



Uganda One Health Epidemiological Bulletin

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Dear Reader,

We are pleased to introduce you to the first issue of the Uganda One Health Epidemiological Bulletin. The bulletin is a product of the Ministries of Agriculture, Animal Industry and Fisheries, Health, Water and Environment, and Uganda Wildlife Authority under the National One Health Platform (NOHP) umbrella. Achieving health among humans, animals and the environment requires integration of interventions and information. This quarterly bulletin aims to inform One Health (OH) practitioners at community, district, national and global levels on zoonoses, surveillance, antimicrobial resistance, food safety and interventions to prepare, prevent, detect and respond to OH events in Uganda. We hope that reading this bulletin will empower you to confront OH challenges for better health among humans, animals and the environment.



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Upcoming Events

Annual One Health Day, 3 November, 2021

Annually, global health experts celebrate One Health Day to raise awareness on role of the One Health approach to address shared health threats at the human-animal-environment interface.

In 2020, Uganda commemorated One Health day during a one day event at Imperial Royale Hotel, Kampala under the theme, "Strengthening One Health Practice: A call for Advocacy and Action".



Officials from the One Health Ministries, Departments and Agencies at the 2020 One Health Day event, Kampala, Uganda

The 2021 One Health Day will promote efforts around the world to bring together all human, animal, and environmental health disciplines towards solving today's critical global health challenges.

Annual One Health Directors' Meeting, 7 September, 2021

Directors from the four-line One Health ministries of MWE, MOH, UWA and MAAIF will hold a meeting to discuss the National One Health Policy regulatory impact assessment and One Health Strategic Plan mid-term evaluation findings. The meeting is an opportunity for the Directors to guide implementation of One Health in Uganda.

The World AMR Awareness Week, 18 - 24 November, 2021

The World Antimicrobial Resistance Awareness Week (WAAW) aims at increasing awareness of global antimicrobial resistance. During WAAW, the general public, health workers and policy makers are encouraged to apply best practices that avoid further emergence and spread of drug resistant infections.

Africa CDC Inaugural One Health Conference, 1 - 3 November, 2021

The Africa CDC will host a three-day virtual One Health Conference to celebrate and share the various One Health work on the continent. For more information, visit - https://sbs.co.za/ africacdc2021/

Launch of the National Technical Guidelines of the 3rd Edition IDSR, 15 September, 2021

Since 2001, the Ministry of Health has implemented the Integrated Disease Surveillance and Response (IDSR) strategy as an early warning system and integrated platform for detecting, reporting and responding to priority public health events.

In the 3rd edition, IDSR has embraced new concepts including application of the One Health approach for effective and integrated surveillance and response to public health emergencies.

World Field Epidemiology Day, 7 September, 2021

World Field Epidemiology Day is a global movement to recognize and raise awareness of the vital role of field epidemiologists in protecting the health of populations and advancing global health security.



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Highlights

Plague Preparedness Assessment in West Nile Region, Uganda, August 2021

Immaculate Atuhaire¹ ¹Uganda Public Health Fellowship Programme

Uganda has a history of importation of zoonotic plague from neighbouring Democratic Republic of Congo (DRC). In 2019, Zombo District, West Nile Region reported two plague case-patients (one fatality) with a history of travel from DRC. From January 2020 - 27 June 2021, a plague outbreak in Ituri Province in DRC involved 578 cases and 44 deaths (CFR = 7.6%). Between 22 April -13 June, Fataki Health Zone reported 37 suspected cases and 12 deaths (CFR = 32%). Fataki Health Zone borders Uganda, placing West Nile Region border districts at high risk of plague importation.

In August, a National Rapid Response Team (NRRT) was deployed to seven districts: Koboko, Maracha, Arua, Zombo, Nebbi, Packwach and Arua City. The NRRT collaborated with Arua Uganda Virus Research Institute (UVRI) and Arua Emergency Operation Center. Using Key Informant Interviews and Focus Group Discussions, the team defined risk of plague introduction, assessed community knowledge and practices, and assessed 47 health facilities for capacity to identify and respond to suspected plague cases. Findings will guide development of a plague preparedness and response plan.



NRRT at Arua UVRI during the Plague Preparedness Assessment in West Nile Region, Uganda, August 2021



After Action Review Workshop for the 2021 Anthrax and Rift Valley Fever Outbreaks in Uganda

Regina Ndagire¹ and Annet Naluwuge¹ ¹One Health Fellows, Infectious Diseases Institute, Kampala, Uganda

Rift Valley Fever (RVF) and Anthrax are among seven priority zoonotic diseases (PZDs) in Uganda. Between January – May 2021, RVF outbreaks were reported in Moyo, Kiruhura, Kazo and Mbarara Districts. Between April – May 2021, Anthrax outbreaks were reported in Kween and Kapchorwa Districts. One Health Teams responded in affected districts to investigate risk factors and make recommendations.

On 3 and 4 August 2021, the National One Health Platform (NOHP) convened a virtual After Action Review (AAR) to document lessons learnt and inform strategic decision making for multi-sectoral coordination and collaboration. Participants were One Health stakeholders from government Ministries, Departments and Agencies, district leaders and implementing partners.

Findings

Response was delayed by inadequate coordination, limited funds, low health worker knowledge on diagnosis, limited laboratory diagnostic capacity, and didn't include risk communication. The AAR proposed: finalization of the RVF Contingency Plan, NOHP coordination for multi-sectoral PZD outbreak response, incorporation of risk communication and advocacy for establishment of a public health emergency response fund.

Conclusion

The AAR served as a platform where lessons learnt from Anthrax and RVF response activities were shared. Implementation of the proposed actions will help improve response to future RVF and Anthrax outbreaks in Uganda.

Articles

Environmental Health Practice; Lessons from an Internship at Kira Municipal Council, 2019

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Introduction

Environmental Health is the branch of Public Health that focuses on the relationship between people and their environment (1). The work of Environmental Health Officers (EHOs) aims at reducing chemical and other harmful exposures in air, water, soil and food to protect people and provide them with healthy environments. In One Health, EHOs contribute to disease surveillance, prevention and control associated with unsafe foods, vectors and vermin, environmental pollution, and sanitation and hygiene.

In Uganda, training in Environmental Health is available at Certificate, Diploma and Bachelor's degree levels. As part of the Bachelor's training, EHOs have an opportunity to apply their knowledge through an internship at District Local Governments or with an accredited organization. Officers can also pursue higher degrees e.g. Master or PhD in a Public Health specialty of their choice. After being licensed by the Allied Health Professionals, EHOs typically serve in positions at District Local Governments (DLG), Universities, Non-Government Organizations (NGOs). In the DLGs and some NGOs, they work as Health Inspectors, and in the Universities, they teach and conduct research (2).

Lessons from an Internship

During an Internship for the Bachelor's of Environmental Health studies, we were attached at Kirra Municipal Council in Wakiso District between June and August 2019. The objective of the attachment was to support Environmental Health interventions at Kira Municipal Council.

We participated in health inspections of premises, and at Health Centers and raised awareness on Water, Sanitation and Hygiene (WASH), Malaria vector control and Family Planning.

Despite the vital role EHOs play in public health, their work is hindered by limited resources and infrastructure. For example, the Public Health Department at the Council does not have equipment and laboratory where environmental or food samples can be tested.

We observed that some recommendations to the public and authorities like closure of premises are ignored due to bureaucracy. Environmental Health knowledge received in training isn't always applied in the field practice; for example, some Health Inspectors intentionally skip mandatory construction site inspections yet proceed but approve the building plans (2).

This internship was a great learning opportunity. Environmental Health is playing an important role in promoting Public Health. The impact of this role can be improved by prioritizing EHO's recommendations, supervision, and improving their access to testing services.

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Africa One Health University Network (AFROHUN), Uganda Chapter, 2020

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Introduction

Africa One Health University Network (AFROHUN) formerly One Health Central and Eastern Africa (OHCEA) is an international university network. AROHUN currently constitutes twenty-four institutions of higher education in public health, veterinary medicine, pathobiology, global health, and environmental science. The institutions are in 16 universities in nine countries in Eastern, Central and Western African Regions.

The AFROHUN seeks to promote global One Health Workforce development services beyond the traditional One Health disciplines and institutions. AFROHUN received a five-year USAID sub-award funded through a consortium led by the University of California Davis to implement the One Health Workforce – Next Generation (OHW- NG) Project.

Under OHW-NG, Uganda is training personnel at Mbarara University of Science and Technology (MUST) and Makerere University (MAK). The country office is based at the Makerere University College of Veterinary Medicine, Animal Resources and Biosecurity (COVAB).

Number of personnel trained

Students

- 62 MAK
- 246 MUST

Faculty_

- 20 MAK
- 20 MUST



<u>The One Health Institute (OHI),</u> <u>Makerere University</u>

Since 2016, Makerere University has conducted a didactic preservice online course in Infectious Disease Management. The 21-30-day course trains students on management of infectious and zoonoses emergencies using a One Health approach. Additional competences enhanced are: Gender, Biorisk Management, Disease Outbreak an Emergency Response, Disease Control and Environmental Health, Managing Antimicrobial Resistance, Community Engagement and Community Public Health.

Pre-service cadres undertake a ten-day field activity. Here, undergraduate students apply their knowledge and skills to identify, design and implement interventions to public health issues in communities using a One Health approach.

Graduate students undergo a two-month OHI graduate fellowship program in host institutions including FAO-ECTAD, President's Initiative on Epidemics, FHI (Family Health International) 360°, Red Cross Community Pandemic Preparedness Program (CP3), and the Infectious Disease Institute (IDI). At host sites, fellows receive mentorship in outbreak investigation, data collection and analysis, leadership, scientific writing and communication.



Nalweyiso Martha, One Health Fellow at IDI interviews a cross-border truck driver during the COVID-19 response, 2020

For more information on AFROHUN, please visit www.afrohun.org.

Food Contamination by Aflatoxins: An Overview

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Introduction

Toxins produced by Aspergillus flavus and Aspergillus parasiticus fungi contaminate food crops and pose a health threat to humans and livestock (1).

An Overview

Risk factors for fungi growth: Drought stress and poor post-harvest handling of food during drying and storage cause physical damage. This exposes food to insect damage, moist conditions and subsequently, fungi growth and aflatoxin production (2).

Types of aflatoxins: Four aflatoxins B1, B2, G1 and G2 in food crops are particularly dangerous to humans and animals. Aflatoxin M1 (AFM1), a product of aflatoxin B1 (AFB1) metabolism can be found in milk (3).

Foods at risk: Most human exposure comes from contaminated nuts, grains and their derived products. Milk, cheese, almonds, figs and spices have been also associated with aflatoxins (3). In a 2013 survey, 11% of 55 maize samples were contaminated with aflatoxins (range = 12.7-123.5mg/kg) beyond the statutory limit of 5.0μ g/kg for aflatoxin B1 (4).

Impact on health: Human aflatoxicosis is characterized by acute liver failure, jaundice, lethargy, nausea and death. Chronic exposure is carcinogenic, can cause birth defects, childhood stunting and immunosuppression (1). Affected cattle, pigs and chicken present with symptoms of reduced productivity and liver and kidney damage (1).

Economic cost: Uganda loses \$577 million annually in health care costs for aflatoxin-induced liver cancer cases (5). A 12-year review of aflatoxin



contamination in sorghum, maize and peanuts reported 45% annual declines in agricultural exports of \$7.48 million (6) In 2021, Kenya imposed an import ban on Ugandan maize due to high levels of aflatoxin contamination.

Prevention and control: Application of biocontrol agents, post-harvest handling practices, resistant crop varieties, improved regulations and product monitoring (7). The Uganda National Bureau of Standards (UNBS) certifies food and feed products for import and export according to set aflatoxin limits. However, prevention and routine analysis of food products for aflatoxins by individual farmers, traders and organizations is limited by knowledge and resources.

Recommendation

Full participation of government through the Ministries of Health and Agriculture, and UNBS is needed to educate the public and enforce market regulations for aflatoxins in food.

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Rift Valley Fever Disease Occurrence in Uganda

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Introduction

Rift Valley fever disease (RVF) is a zoonotic infectious viral disease that affects humans, livestock and wildlife. In humans it manifests as mild-flu, severe hemorrhagic fever, and death. Clinical symptoms among livestock include fever, abortions and death of young ones. The RVF is transmitted by infected mosquitoes of the genera Anopheles, Aedes and Culex. Transmission is facilitated by the interaction of animals, humans and their environment (Figure 1).



Figure 1: Transmission of Rift Valley Fever disease under normal circumstances (1)

The World Organizations for Animal Health (OIE) and human health (WHO) both recognize RVF as a notifiable animal and human disease of concern. RVF causes serious socio-economic and public health consequences. It is also of major importance in the international trade of animals and animal products (2) (3). Since 2000, RVF has resulted into 1,190 cases among humans, 17,900 cases and 8,102 deaths among livestock across Sub-Saharan Africa (4).



Uganda's situation analysis

Uganda lies in the middle of the Albertine Ecosystem, also referred to as the hot spot for biodiversity and for emerging and re-emerging diseases (8). Forty percent of people live in close interaction with wildlife, livestock and humans which makes them susceptible to cross species transmission of diseases like RVF (9).

More than half (65%) of Ugandans are involved in agriculture. Interactions between livestock and humans increase risk of zoonotic diseases including RVF (3, 10). Western and North Eastern Uganda are more prone to RVF due to the abundance of a vegetation cover that favors vector breeding and the cattle rearing that favors the human-animal interaction (11).

Human and animal samples suspected of Viral Hemorrhagic Fever infection are tested at Uganda Virus Research Institute (UVRI). Following confirmation of cases, national and district task forces respond to outbreaks. Response involves investigations of exposures, case identification and management, contact tracing, health education and institution of control and prevention measures (7).

Minimizing the risks for RVF in Uganda requires building national surveillance and response capacities. National surveillance for RVF involves Ministry of Health, UVRI and Ministry of Agriculture, Animal Industries and Fisheries (12).



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Although RVF is vaccine preventable and vaccination has been adopted by most of the regional countries, it has not been adopted by Uganda (13). Also, there are gaps in access to diagnostic kits, medicines and vaccines for RVF (14).

Conclusion

Rift Valley Fever is an important zoonotic disease in Uganda. We recommend strengthening surveillance, and increasing investments in diagnostics, vaccines and drugs for future outbreaks.

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Trends and Distribution of Animal Bites and Deaths due to Suspected Human Rabies in Uganda, 2016-2020

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Introduction

Human rabies is a vaccine-preventable, viral zoonotic disease caused by Lyssavirus. It is transmitted by saliva through bites and scratches of infected mammals. The rabies virus infects the central nervous system and causes severe neurological symptoms which cause death in 100% of human cases (1).

Human rabies is distributed worldwide. Of 59,000 annual deaths, 95% occur in Africa and Asia. In Uganda, 300 deaths from suspected rabies are recorded annually (3). The disease remains a public health threat because there is no proven cure or treatment (2).

Human rabies infection can be halted before symptoms present if post-exposure prophylaxis (PEP) is received immediately after exposure. The average cost of human rabies PEP is US\$ 40 in Africa; this expense poses a financial burden on affected families whose average daily income is US\$ 1–2 per person (1).

Uganda is signatory to the Global Alliance for Rabies Control and is part of the global campaign of "zero human rabies deaths by 2030" (1). Subsequently, human rabies is one of seven prioritized zoonotic diseases. However, the trends and distribution of human rabies infection is poorly understood and underestimated due to lack of accurate data, under reporting and misdiagnosis (4). Since 2001, animal bites among humans are used by Ministry of Health (MoH) to track the potential risk of exposure to rabies in Uganda (5).

We conducted a secondary analysis of routinelycollected surveillance data on animal bites and suspected human rabies deaths from 2016 to 2020.

Methods

At health facilities, an animal bite is defined as exposure to a bite from an animal that could potentially transmit rabies. A suspected human rabies case is a person with history of contact with a rabid animal with one or more of: headache, neck pain, nausea, fever, fear of water, anxiety, agitation, abnormal tingling sensations or pain at the wound site.

Animal bites and human rabies data is reported through the Health Management Information System- an integrated reporting system for health facilities. Using a mobile phone messaging application (mTrac), health facilities submit their weekly epidemiological reports on animal bites and suspected human rabies to the national electronic District Health Information System version 2 (DHIS2).

Using DHIS2, we extracted the number of animal bites (suspected rabies) and suspected rabies deaths by gender, age, period (year), region and district from 2016 to 2020. We extracted population data from the Uganda National Census 2014. We used Excel 2019 to generate graphs, and Quantum Geographic Information System (QGIS) to generate maps. Using linear regression, we assessed trends of incidence of animal bites at P<0.05.

Results

Between 2016 - 2020, 74,144 patients reported animal bites at health facilities. Central region reported highest number of animal bites (20,677 (28%)) while the Eastern region reported the lowest number of animal bites (15,513 (21%)) (Table 1).



Year	Distribution of animal bites (suspected rabies) by Region (%)			
	Central	Northern	Western	Eastern
2016	3,387	3,264	3,272	2,787
	(27)	(26)	(26)	(22)
2017	4,068	4,311	3,262	2,494
	(29)	(30)	(23)	(18)
2018	3,383	4,836	3,470	2,870
	(23)	(33)	(24)	(20)
2019	4,734	4,220	3,438	3,254
	(30)	(27)	(22)	(21)
2020	5,105	4,236	4,457	3,502
	(30)	(24)	(26)	(20)
2016-	20,677	20,056	17,899	15,513
2020	(28)	(27)	(24)	(21)

Table 1: Proportions of animal bites (suspected rabies) by Region, Uganda,2016-2020

From 2016 to 2019, there were more animal bites (suspected rabies) among the 5-59 age-group (47,270 (83%)) in comparison to the 0-4 age-group (7,026 (12%)) and the above 60 age-group (2,548 (5%)) (Table 2). Cases of animal bites were slightly higher among males (40,369 (54%)) in comparison to females (33,775 (46%)).

The incidence of animal bites (suspected rabies) progressively increased throughout the study period from 34/100,000 population in 2016 to 42/100,000 population in 2020 (Figure 1), though it was not statistically significant (P=0.85).

During the study period, 181 deaths due to suspected human rabies were reported with an average of 36 deaths per year. The trend of suspected human rabies deaths declined from 35 per 10,000 population in 2016 to 33 per 10,000 population in 2020.

Generally, animal bites (suspected rabies) occurred all over the country. Districts in the Northern, West Nile, Central and South Western Uganda generally reported





Figure 1: Distribution of incidence of animal bites (suspected rabies) in Uganda, 2016-2020 $\,$

Discussion

Over the five years, the trend of incidence of animal bites (suspected rabies) in Uganda increased while rabies deaths decreased. Males and persons in the age category of 5-59 years reported more suspected rabies than other groups. Districts in the Central and Northern regions reported higher annual incidences of suspected rabies in comparison to other regions.

In Uganda where rabies is endemic, the increasing incidence of animal bites suggests that exposure to rabies infection remains an important public health challenge. The finding that most of the animal bites in our study were inflicted on males is consistent with results reported from other studies (5, 7).

Although several factors may explain gender and age differences in the distribution of animal bites, occupational activities that expose individuals to dog bites are likely to be more common among males and persons above five years of age (7).



The study describes the burden of animal bites (suspected rabies) and their injuries. However, since we used passive surveillance data, our results are subject to under-reporting, inaccurate data on age, residence, occupation and the biting animal. In addition, there could have been misdiagnosis of deaths since some other diseases or conditions can present with symptoms like rabies.

Conclusion and recommendations

Exposure to potential rabid animal bites and mortality attributed to rabies infection remain serious public health challenges across all regions of Uganda. The Ministries of Health and Agriulture should call for mandatory vaccination of all dogs and mammals that closely interact with humans. Ministry of Health should improve human rabies surveillance to record and report key epidemiological data. The Ministries of Health and Agriulture should also prioritise improving human and animal rabies surveillance to help focus rabies control interventions and their monitoring.

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