolation, rapid diagnosis, tracing, and follow-up of potential contacts. Currently, Uganda has responded by tightening screening at the ports of entry to ensure that all travelers from the countries affected by COVID-19 are recorded and followed up. While Uganda has not put a ban on travels from COVID-19 hotspots, the Ministry of Health requires that all travelers from the affected countries self quarantine for 14 days. If you have traveled through Entebbe international airport in the last 2 months, you must have encountered the determined health officers donned in protective wear including a disposable apron, gloves, and face mask. The screening process involves taking body temperature and observing other flu-like symptoms and cough. Travelers are required to fill in health forms detailing recent travel history from phone contacts, place of residence while in Uganda, and duration of stay and purpose of visit. These travelers are then followed up for 14 days to ensure they are observing self quarantine. While Uganda has not registered a case by 15 March 2020, messages have been widely shared with the population on what precautions to take to avoid spread including hand washing, minimizing social interaction (crowds), and avoiding handshakes and hugging among others.

The Corona Virus Disease Pandemic: Uganda Holds the First Public Dialogue on COVID-19 as a Preparedness Measure

By Maureen Katusiime, Uganda Public Health Fellowship Program

Corona Virus Disease (COVID 19) is a new viral disease caused by SARS COV-2. The median incubation period is 4-6 days (range 2-14 days). It is transmitted through respiratory droplets in air or close contact and presents with fever, cough, fatigue, headache or flu like symptoms similar to seasonal influenza among others. COVID-19 affects all ages, mostly severe in old age or among cases with underlying conditions. Eight percent of cases are usually mild, 15% are severe, and 5% are critical. Most people recover spontaneously with supportive care. As of 13th March 2019, 125,048 confirmed (6,729 new) cases; 4,613 (321 new) deaths due to COVID-19 were reported globally, with China contributing the bulk of the numbers.

On 31st December 2019, China notified the WHO that it had observed cases of unusual respiratory disease. On 1st January 2020, using epidemiological data and after noticing human to human transmission, WHO declared the outbreak and on 30th January after spreading into other countries, COVID-19 was declared a Public Health Event of International Concern. On 11th March, it was declared a pandemic having spread to 146 countries and territories on six continents.

Therefore as part of the preparedness efforts, Uganda held a public dialogue on COVID-19 at Imperial Royale Hotel Kampala on 13th March 2020. This public dialogue was organized by Makerere University School of Public Health (MakSPH) in collaboration with Ministry of Health, Uganda, WHO Uganda, US Centers for Disease Control and Prevention (CDC), and African Field Epidemiology Network (AFENET). The theme for this public dialogue was "Country Preparedness to Prevent, Detect, and Respond to the Corona Virus Disease (COVID-19) Epidemic".

This dialogue targeted hoteliers, religious leaders, business community, immigration officers, and the general public. The objective of this public dialogue was to contribute to COVID-19 preparedness in Uganda through providing a platform to increase awareness of the general public on COVID-19, and educating the general public on the strategies the country is implementing to prevent, quickly detect, and appropriately respond to the COVID-19 pandemic.

The dialogue provided opportunity for educating the public on infection prevention measures they should undertake to prevent themselves and others from getting infected with COVID-19 including clarifying myths and misconceptions, generating potential insights and gathering support from the general public and key stakeholders to strengthen national preparedness efforts to the COVID-19 pandemic in Uganda. The public accessed the dialogue by attending in person at the hotel or via an online platform for those that could not make it to the hotel physically.

The key Speakers at this dialogue included; Prof. Rhoda Wanyenze, Dean, MakSPH, Dr. Lisa Nelson, Country Director CDC, Dr. Yonas Tegegn Woldemariam, WHO Country Representative, Dr. Henry Mwebesa, Director General Health Services, MoH who represented the Minister of Health, Dr. Allan Muruta, Commissioner PHE, Mr. Atek Kagirita, Incident Manager COVID-19, Dr. Elizabeth Ekirapa, Program Director FETP, MakSPH, Mr. Kenneth Bainomugisha, Station Manager Airport Services, and Dr. Simon Antara, Country Director, AFENET.

The public dialogue was a success with an estimated 370 people attending in person and about 70 via online. Participants that attended included representatives from WHO, CDC, AFENET, different Ministries (Uganda), policy makers, academia, business community such as Kampala City Traders' Association (KACITA), religious leaders from different sects, Civil Aviation Authority (CAA), Kampala Capital City Authority (KCCA), Non-Governmental Organizations (NGOs) such as The AIDS Support Organization (TASO) Uganda, Makerere University Walter Reed Project (MUWRP), and Civil Society Organizations (CSOs) among others. Most questions asked by the general public fell under three main categories; need more knowledge /information about COVID-19 key facts, transmission and preventive measures, need to know more about surveillance and preparedness plans being undertaken by the government and need for research and support for innovations about COVID-19 in Uganda.

The public dialogue was concluded by urging the public to practice infection prevention measures, avoid mass gatherings, assurance that continued efforts to engage all key stakeholders in the preparedness process were ongoing and encouragement that each person had a role to play in preparedness efforts to protect the country from COVID-19.

Left to right; Prof. Rhoda Wanyenze, Dean MakSPH, Dr. Elizabeth Ekirapa, MakSPH, Dr. Simon Antara, Country Director AFENET, Dr. Lisa Nelson, US CDC Director, Dr. Allan Muruta, Commissioner PHE, MoH, Dr. Yonas Tegegn Woldemariam, WHO Representative, Uganda , and Mr. Atek Kagirita, Incident Manager COVID-19

Is Uganda ready for its next outbreak?: Getting ahead of the next epidemic

By Sandra Nabatanzi, Uganda Public Health Fellowship Program

Introduction

Uganda has faced several outbreaks every year including; Malaria, Measles, Cholera, Ebola Virus Disease, Marburg Virus Disease, Crimean Congo Haemorrhagic Fever, Yellow Fever, and Rift Valley Fever among others. In 2019 alone, the Emergency Operations Center was activated for response to 12 public health emergencies. Currently Uganda remains on high alert and heightened preparedness for Ebola Virus disease (EVD) that is an ongoing propagated EVD outbreak in Democratic Republic of Congo where 3,444 cases and 2,264 deaths were reported as of 25 Feb 2020 and Corona Virus Disease - 2019 (COVID-19) which is rapidly spreading to various countries in the World from China. As of 29 Feb 2020, 85, 403 cases and 2,924 deaths of COVID – 19 in 54 countries were reported.

Uganda is vulnerable and prone to epidemics due to several reasons; 1) Increased human interaction with forests, caves, and animals due to economic and other activities. 2) Geographic location in filovirus, meningitis, and yellow fever zones, 3) Effects of climate change – heavy rains and flooding 4) Conflicts and population displacement in the Great Lakes region. 5) Increased international movement of people particularly refugees across Uganda's borders.

Capacities built from Experiences and Lessons learned from outbreak response and preparedness to outbreaks.

Uganda has established functional coordination structure that is multi sectoral and multidisciplinary known as the National task force on epidemics preparedness and response that meets regularly. The same structure is mirrored at district level. The Public Health Emergency Operations Centre (PHEOC) is in place, activated during response to emergencies to coordinate the government response, receive, analyse, disseminate, and monitor incident information. The National and district rapid response teams including field epidemiologists have been trained and remain on standby to respond to epidemics once notified.

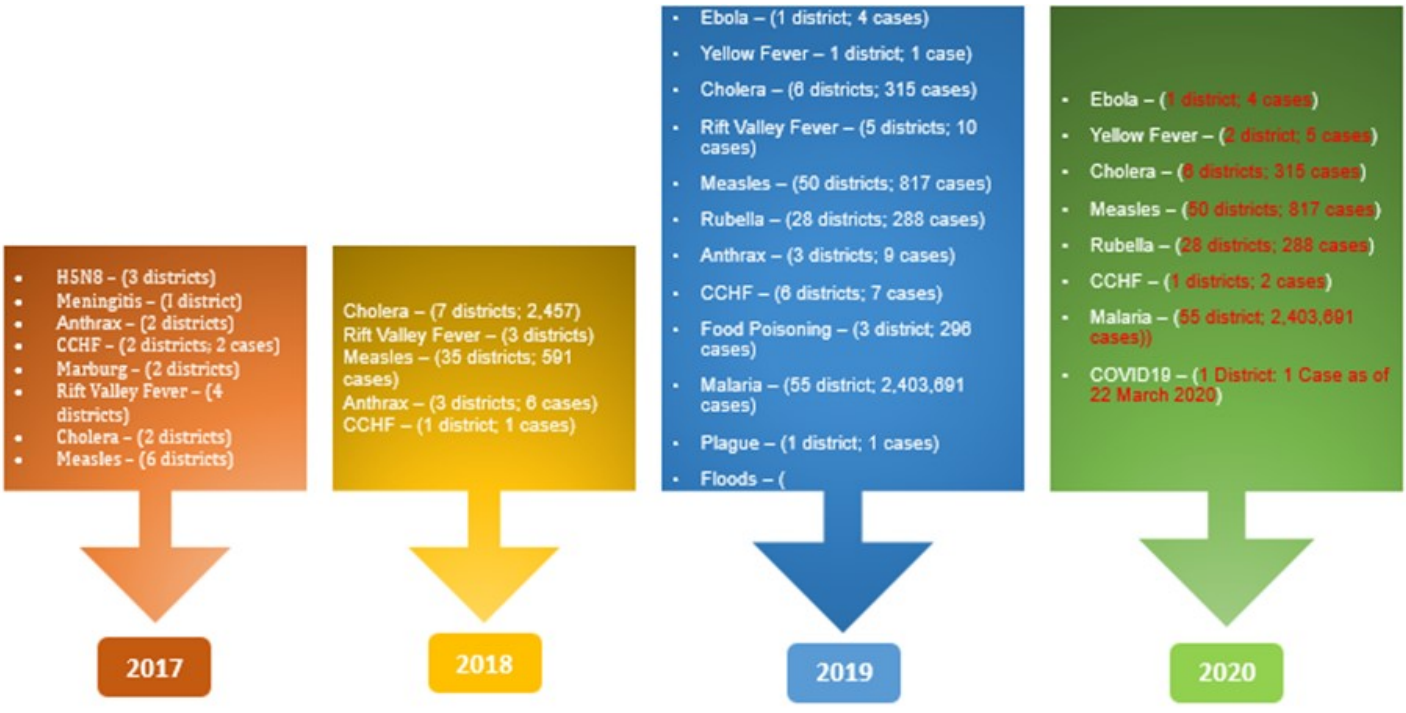
In 2000, Uganda adopted the Integrated Disease Surveillance and Response Strategy (IDSR). The IDSR is the framework Uganda uses for response to Public Health Emergencies.

Laboratory capacities are in place to confirm all priority diseases at the National reference laboratories; Uganda Virus Research Institute (UVRI), and Uganda National Health Laboratories Services (UNHLS).

The Uganda Virus Research Institute mandate is to conduct scientific investigations/research, surveillance and diagnostics pertaining to viral and other communicable diseases in order to contribute to knowledge, policy, and practice. The UVRI houses the following national and international reference and specialised testing laboratories: 1) the national and regional reference centre for vector borne viral diseases; 2) the national influenza Centre (World Health Organization (WHO) influenza collaborating laboratory); 3) the national diagnostic laboratory for highly infectious viral infections; 4) the Africa WHO yellow fever reference laboratory; 5) the national HIV reference and quality assurance laboratory; 6) the national and regional reference laboratory for HIV drug resistance, 7) WHO Measles and Rubella Regional Reference laboratory and 8) WHO Inter-country Polio laboratory.

The Uganda National Health Laboratories Services provides stewardship for National Health Laboratory Network to guide the prevention of disease and promotion of health in Uganda through early detection of the disease in order to achieve overall sustainable development. The UNHLS houses HIV Viral Load, HIV Early Infant, Hepatitis B, Sickle cell, Microbiology, Histopathology, Molecular, and Malaria diagnosis laboratories and a Biorepository. The functions of UNHLS are to 1) develop policies, guidelines and standards for Health Laboratory and diagnostic services in Uganda, 2) provide leadership and governance for health laboratory and diagnostic services in the country, 3) build capacity and strengthen systems and structures for health laboratory and diagnostic services delivery at all levels of healthcare system, 4) provide quality reference laboratory and diagnostic services for clinical care, public health and research 5) build effective and sustainable National Health Laboratory and diagnostic quality management systems.

A national laboratory sample transportation system is in place for shipping of samples to the reference laboratories. Isolation facilities have been set up in selected health facilities for quick isolation and management of infectious patients.



Timeline showing the increase in frequency of outbreaks in Uganda, 2017 – March 2020

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Risk communication strategies are in place using the village health teams, print, radio, and social media.

Uganda has recently conducted a country wide mass Measles/ Rubella campaign to contain Measles/Rubella outbreaks. Plans are underway to conduct reactive mass vaccination against yellow fever in districts where outbreaks have been reported. Plans are also underway to apply for inclusion of yellow fever vaccine in Uganda's routine immunization schedule.

Conclusion

Despite efforts in place to prevent, quickly detect, and respond to outbreaks, Uganda remains at risk of disease outbreaks due to the sustained human to animal interaction, climate change, urbanization, food insecurity, culture and free movement across borders. Outbreaks pose an economic hazard to our country which has a fragile health system. Building resilient systems and financing outbreak management is crucial to our country meeting Sustainable Development Goals.

Uganda PHFP Recruits a new cohort of Disease Detectives

By Doreen N. Gonahasa, Uganda Public Health Fellowship Program

The Uganda Public Health Fellowship Program recruited the 6th cohort of Field Epidemiology fellows for the period 2020-2021. The program annually recruits fellows for a two-year in-service training program. Pioneer fellows for the Field Epidemiology track (FET) were recruited in 2015. The thirteen 2020 cohort of fellows are of mixed backgrounds, including Medicine, Laboratory, Veterinary medicine, Radiography, Biostatistics, and Environmental health. During their course of training, they will be disease detectives providing invaluable support to the different priority Ministry of Health (MoH) departments. They have been attached to various priority host sites within MoH and related institutions. These sites include; Uganda National Expanded program for Immunization, National TB and Leprosy Program, Aids Control Program, Infectious Diseases Institute, National Malaria Control Program, Non-Communicable Diseases Division, Vector Control Division, National Animal Disease Diagnostic and Epidemiology Centre, Maternal and Reproductive health, and the Cancer institute. We wish the team a great time during the training. Brace yourselves for a wonderful ride!

The 2020 Cohort with the Program Coordinator, Dr. Alex R. Ario (extreme right) and CDC Resident Advisor Dr. Julie Harris (extreme left)

Upcoming Events

World Immunization Week 2020 24th –30th April 2020

The World Health Organization (WHO) holds an annual celebration in every last week of April which aims to promote the use of vaccines to protect people of all ages against disease.

The theme this year is **#Vaccines Work for All** and the campaign will focus on how vaccines – and the people who develop, deliver and receive them – are heroes by working to protect the health of everyone, everywhere.

World Malaria Day 2020; 25th April 2020

The world health organisation (WHO) together with the Roll Back Malaria Partnership to End malaria holds an annual world Malaria Day . Similar to the previous years the activity is held upon the theme "Zero malaria starts with me", a grassroots campaign that aims to keep malaria high on the political agenda, mobilize additional resources, and empower communities to take ownership of malaria prevention and care.

World No Tobacco Day – 31 May 2020

The theme this year is Protecting youth from industry manipulation and preventing them from tobacco and nicotine use. The World No Tobacco Day 2020 global campaign will serve to: 1) Debunk myths and expose manipulation tactics employed by the tobacco and related industries, particularly marketing tactics targeted at youth, including through the introduction of new and novel products, flavors and other attractive features; 2) Equip young people with knowledge about the tobacco and related industries' intentions and tactics to hook current and future generations on tobacco and nicotine products; and 3)Empower influencers (in pop culture, on social media, in the home, or in the classroom) to protect and defend youth and catalyze change by engaging them in the fight against Big Tobacco.

World Food Safety Day 2020; 7th June 2020

Food safety is key to achieving several UN Sustainable Development Goals and is a shared responsibility between governments, producers, and consumers. Through the World Food Safety Day, WHO pursues its efforts to mainstream food safety in the public agenda and reduce the burden of foodborne diseases globally.

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The Uganda PHFP graduates its fourth cohort of Field Epidemiologists

By Doreen N. Gonahasa, Uganda Public Health Fellowship Program

Workforce Development is one of the technical areas of the IHR (2005). The Uganda Public Health Fellowship Program (PHFP) has made great strides to attainment of this capacity through an training in service of field epidemiologists since 2015. On Friday 31 January 2020, the Program graduated its 4th cohort of fellows following two intensive years of training in advanced field epidemiology bringing the total number of PHFP graduates to 40 since its inception. Ten graduates were awarded certificates in a well attended colourful ceremony hosted at the Imperial Royale Hotel, Kampala. The ceremony was attended by various stakeholders including Hon. Robinah Nabbanja (Minister of State for Health, General Duties), Dr. Charles Olaro (Director General Health Services) and other Ministry Officials, the US Embassy Deputy Chief of Mission (DCM), the CDC Country Director and staff, World Health Organization Representative, the Dean and staff of the Makerere University School of Public Health, African Field Epidemiology Network representative, and other dignitaries including PHFP alumni.

During the ceremony, the graduands presented their achievements over the two years and showed evidence based and policy-relevant recommendations for addressing some of the public health challenges faced in Uganda over the years through the projects they implemented. Projects under taken by fellows ranged from response to public health emergencies, descriptive analyses of surveillance data, HIV, and public health interventions aimed at improving quality of service delivery.

The presentations were followed by award ceremony which was graced by the USAID DCM and the Minister of State for Health who applauded the programme for being at the forefront of building human resource capacity, which should be a priority of all resource constrained countries. She appreciated the partnership with the Ministry of Health which has enabled the program to succeed. The WHO Representative pledged that there would be many opportunities for work placement and wished the graduates success in all their future deployments.

The graduates (seated) with some of the dignitaries

Yellow Fever Vaccine should be Introduced in Uganda's Routine Immunization Schedule - Policy Brief

Maureen Nabatanzi[1], Benon Kwesiga[1], Gloria Bahizi[1], Lilian Bulage[1], Bernard Lubwama[2], Alex Riolexus Ario[1]

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Summary

Despite the availability of an effective vaccine, Uganda continues to experience yellow fever outbreaks. On 8 May 2019, the Ministry of Health confirmed a yellow fever outbreak in Masaka District among children (4 cases, 0 deaths). Although Uganda held reactive vaccination campaigns in central and southwestern districts - including Masaka - in 2016, pockets of the population remain that are not vaccinated. Between May 2019 and February 2020, four more outbreaks were reported in four separate districts (9 cases, 6 deaths). We recommend integration of yellow fever in the routine immunization schedule for children to ensure all Ugandans are vaccinated to prevent outbreaks.

Introduction

Yellow fever is an acute viral hemorrhagic disease caused by yellow fever virus. Most infected persons are asymptomatic. Initial symptoms include sudden onset of fever, chills, headache, backache, general muscle pain, fatigue, nausea, and vomiting. In approximately 15% of infected persons, a brief remission for less than a day is followed by recurrence of initial symptoms and progression to jaundice and hemorrhage. Among these severe cases, 20-50% die (1, 2).

Both monkeys and humans can be infected with yellow fever virus, which has a sylvatic (jungle) cycle, an intermediate cycle, and an urban cycle. In the sylvatic cycle of transmission, mosquitoes acquire the virus by feeding on infected monkeys and transmit it to persons working or living around the forest. In the intermediate cycle, the virus is transmitted person-to-person in forest-bordering areas. The virus can then enter an urban cycle where it is transmitted from person-to-person in areas with high mosquito density and where most people are unvaccinated (2, 3). Yellow fever occurrence is influenced by the presence of the *Aedes* mosquito vector, the proximity of infected monkeys, the environment, and the human population. These dynamics in turn influence the transmission cycle (Figure 1). A total of 27 African and 13 Latin American countries report a few hundred cases annually. These countries, in which yellow fever is endemic, are the most vulnerable to yellow fever outbreaks (1, 3, 4).

The yellow fever vaccine is safe and effective, and one shot confers lifelong protection to recipients. In endemic countries, World Health Organization (WHO) recommends the combined use of yellow fever vaccine through the routine Expanded Program on Immunization (EPI) and mass vaccination campaigns as an effective approach to prevent yellow fever and control outbreaks (1). A vaccine coverage of over 80% is necessary to interrupt local transmission and achieve herd immunity (4).

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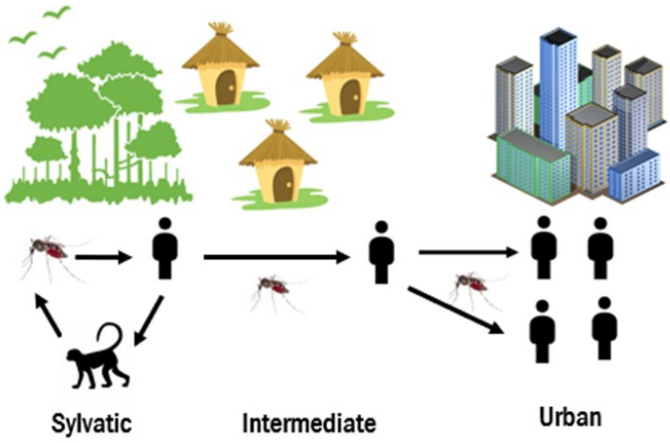


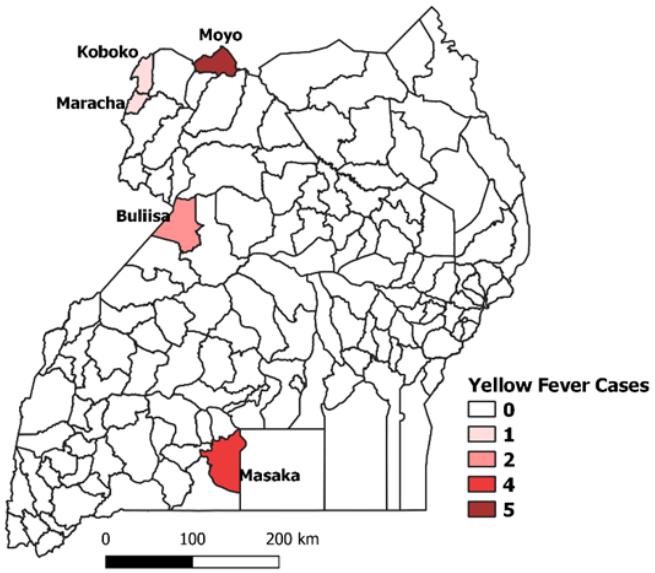
Figure 1: Yellow fever transmission cycles

Uganda is one of 27 African countries with both the mosquito vector and potential monkey hosts present, and therefore at risk of yellow fever transmission (3, 5). From 1941 to 2016, Uganda reported seven yellow fever outbreaks. One of these outbreaks occurred in northern Uganda in 2010 and affected 181 case-patients, of whom 45 died (Case Fatality Rate, CFR=25%). The 2016 outbreak was reported in Masaka, Rukungiri, and Kalangala districts in central and southwestern Uganda. It affected 32 case-patients, of whom 7 died (CFR= 22%) (6, 7).

On 8 May 2019, the Ministry of Health (MoH) confirmed an outbreak of yellow fever in Masaka District. The index case-patient was a 12-year-old female from Bukakata sub-county. Four more case-patients (2 probable, and 2 suspect) were identified in Bukakata; all were children 3 to 17 years old.

Between 8 May 2019 and 4 February 2020, four additional outbreaks of yellow fever were confirmed from Koboko (n=1; 1 confirmed, CFR=0%), Buliisa (n=2; 2 confirmed, CFR=50%), Moyo (n=5; 3 confirmed, 2 probable, CFR=100%) and Maracha (n=1; 1 confirmed, CFR=0%) (Figure 2).

Figure 2: Yellow Fever Outbreaks in Uganda between 8 May



2019 and 4 February 2020

Risk factors in all affected districts were living in or working near forests inhabited by monkeys and *Aedes* mosquitoes, and being unvaccinated. Indeed, none of the case-patients reported in 2019 ad 2020 had received yellow fever vaccine.

Context and Importance of the problem

Uganda's Integrated Disease Surveillance and Response (IDSR) guidelines recommend the strengthening of routine yellow fever vaccination and reactive mass vaccination if a single case is confirmed (5). However, Uganda has not introduced the yellow fever vaccine into the routine EPI. Following the 2016 outbreak, a reactive vaccination campaign was conducted in the affected districts with the aim of preventing further outbreaks. According to administrative records, the post vaccination coverage in affected districts was 75%. All case-patients affected by the 2019-2020 outbreaks were unvaccinated. In addition to being unvaccinated, living close to swampy and forested areas inhabited by monkeys was a risk factor. Unvaccinated Ugandans are at continued risk of yellow fever transmission. There is need to build the population's immunity against yellow fever through introduction of the vaccine in routine EPI.

Critique of policy options

Yellow fever is a priority disease under Uganda's IDSR. Prevention of yellow fever is mainly focused on surveillance and response activities. This is done through national weekly surveillance reports per health facility and through community-based disease surveillance (5). In addition, UVRI set up sentinel sites specific to alerts of arboviral infections. However, there is a gap in vaccination interventions.

Among the 27 African countries at high risk of yellow fever, Uganda is one of only five that has yet to introduce the vaccine into the routine EPI. According to Uganda's immunization policy (2012), vaccination against yellow fever may be carried out by the Uganda National Expanded Program for Immunization (UNEPI) in partnership with the private sector, as guided by the disease epidemiology. The few mass vaccination campaigns conducted in Uganda occurred in selected districts and were in reaction to outbreaks. Under the International Health Regulations, Uganda necessitates all travellers to and from Uganda to possess proof of yellow fever vaccination. Ugandans and Internationals who wish to travel must sponsor their own yellow fever vaccination; on individual basis, the vaccine costs about USD $27. This status quo is contrary to UNEPI's mission to ensure that every child and high-risk group is fully vaccinated with high quality and effective vaccines.

In 2017, the Uganda National Immunization Technical Advisory Group recommended introduction of a yellow fever vaccine in Uganda's routine immunization schedule at 12 months of age (8). However, immunization services in Uganda are mainly funded by the government of Uganda with additional support from health development partners, and this intervention faces competing vaccine introduction priorities, limited political will, and financing challenges. UNEPI's 2012-2016 Comprehensive Multi-Year Plan highlighted that the government of Uganda had a big funding gap for immunization. Continued advocacy with Parliament, Ministry of Finance and Economic Development, and other relevant authorities is needed to increase the health budget and thereby increase amounts available for new vaccines (9). Mobilization of partnerships for implementation can contribute to the funding gap. For example, GAVI the vaccine alliance supported the introduction of the rotavirus vaccine into routine EPI in Uganda in 2016. GAVI has also pledged to support high risk countries to implement yellow fever

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routine immunization (4).

Offering yellow fever vaccine through the routine EPI strategy has been proven as an effective strategy to improve coverage and reduce risk of outbreaks (1). It is feasible and safe to administer the vaccine jointly with other vaccines at 12 months of age (1). Above 80% vaccine coverage, the EPI strategy establishes high-level population immunity and continued routine vaccination of new birth cohorts is required to prevent outbreaks (4). According to WHO, by 2016, each dose cost an average of US$ 1.07 in public government-funded programs (1, 4).

Recommendations

There is need to strengthen yellow fever vaccination as a priority in prevention of future yellow fever outbreaks. Policy makers can mandate improvement of vaccine coverage of the population by: integrating the yellow fever vaccine into the existing routine EPI targeting all children aged 12 months.

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Tuberculosis declared a public Health Emergency in Uganda, Nov 2019

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Following the high numbers of people contracting tuberculosis (TB), high case fatality rates, and low levels of completion of TB treatment, the Ministry of Health in November 2019, declared TB a national public health emergency. This was aimed at mounting a national emergency response towards this disease.

It is estimated that a third of Ugandans are infected with the TB germ and everyday 235 people develop TB disease, out of which up to 30 die. Tuberculosis can affect anyone, anywhere in the country. However, some sub-populations and areas are more affected than others for example.

urban areas, institutionalized populations (boarding schools, prisons, university hostels, etc.), nomadic and other mobile populations, health workers, individuals who live in inadequately ventilated conditions, people living with HIV, diabetics the undernourished, those who excessively use alcohol, and tobacco users.

The national TB incidence is 200/100,000 population with a notification rate of 156/100,000 population. The distribution of TB in the country is not uniform with the targeted districts notifying up to 600/100,000 population., e.g. in Karamoja Region, notification rate ranges from 200-800/100,000, Acholi 100-500/100,000, Lango 130-360/100,000. In 2019 the TB rates in Karamoja were up to 10 times the national estimated burden, however only half of the estimated TB patients were registered in treatment and only 50% of the TB patients who were on treatment in the same year finished their full course of treatment (treated successfully). Four in 10 of the people with tuberculosis either do not start treatment or have their treatment interrupted for 2 consecutive months or more (lost to follow up, LTFU) in this region. The Uganda Prison services (UPS) has notified the Ministry of Health of high rates of Tuberculosis in prisons, sometimes as high as 13 times the national average.

The Ministry of Health and partners have embarked on the response targeting areas of Lango, Acholi and Karamoja regions, and the Uganda Prisons Service. The National and District Task Force) has/have been activated for this national emergency. With support from the national incident management team and the Rapid Response Teams, the district teams will continue various activities including case management and containment, community engagement, contact tracing, psychosocial support, and community TB surveillance among others. Working with partners and the district teams, screening for TB at all service points at health facilities has been strengthened, contact tracing scaled up, surveillance for TB at household level, and treatment support for TB patients.

The Ministry of Health therefore calls upon the public to cooperate with the health workers to ensure effective screening for TB at the facility and in the community, support to people with TB to complete their treatment and to ensure daily observed therapy for TB medicine.

Malaria Outbreak facilitated by Roadside Pools in Zombo District, Uganda, January - June 2019

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Summary

As part of national strategy, Uganda in 2014 began implementing multifaceted interventions to facilitate malaria elimination. However, the country still routinely has outbreaks. Zombo District had an upsurge of malaria cases starting January 2019. We investigated to determine the outbreak scope, identify exposures for transmission, and recommend evidence-based interventions. We defined a case as positive malaria rapid diagnostic test (mRDT) or microscopy from 1 January-30 June 2019 in a resident of or visitor to Zombo District.

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We reviewed medical records in all district health facilities to identify cases. In a case-control study, we compared exposures between case-patients and asymptomatic village- and age-matched controls. We conducted entomological and environmental assessments in the same sub-county. We identified 63,451 case-patients (AR=24%) and 100 deaths. Children <5 years were most affected (AR=34%). Females (AR=28%) were more affected than males (AR=20%). Sub-county AR ranged from 7.3% (Nyapea) to 34% (Kango). All 14 mosquitoes captured in homes were engorged with blood. All seven breeding sites observed had Anopheles larvae. Among 149 case-patients and 149 controls, 83 (50%) case-patients and 63 (43%) controls lived <500 meters from roadside pools (OR: 2.7, 95% CI: 1.4-5.2); 17 (11%) case-patients and seven (4.7%) controls lived <500 meters from a swamp (OR: 6.0, 95% CI: 1.3–27). Fifty-one (76%) controls and 56 (38%) case-patients wore protective clothes in evenings (OR: 0.49, 95% CI: 0.27-0.87), and 90 (60%) controls and 80 (54%) case-patients slept under a mosquito net in the 2 weeks before symptom onset (OR: 0.74, 95% CI: 0.46–1.2). We described an outbreak attributed to poor use of protective measures and standing water with mosquito larvae. We recommended increased awareness on malaria prevention measures, creation of proper drainage offshoots, prompt treatment for the sick, and use of bed nets.

Introduction

Globally malaria remains a major cause of ill-health and deaths with approximately 219 million cases occurring in 2017 compared to 239 million cases in 2010 (1). Approximately 75% of cases and deaths were from Sub-Saharan Africa; where approximately 60% of the population is at risk (2). In Uganda, malaria remains a leading cause of morbidity and mortality with over 90% of the population living at risk of developing the disease (3,4). Uganda is ranked fourth among the highest malaria-burden countries in the world, with some of the highest transmission rates in the world (5). Malaria accounts for up to 50% of outpatient visits, 15–20% of admissions and up to 20% of hospital deaths (4). According to the Uganda Malaria Indicator Survey 2009, malaria parasitemia was high in most regions of the country, with hyper-endemicity (prevalence of 50–75%) demonstrated in three regions, meso-endemicity (prevalence 10–50%) in six, and hypo -endemicity (prevalence < 10%) in one region (6). The subsequent Malaria Indicator Survey conducted in 2015, showed a reduction in parasitemia risk in all regions of the country (4). This decline in parasitemia has been attributed to interventions, including the increased coverage of insecticide-treated mosquito nets (ITNs), integrated community case management, and indoor residual spraying (IRS) (6,7). However, Zombo District did not participate in the 2017 IRS conducted by Ministry of Health (1) and is currently not implementing integrated community case management (ICCM) which is another control measure for malaria among children less than five years. On 3rd June 2019, through routine analysis of malaria surveillance data, Zombo District showed an upsurge of malaria cases which exceeded the action threshold from Epi week 1 of 2019 (**Figure 1**). We investigated to determine the scope of the outbreak, identify the exposures for increased transmission, and provide evidence-based control and prevention measures.

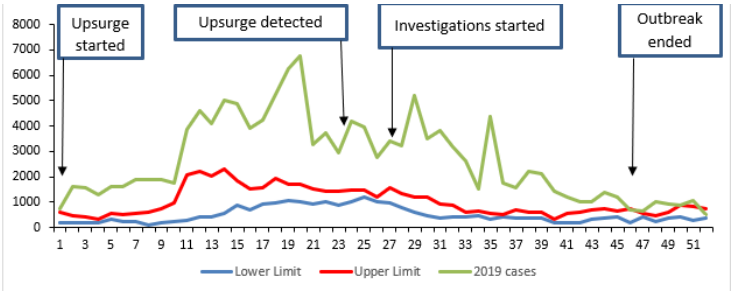

Figure 1: Upsurge of malaria cases from epi week 1 of 2019 in Zombo District, Uganda, July 2019

Methods

We defined a malaria case as a positive malaria test result by mRDT or microscopy from 1 January to 30 June, 2019 in a resident or visitor of Zombo District. We reviewed health facility records at all the health facilities in Zombo district to identify cases. We performed descriptive analysis by person, place, and time.

We randomly selected a sub-county that had an attack rate greater than 20% (Abanga sub-county). We conducted environmental and entomological assessment in Abanga sub-county and interviewed 20 confirmed case-patients that we sampled conveniently for hypothesis generation. We conducted pyrethrum spray catches (PSC) in the five parishes of the same sub county. We conducted a matched case-control study in all the parishes. We recruited 149 cases and 149 controls.

Results

We identified 63,451 malaria cases-patients during 1 January to June, 2019 and 100 malaria related deaths (CFR= 16 /10,000 population). The overall attack rate was 24%, and median age of 10 years (range: 0.038 to 98 years). Age-group < 5 years was most affected (AR: 34 %) followed by 5–18 year (AR:29) and >18 years (AR: 14%). Females were more affected (AR: 28%) compared to males (AR: 20 %). The outbreak affected all the 13 sub units of Zombo District with Kango sub-county being most affected (AR: 34%) followed by Atyak (AR: 31%) (**Figure 2**)

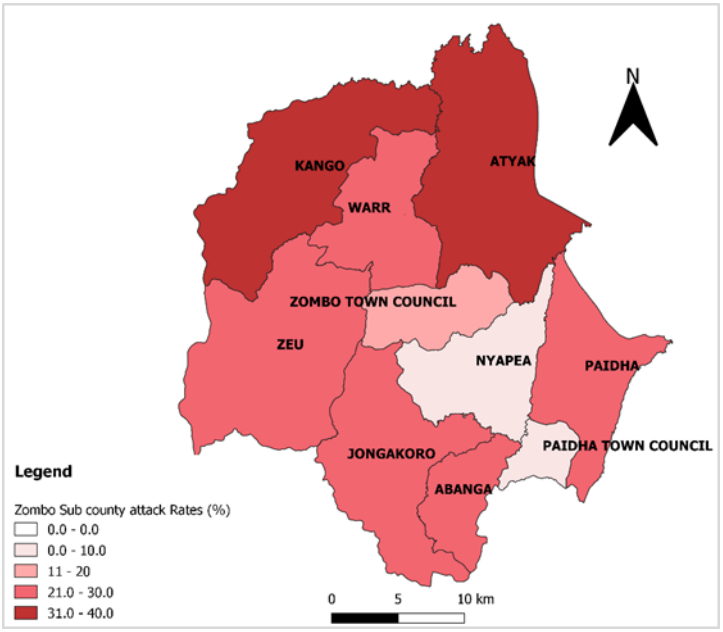

Figure 2: Map showing attack rates by sub-county and town councils, Zombo District, January-June 2019

There was a gradual increase of cases from December 2018 to January 2019 peaking in April and May 2019. A gradual decline is noted in June. However, the upsurge was detected in June 2019, seven months after the onset. There was low consistent rainfall peaking in May and June 2019. With every peak of rainfall there was an increase in the number of cases at least three weeks after. The epicurve is indicative of a continuous transmission pattern that has been sustained from January to June 2019 (**Figure 3**).

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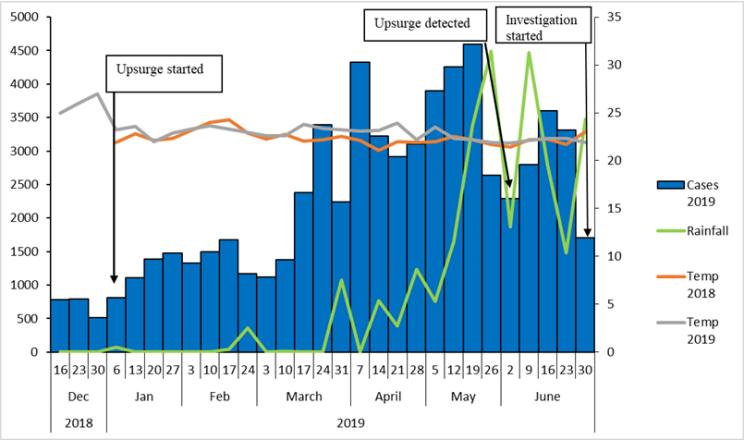

Figure 3: Epidemic curve by of malaria cases (N= 63,451), Zombo District, Uganda, January-June 2019

Figure 4: Road side pool identified during an environmental assessment in a malaria outbreak investigation in Abanga sub county, Zombo District, January-June 2019

Hypothesis generation findings

Of the 20 case-patients interviewed, 85% (17/20) lived in houses with a mud wall and grass roof, 75% (15/20) reported having damaged mosquito nets, 70% (14/20) reported entering bed after 9:00pm , 70% (14/20) had history of a sick person in the neighborhood before onset of symptoms, 65% (13/20) had water logging present near their household, 65% (13/20) reported closing doors and windows after 7pm, 60% (12/20) reported wearing protective clothes in the evening, 60% (12/20) reported using mosquito net, 55% (11/20) reported history of sick person in the household, and 50% (10/20) reported gathering around a fire place in the evening. Based on the findings, we hypothesized that: Entering bed after 9pm, living in an area with water logging, having a sick person in the household or neighborhood and wearing protective clothing in the evening were associated with the outbreak.

Case control study results

On average, every household had 2 mosquito nets (max: 7, Min: 0 and mode: 1). There was a significant difference in malaria infection with increase in household size**.** Overall mosquito net ownership was 78% (233/298). Twenty one percent (32/149) of case-patients and 13% (20/149) of control persons reported sleeping under a damaged mosquito net (OR: 1.7, 95% CI: 0.94–3.1). 54% (80/149) of case-patients and 60% (90/149) of control persons slept under a mosquito net 2 weeks before symptom onset (OR: 0.74, 95% CI: 0.46–1.2) . Fifty six percent (83/147) of case-patients and 43% (63/147) control persons lived within 500 meters of a road side pool 2 weeks before symptom onset (OR: 2.7, 95% CI 1.4 -5.2) ; 11% (17/149) of case-patients and 4.7% (7/149) control persons lived within 500 meters of a swamp two weeks before symptom onset (OR: 6, 95% CI: 1.3–27). 59% (88/148) of case-patients and 16% (24/148) of control persons had a household member with malaria 2 weeks before symptom onset (OR: 11, 95% CI: 5.07–27); and 59% (88/148) of case-patients and 16% (24/148) of control persons had a neighbor with malaria prior to onset of symptoms (OR: 11, 95% CI: 5.07–27). 38% (56/149) of case-patients and 76% (51/149) of control persons wore protective clothes in the evening, (OR: 0.49, 95% CI: 0.27-0.87).

Environmental and entomological assessment

We observed road side pools of stagnant water, pits from brick laying and puddles in Abanga Sub-County. Seven breeding sites were sampled of which 85% (6/7) were man made and 15% (1/7) were from natural sites such as gullies. Of the six man made breeding sites, 67% (4/6) were roadside pools, 17% (1/6) from brick laying, and 17% (1/6) murram excavation pits. All the sampled breeding sites were found to have anopheles larvae at different stages. The highest number of larvae (250/50 mls of water) Of the 27 households reached for the PSC, 63% (17/27) had a mosquito net and only 26% (7/27) had a ceiling. Fourteen adult anopheles mosquitoes were caught in the 27 households. Of which 79% (11/14) were *Anopheles gambiae* and 21% (3/14) *Anopheles funestes* species. The indoor resting density was 2 mosquitoes /household / night. All 14 (100%) mosquitoes were blood fed. Early morning collections showed higher numbers that decreased with increasing hours of the day, indicating that the mosquitoes in the locality are endophagic (bite predominantly indoors) and rest outdoors (Exophilic) based on few mosquitoes caught in the later hours of the day.

Discussion

In this study we identified 63,451 malaria cases and CFR: 16/10,000 population. The upsurge was noted in epi week 1 of 2019 peaking in March and April 2019. Children below 5 years and females were most affected. Consistent low levels of rainfall that started in epi week 49 of 2018 and continued throughout the outbreak period. This outbreak was associated with living within 500 meters to a road side pool or swamp and wearing protective clothing in the evening was protective from malaria infection. Entomological assessment showed multiple water breeding sites of Anopheles mosquitoes.

This investigation revealed that those who had mosquito breeding site around their houses were more likely to be diseased by malaria than those who didn't have mosquito breeding site. This is consistent with other studies in Ethiopia (8,9). Human activity like brick laying, swamp farming, and road construction led to creation of temporary pools of water, that had poor drainage potentiating breeding of the malaria vectors. These breeding sites were sustained by low levels of continuous rainfall and consistently high temperatures throughout this period which are factors that facilitate increased breeding of mosquitoes.

This is consistent with an environmental study in Cameroon that demonstrated increased density of malaria parasite higher in the rainy season (21). These breeding sites could not dry in short periods by themselves. The breeding sites were found to have anopheles larvae at different stages signifying that mosquitoes were available at all times not causing interruption in transmission.

Studies have shown that larval densities fluctuate in malaria endemic populations during seasonal changes in climatology.

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During the rainfall periods, temporary pools of water are formed in areas with swamps, ditches, and pools along the road side among others. These sites hold fresh stagnant water that provides active breeding sites for malaria vectors (15). PSC identified Anopheles gambiae and Anopheles funestes species that are mainly endophagic and exophilic which are the species responsible for malaria transmission in most of Africa (21). To control the malaria outbreak, mosquito breeding sites therefore need to be cleared by involvement of the local community, draining of temporary pools, environmental modification, and use of larvicides to interrupt the breeding cycle.

Wearing protective clothes was protective in this outbreak. This is consistent with a study in Ethiopia were wearing of protective clothing was shown to reduce the odds of malaria infection(15). Wearing of protective clothes helps reduce the exposed body extremities that could have reduced the possibility of mosquito bite (15). Similarly, use of mosquito nets was shown to be protective but most of them were old and some torn, or shared by many people in the home, used for different purposes such as protecting domestic birds, curtains; which could explain why the association was not significant. Other factors such as inconsistence in use and going to bed after 9 pm could explain the insignificant association. This is consistent with a study conducted in Cameroon in which the prevalence of malaria was high even among those who used mosquito nets and another in Ethiopia in which an outbreak resulted from poor vector control measures (17,21).

In this study, children had higher odds of malaria infection compared to older age-groups. Similar findings were found in other studies conducted in Uganda and Cameroon that demonstrated higher odds of malaria infection among children (12, 21). Also, a study conducted in Tanzania on malaria prevalence and socio-demographic factors demonstrated that children and female were more susceptible to malaria (20). This could be explained by protective immunity among adults as a result of previous exposure to malaria compared to malaria naïve children.

We also found that, females were more affected than males. These findings are similar to findings in a study in Zimbabwe (19). This difference could be because adult women do more night activities that expose them to mosquito breeding sites, such as cooking in kitchens detached from their houses, splitting fire wood, fetching water. This could also be explained by the women's better health seeking behaviours compared to the men (23).

Vector control measures such as indoor residual spraying, replacement of LLINs, draining or chemical spraying of breeding sites for removing the larvae; have not been done in Zombo District. This could explain the increased levels of malaria that surpass the epidemic threshold.

The district does not consistently draw malaria channels to help in the detection of outbreaks early because of this, there was a delay in the detection and response to this outbreak which could explain the high malaria cases and CFR. This is consistent with studies by Adhisu et al 2014, and Workineh et al 2019, which demonstrated that delayed detection and interventions were the propagating factors for the outbreaks.

Conclusions and recommendations

The outbreak affected the entire district with children, females, and Kango sub-county being most affected. There was continuous transmission of malaria propagated by road side pools of standing water and swamps and inconsistent use of bed nets.

Wearing protective clothes was protective. We recommended that the district in collaboration with NMCP create awareness on malaria prevention measures like proper mosquito net usage, and a proper road drainage system put in place to avoid water logging. NMCP should have malaria channels drawn at least twice a month for each district to ensure that outbreaks are detected early and responded to promptly.

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The Annual Maternal and Perinatal Death Surveillance and Response (MPDSR) Report FY 2018/19 highlighted a reduction in institutional maternal mortality ratio from 108 to 92 per 100,000 deliveries in Uganda

By Katusiime Maureen

On 13th February 2020, the Ministry of Health, Reproductive and Infant Health Division with support from National Maternal Perinatal Death Surveillance and Response (MPDSR) Stakeholders, Non-Government Organisations (NGOs), Civil Society Organisations (CSOs), and Development partners disseminated the Annual MPDSR Report for Financial Year (FY) 2018/19 at Hotel Africana, Kampala. This dissemination meeting was aimed at documenting progress on the implementation of MPDSR during the FY 2018/19 and stimulating actions among stakeholders at different levels. Specific objectives of this national meeting included; sharing updates on efforts in implementation of MPDSR, sharing lessons learnt and good practices, and making recommendations and action plans to improve maternal and perinatal health for year 2019/2020.

This meeting was attended by representatives from World Health Organisation (WHO), United Nations Children's Fund (UNICEF) , United Nations Population Fund (UNFPA), the United States Agency for International Development (USAID), different Ugandan ministries, NGOs, CSOs, policy makers, academia, and researchers among others. Presentations about work on surveillance and response to improve maternal and perinatal health outcomes were made by different partners. Key highlights of the MPDSR report FY 2018/19 included; a relative reduction in the institutional maternal mortality ratio from 108 per 100,000 to 92 per 100,000 deliveries and an overall

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reduction in the Institutional perinatal mortality rate from 29.1 to 23.6 per 1,000 live births in FY 2018/19. This report also highlighted leading causes of maternal deaths as; obstetric haemorrhage (46%), infections (13%), and hypertensive disorders in pregnancy (11%) while, birth asphyxia (47%), septicaemia (11%), and prematurity (8%) accounted for majority of perinatal deaths. Delays in mothers seeking care, lack of blood products, supplies and consumables, lack of partner support and skills gaps among health workers in provision of emergency obstetric and new-born care services (EMONC) were the major avoidable factors that contributed to these maternal and perinatal death events. The report noted that the reductions in mortality were a result of increased skilled birth attendance, supportive supervision, facility based trainings, onsite health provider mentorships, and Continuous Medical Education (CMEs) with technical assistance from Ministry of Health and its Partners.

Presentation of the MPDSR report triggered meaningful discussions among stakeholders and generated key actionable recommendations to improve maternal and new born quality of care.

Among these included; equipping health workers with practical skills in emergency obstetric and new-born care service delivery, intensifying interventions to prevent and manage complications such as; post-partum haemorrhage, hypertensive disorders in pregnancy, birth asphyxia, and prematurity. Functionalizing HC IVs and Hospitals, with a focus on new-born care units and lastly improving functionality of MPDSR committees at the various levels including data capture and utilization.

Right to left Dr. Victoria Nankabirwa, Nsambya Hospital; Dr. Frank Kaharuza, USAID; Dr. Richard Mugahi, MoH and Dr. Alex Muhereza, RHITES North - Acholi