MINISTRY OF HEALTH UGANDA

UNIPH

PUBLIC HEALTH Bulletin

Volume 8| Issue 4| October– December, 2023

UGANDA PUBLIC HEALTH BULLETIN

October – December, 2023

Dear Reader,

We take great pleasure in welcoming you to Issue 4, Volume 8 of the Uganda Public Health Bulletin.

We aim to inform the district, national, and global stakeholders on disease outbreak investigations, public health surveillance, and interventions undertaken in detecting, preventing, and responding to public health events in Uganda.

In this issue, we present a variety of articles including; Reporting of public health signals through the events-based surveillance system, factors associated with loss to follow-up among adults living with HIV, trends and distribution of hypertension in Uganda, measles cases reported through the case-based surveillance system.

Should you have any questions or require additional information related to articles in this bulletin please contact us on: daanyu@uniph.go.ug, akamukama@uniph.go.ug, smwebaza@uniph.go.ug, dorit@uniph.go.ug OR lbulage@uniph.go.ug

We hope you find this information valuable and we shall appreciate any feedback from you.

Thank you

Inside this issue:

Level of reporting and factors associated with reporting of public health signals by Village Health Teams in the Event-Based Surveillance System, Kabarole District, Uganda, July 2022–March 2023

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Summary
Background: Event-based surveillance (EBS) is the collection, analysis and reporting of unstructured health-related information to detect public health risks. In July 2022, the Uganda Ministry of Health (MoH) trained Village Health Team (VHT) members in Kabarole District and rolled out the EBS system with an emphasis on submitting public health signals. We assessed the level of reporting and factors affecting reporting in the EBS system by VHTs in Kabarole District, Uganda, July 2022–March 2023.
Methods: We conducted a cross-sectional study among VHTs and key informants (KI) involved in EBS activities from the district health office and health facilities in the district in March 2022, eight months after the rollout of EBS in Kabarole District. We used multistage sampling to recruit VHTs from sub-county to village levels. Purposive sampling was used to select KIs involved in EBS activities to gain insight into factors influencing EBS reporting. We collected data using an interviewer-administered structured questionnaire which comprised of socio-demographic and occupational characteristics and a KI interview guide. We assessed the proportion of VHTs who submitted any public health signal in the EBS system from July 2022–March 2023. Multiple logistic regression analysis was used to identify factors associated with reporting. Qualitative data were analyzed using thematic content analysis.
Results: Among 380 participating VHTs from 189 villages, 258 (68%) were female, 262 (69%) had attained secondary school education, and 288 (76%) had worked >5 years as a VHT. Mean age was 44±12 years; median work experience as a VHT was 7 years (interquartile range: 5-19 years). Ninety-one (24%) respondents had reported a public health signal in the EBS system in the last eight months. Reporting was associated with age >45 years (adjusted odds ratio [aOR]=2.4; 95%CI: 3.3-5.7), being female (aOR=2.8; 95%CI: 2.0-5.7), doing VHT work >5 days per week (aOR=4.4, 95%CI: 1.2-5.1), and having at least secondary school education (aOR=1.1, 95%CI: 1.2-4.8). Factors influencing reporting included remuneration, feedback, and support supervision from the district health authorities.
Conclusion: Less than a quarter of VHTs in Kabarole District reported public health signals in the EBS system during the eight-month period following implementation. Leveraging older, more experienced VHTs with higher education levels as mentors and providing routine support supervision of VHTs may improve reporting of public health signals in the EBS system.

Introduction
Event-Based Surveillance (EBS) involves collection, monitoring, assessment and interpretation of primarily unstructured, ad-hoc information regarding health events that may present acute public health risk [1]. Such information can come from diverse sectors including formal and informal data from human, animal, environmental, and other sectors [2, 3]. The overall goal of EBS is to enhance timely early detection of outbreaks and other public health threats. In low-resource countries such as Uganda, where routine surveillance is still weak, EBS can be a supplementary tool for indicator-based surveillance (IBS), the more standard approach to national surveillance systems [4]. Event-Based Surveillance strengthens the early warning function of national surveillance systems, improves their ability to generate data for action, and facilitates rapid signal verification and response [5].
To promote the adoption of EBS, the World Health Organization (WHO) published guidelines to help member states design event-based surveillance systems and suggested actions needed to improve International Health Regulation (IHR) capacities for health security in 2019[6]. To date, EBS has been adopted by several countries as a way of expanding the detection capacity of their existing surveillance systems [1, 7, 8].
Despite the potential advantages of the EBS system and the availability of guidelines to design it, countries still struggle to sustainably and effectively implement it [9]. This may be due to a limited understanding of its key principles or how best to implement it at the national level.
To promote the adoption of EBS, in July 2022 the Uganda Ministry of Health, together with partners, identified and trained community

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health workers (known as Village Health Team (VHT) members. Village Health Team from several districts, including Kabarole District, were trained to rollout the EBS system. However, the success of the rollout and the factors influencing VHTs reporting of public health signals in EBS are unknown. We evaluated the level of VHT reporting and the factors influencing reporting of public health signals in the EBS system eight months after its roll-out to provide recommendations to the Ministry of Health (MoH).

Methods

Study design and setting

We conducted a cross-sectional study using both qualitative and quantitative methods from March 20–26, 2022, in Kabarole District, located in southwestern Uganda. The district acts as a gateway to the eastern Democratic Republic of Congo's (DRC) border districts of Kasese (in the west) and Bundibugyo (in the northwest). Kabarole's location exposes it to elevated risk of various outbreaks and public health events that may stem from its neighbours, most recently Ebola and measles[10]. The area also receives high numbers of refugees [11]. Kabarole District has a population of 348,000 [12], 15 sub-counties, 52 parishes, and 346 villages. It has an estimated 1,048 VHTs who participate in public health campaigns and perform community disease surveillance. The Ministry of Health guides that a village should have at least 4-5 VHTs depending on the population density [13]. In July 2022, the Uganda Ministry of Health together with partners identified and trained 528 VHTs in Kabarole District. They were trained for a period of one week in EBS on how to detect signals, how to record them in the VHT and EBS notebooks, and how to transmit them to the centre MoH by means of SMS using 6767 platform or to the electronic Integrated Disease Surveillance and Response (eIDSR) system.

Structure and reporting of signals in the Uganda Event Based System

The EBS unit at the National Public Health Emergency Operations Center (NPHEOC) coordinates all EBS activities in the country. The NPHEOC is situated in the Division of Public Health Emergencies under the Department of Integrated Epidemiology Surveillance and Public Health Emergencies. This department is supervised by the Directorate of Public Health, which reports to the Director General of Health Services of the MoH at the National level.

Public health signals can be sent by any community member, including VHTs, and are mainly received from communities, schools, and hospitals. They are transmitted through the text messaging platform; the 6767, the eIDSR) platform or phone calls on a toll-free hotline to the EBS unit at the NPHEOC. These public health signals can also be reported to the nearest health facility. The EBS unit at the NPHEOC also does routine media scanning and social media monitoring. Once signals are reported, the EBS team at the NPHEOC triages them and sends them to the district for verification by the district team whether false or true. This stage forms the basis of decision-making about whether to keep the signal, watch, respond or ignore it. VHTs receive feedback via phone calls from the NPHEOC or district health authorities.
Together with partners, the MoH carried out trainings and developed several reporting tools, guidelines, and standard operating procedures (SOPs) for EBS to facilitate its nationwide implementation in 2022 [14]. The guidelines indicate the priority events and signals (Table 1) that are supposed to be reported in the EBS system. Community signals are broad, non-disease-specific and are simplified for easy comprehension by VHTs and community members. A VHT is expected to report them immediately using the available communication channels.
EBS has own reporting channels where information is sent through, although sometimes this information is also embedded in the Indicator Based Surveillance (IBS) system. At the end of every month, all public health signals from the different districts are submitted to the EBS unit at the NPHEOC for analysis.

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Table 1: List of public health signals developed by the Ministry of Health, Uganda

Human signals Unexplained bleeding from any part of the body in a person of any age. A child below the age of 15 years with sudden onset of weakness in any one of the limbs Anyone with fever and rash Any occurrence of unusual signs, symptoms or deaths Two or more persons with similar signs and symptoms in the same location (i.e. school, village, workplace, prison, country, region, etc.) Sudden death in an apparently healthy individual Anyone with three or more watery stools in 24 hours Respiratory symptoms with fever in any person who has recently travelled abroad in the last 14 days. Anyone who gets severe symptoms following vaccination. Unusual numbers of children absent from the same school or class due to same illness Unusually high number of people from the same location buying drugs for the same illness from a drug shop.
Environmental signals Massive growth of algal bloom (green growth) or water weeds in water bodies e.g. lakes, rivers or streams Improper waste disposal, leakage or spillage on land, in air or water bodies Unusual change in physical water quality parameters of drinking water sources (e.g. colour, taste, odor, suspended solids, turbidity) Occurrence of an environment hazard e.g., flood, landslide, earthquake, frequent and more intense earth vibrations, release of gasses, cracks on the ground Unexplained death of aquatic animals (e.g., fish, hippos, etc.) Reported outbreak of water related diseases in a health facility Sudden increase in average atmospheric temperature noticed for two days
Animal signals Sudden death of an animal Any animal presenting with unusual signs or behaviour (e.g. aggression, bleeding, dizziness, weight loss, isolation from other animals, diarrhoea, body swellings, limpness, loss of hair, coughing, excessive drooling, blindness) Any animal with a loss in production (e.g. milk, eggs, abortions)

Sample size determination and sampling procedure

We used the formula by Kish-Leslie for determination of sample size for single proportion [15]. We utilized a 56% estimated proportion of VHTs reporting surveillance information with a margin of error of 5%, and obtained a sample size of 380 respondents [16].

We used multi-stage sampling to select VHTs. A list of sub-counties for which VHTs were trained in EBS was obtained from the Kabarole District Health Office. Twelve sub-counties had their VHTs trained in EBS system. From this list, 6 sub-counties were randomly selected. All parishes and villages from the selected sub-counties were considered for the study, for a total of 190 villages. At the village level, two VHTs were randomly selected and interviewed after obtaining their consent.

For qualitative data, 12 key informants were purposively selected because of their involvement in EBS activities. These included health facility disease surveillance focal persons, the regional epidemiologist, the assistant district health officer, district surveillance focal person, the district veterinary officer, the district biostatistician, and the district health inspector.

Data collection instruments and study variables

Our independent variables comprised socio-demographic and occupational characteristics including age, sex, level of education, years of residence in the village, primary source of income, work experience as VHT, days worked per week as a VHT, having received training in the EBS system, having received EBS job aids, having sent public health signals in the EBS system, the method used to report public health signals, reason for not reporting public health signals, having held monthly VHT meetings, having received monthly supervision on EBS reporting and whether the VHT received feedback after sending public health signals.

The outcome variable of interest was the reporting of public health signals by VHTs in the EBS system. Reporting of public health signals was dichotomized into a binary outcome (yes/no) where 'yes' were VHTs who self-reported submission of any public health signal in the

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EBS system in 8 months after roll out from July 2022–March and 'no' were VHTs who did not.

We collected quantitative data using an interviewer administered structured questionnaire which was designed based on other studies done on EBS [7]. The questionnaire was translated into the local language (Rutooro) and verified by a second translator, and inconsistencies were corrected. Respondents completed the interview in their preferred language of either Rutooro or English, with Rutooro responses being translated into English.

Qualitative data were collected using a key informant interview guide. The interview guide covered the following domains: (1) barriers and facilitators to reporting of public health signals by VHTs in the EBS system, (2) knowledge and experience of the EBS system and its utilization amongst VHTs, (3) scaling up the utilization of the EBS system by VHTs in reporting public health signals. We specifically inquired about availability and utilization of EBS reporting tools and drafting of summary reports, timeliness of reporting by VHTs, signal verification and giving feedback to VHTs, explored factors that are deemed crucial to operationalize of EBS activities, including funding, renumeration, support supervision, holding regular meetings, mentorships and training.

Data management and statistical analysis

We entered data into Microsoft Excel and exported to Stata version 16 software (Stata Corporation, College Station, Texas, USA) for analysis. Data that were continuous and normally distributed like age were represented as mean and standard deviation (SD), while continuous non-normally distributed data like work experience as a VHT, number of days between occurrence of public health signal and reporting in the EBS system and number of days between submission of signal and receiving of feedback were represented as medians with interquartile ranges. We summarized categorical data like sex, level of education, source of income, knowledge of EBS, having received EBS job aids, method used to send signals, having received feedback after sending public health signals, having monthly meeting and having received monthly supervision on EBS reporting by as frequencies and percentages.

The reporting rate of public health signals was calculated as the percentage of respondents who had submitted any public signal in the EBS system during July 2022–March 2023.

Multiple logistic regression analysis was conducted to identify factors associated with reporting of public health signals in the EBS system. In this analysis, reporting of public health signals was dichotomized into binary outcomes (yes/no). The association between independent variables and the outcome variable was presented as odds ratios (ORs) and 95% confidence intervals (CIs).

For qualitative data, the audio recordings obtained from the KII sessions were transcribed verbatim and compared, coding and analysis of the transcripts were done using thematic content analysis [17]. Quotes from the participants that best described the various themes and sub-themes were stated.

Ethical considerations

We conducted this activity in response to assessment of capacity in early detection of disease outbreaks. The Ugandan MoH authorized this activity. This activity was reviewed by US CDC and was conducted consistent with applicable federal law and CDC policy. §§See e.g., 45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. §241(d); 5 U.S.C. §552a; 44 U.S.C. §3501 et seq. The office of the Center for Global Health, US Center for Disease Control and Prevention determined that this activity was not human subject research and with its primary intent being for public health practice or disease control.

We obtained permission to conduct the activity from the district health authorities of Kabarole District. Permission was also obtained from the chairpersons of the different local council one (LC 1) authorities in the different villages where the VHTs operated from. LC 1 is the smallest administrative unit at the village level.

We obtained written informed consent from all the respondents who took part in the activity. They indicated their consent by checking an appropriate box for consent before proceeding with the interviews. Participants were assured that their participation was voluntary and that there would be no negative consequences for declining or withdrawing from the activity. Data collected did not contain any individual personal identifiers and information was stored in password-protected computers, which were inaccessible by anyone outside the investigation.

Results

Characteristics of village health team members reporting in the event-based surveillance system, Kabarole district, Uganda, July 2022–March 2023 (N=380)

All 380 participants that were selected were interviewed (100% response rate). Among these, 258 (68%) were female, 262 (69%) had at least secondary level education, 288 (76%) had a work experience of >5 years as a VHT, and 319 (84%) worked ≤5 days a week as VHTs. The mean age of respondents was 44±12 years (range: 21-58 years). The median work experience as VHT was 7

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years (interquartile range [IQR]:1-19), median number of days between occurrence of a public health signal and reporting in the EBS system was 3 days (IQR:1-9), and the median number of days between submission of a public health signal and feedback was 8 days (IQR:3-26). Most respondents (304; 80%) said they had received EBS training (Table 2).

Table 2: Characteristics of village health team members reporting in the event-based surveillance system in Kabarole district, Uganda July 2022–March 2023 (N=380)

Characteristic	Number	(%)
Sex		
Male	122	(32)
Female	258	(68)
Age in years		
≤ 45	206	(54)
>45	174	(46)
Education level		
Primary	103	(27)
Secondary	262	(69)
Tertiary	15	(4)
Years of residence in the village		
≤10	46	(12)
>10	334	(88)
Primary source of income		
Crop cultivation	281	(74)
Business	61	(16)
Livestock farmer	8	(2)
Others	30	(8)
Work experience as VHT in years		
≤5	91	(24)
>5	289	(76)
Days worked per week as VHT		
≤5 days	319	(84)
>5 days	61	(16)
Received training on EBS		
Yes	304	(80)
No	76	(20)
Received EBS job aids		
Yes	262	(69)
No	118	(31)
Sent public health signals in EBS system in last 8 months		
Yes	91	(24)
No	289	(76)
Method used to report signals		
Text message	365	(96)
Telephone call	11	(3)
Other	4	(1)
Reason for not reporting		
Absence of events worth reporting	297	(78)
Poor telecommunication network	66	(17)
Lack of motivation	17	(5)
Received feedback after sending public health signals		
Yes	27	(7)
No	353	(93)
Held monthly VHT meetings		
Yes	213	(56)
No	167	(44)
Received monthly supervision on EBS reporting		
Yes	38	(10)
No	342	(90)

Among the 380 VHTs, 91 (24%) reported a public health signal in the EBS system in the eight months after rollout. The median number of days between occurrence of a public health signal and reporting in the EBS system was 3 days (IQR:1-9) and the median number of days between submission of a public health signal and feedback was 8 days (IQR:3-26). Three hundred sixty-five respondents (96%) used text messages through the IDSR 6767 platform. The reasons for non-reporting were; absence of events worth reporting 297 (78%), poor telecommunication network 66 (17%), lack of motivation due to failure to receive feedback about the sent signals from the district 17 (5%) (Table 2)

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Reporting of public health signal amongst village health team members in the event-based surveillance system, Kabarole district, Uganda, July 2022–March 2023

Most (54%) respondents reported an environmental hazard signal of heavy rains and hailstorms, while 23% reported acute respiratory symptoms with fever. Two-thirds (65%) had heard the signals they reported on the community local radio as their primary source before submitting the signal to the EBS system (Table 3).

Table 3: List of signals reported by village health team members and their sources in the event-based surveillance system in Kabarole District, Uganda July 2022–March 2023 (N=91)

Type of signals reported	N	(%)
Heavy rains and hailstorms	49	(54)
Respiratory symptoms with fever in a person of any age	21	(23)
A person with fever and rash	10	(11)
Two or more persons with similar signs and symptoms in the same location	5	(6)
Unexplained bleeding from any part of the body	4	(4)
Sudden animal deaths	2	(2)
Sources of signals		
Community local radio	59	(65)
Community members	17	(19)
Health workers	10	(11)
Faith based congregations (churches and mosques)	3	(3)
Livestock farmer	2	(2)

Factors associated with reporting of public health signals amongst village health team members in the event-based surveillance system, Kabarole District, Uganda, July 2022–March 2023 (N=380)

In bivariate analysis, age, sex, days worked per week, level of education, the method used to report signals and having monthly village meetings had a statistically significant relationship with signal reporting while years of residence in the village, primary source of income, having received EBS job aids, having received feedback after sending the public health signal, and having received monthly supervisory visits on EBS reporting were not.

In multivariable analysis, reporting of public health signals in the EBS system was associated with age >45 years (AOR 2.4; CI: 3.3-5.7 and being female (AOR 2.8; CI: 2.0-5.7). Doing VHT work for >5 days per week showed a significant association with reporting (AOR 4.4 CI: 1.2-5.1). Additionally, having secondary school and higher -level education was linked to reporting (AOR 1.1 CI: 1.2-4.8), as well as having monthly village health meetings (AOR 1.2 CI: 4.6-7.9) (Table 4).

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Table 4: Factors associated with reporting of public health signals in the event-based surveillance system amongst village health team members in Kabarole District, Uganda, July 2022–March 2023 (N=380)

Characteristic	Reporting of public health signals in EBS system				Bivariate analysis		Multivariate analysis	
	Yes (n=91)		No (n=289)		OR (95%CI)	P Value	Adjusted OR (95%CI)	P Value
	n	(%)	n	(%)				
Age in years								
≤45	26	(29)	180	(62)	Ref		Ref	
>45	65	(71)	109	(38)	2.4 (3.3-5.7)	0.006	1.8 (2.1-6.9)	0.019
Sex								
Male	35	(39)	87	(30)	Ref		Ref	
Female	56	(61)	202	(70)	3.2 (4.5-6.4)	<0.001	2.8(2.0-5.7)	<0.001
Education level								
Primary	17	(19)	86	(30)	Ref		Ref	
Secondary	74	(81)	193	(70)	1.4(1.7-5.6)	0.041	1.1(1.2-4.8)	0.032
Days worked per week as VHT								
≤5 days	39	(43)	280	(97)	Ref		Ref	
>5 days	52	(57)	9	(3)	3.3 (2.5-4.2)	0.001	4.4(1.2-5.1)	0.041
Received training on EBS								
No	25	(27)	51	(18)	Ref		Ref	
Yes	66	(73)	238	(82)	2.1 (1.4-3.3)	0.002	1.5 (0.9-2.7)	0.729
Method used to report signals								
Text message	86	(94)	283	(98)	Ref		Ref	
Telephone call	5	(6)	6	(2)	0.6 (1.3-4.4)	0.041	0.8 (0.4-2.8)	0.652
Held monthly village health meetings								
No	30	(33)	137	(47)	Ref		Ref	
Yes	61	(67)	152	(53)	1.7(1.3-9.7)	0.048	1.2 (4.6-7.9)	0.018

Qualitative results: Factors affecting reporting of public health signals in the event-based surveillance system amongst village health team members in Kabarole District, Uganda July 2022–March 2023 (N=12)

During the interviews with 12 key informants, two themes emerged from the content analysis as being linked to reporting of public health signals: motivation-related factors and communication-related factors.

Motivation-related factors

This theme included two subthemes, renumeration and feedback. It was noted that these factors hindered VHTs from carrying out their EBS reporting activities. Lack of renumeration to carry out EBS activities was believed to affect the reporting of signals by the VHTs in the EBS system. The VHTs conducted EBS activities without any form of compensation for their transport and airtime.

…although the work is voluntary in nature, VHTs need a motivation package which may include a monthly allowance, transport refund or some form of incentive…" KI from Rwenzori Region

"…during the roll out, VHTs were expecting a payment as they carryout EBS activities in their villages, unfortunately, the payment did not come through which made them demotivated and some decided to abandon the program……" KI from Mugusu Town

Lack of feedback after sending signals to the EBS system was believed to be another demotivating factor. Feedback in terms of confirmation of receipt of signals, verification of signals and response after verification is supposed to come from the district health office but never comes through. The district surveillance focal person who is in charge of feedback noted that the district lacks resources to verify signals and thus may not give timely feedback to the VHTs.

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"…Sometimes we don't get feedback, even when the district people come on the ground, they don't talk to us about the performance of VHTs in terms of reporting of public health signals……" KI from Rweganju Subcounty.
"…Feedback is among the key motivating factors for the VHTs to continue sending signals, but we have not done much as a district in the last 8 months in giving feedback…we lack resources necessary for signal verification and this affects the process of giving timely feedback …" KI from Kabarole District Health Office

Structural and communication-related factors

This included two subthemes: supervisory meetings and clarity of signals. These factors affected the reporting of signals in the EBS system**.** It was noted that there were very few supervisory meetings held between the VHTs and their respective supervisors. The low frequency of meetings often leaves VHTs on their own without any guidance on reporting.
"…*I usually hold one meeting per quarter with the VHTs and this also depends on the availability of time and resources*…" KI from Rweganju Subcounty.
"…EBS is a quick system for reporting but the VHTs send signals on their wish and they don't report in time… mainly because they are not well supervised in this area…" KI from Kiika Town
It was noted that some VHTs do not have clear information on which signals they should report in the EBS system. This leaves out a large number of unreported signals.
"…some VHTs believe that they should only report major occurrences happening in their villages… this leaves many signals which appear small to them unreported…" KI from Kabarole District Health Office
"…currently, the task of the signal verification at the district is done by the District Surveillance Focal Person, we need a team to do this instead of an individual who may ignore some signals because they lack clarity…" KI from Kabarole District Health Office

Discussion

We assessed the level of reporting of public health signals and factors influencing reporting of public health signals by VHT members in the EBS system in Kabarole District. Less than a quarter of VHTs in Kabarole District reported public health signals in the EBS system during the eight-month period following implementation. Reporting was associated with being aged >45years, being female, working for more days of the week, having secondary level education and having regular monthly village health meetings. This study provides opportunities to improve on the reporting rates of public health signals amongst VHTs in the EBS system.

Less than a quarter of VHTs reported public health signals in the EBS system eight months after roll out. This reporting rate of public health signals observed by the VHTs was low. A study conducted in Sudan among community health workers reported an 85% (45/53) incidence of reporting of signals in the EBS system [1]. The high performance of the EBS in Sudan was attributed to the positive attitude of the CHWs and their willingness to continue performing the EBS activities. Other factors were regular training and supportive supervision received from the national level. The low performance from our study is possibly because of lack of supervision of VHTs by their supervisors on reporting of public health signals. In our study, we found that 342 (90%) of VHTs did not receive supervision on EBS signal reporting. Consequently, as noted by one KI, the resultant effect of this inadequate supervision was that VHTs reported signals as they so wished. Support supervision of community health workers is a crucial component of a successful public health surveillance system in the delivery of quality service [18]. It is likely that individuals who are provided with support supervision report accurate and timely public health signals. It is advised that routine regular support supervision be provided to VHTs about reporting of signals in EBS signals. This will help in identifying and addressing barriers to reporting in order to facilitate adequate reporting of public health signals.

Older aged VHTs were more likely to report public health signals than younger ones. This may be because older people may have more experience and knowledge about health issues due to longer periods of service hence, making them more likely to notice and report public health signals [19]. Studies have demonstrated that older workers generally have higher levels of performance than younger ones and this is attributed to the cumulative increase in work experience and confidence over the years [20]. This suggests that older VHTs could be a vital human resource in implementation of EBS activities. In contrast to our findings, a study conducted in Benin showed that performance of health workers declined with increasing age where younger health workers outperformed old ones [21]. The reason for this was that younger health workers are more eager to look for new knowledge to improve on their performance while older health worker relied on prior knowledge and experience.

Females were more likely to report public health

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signals than the males. Females may have a different communication style as compared to males. Female health workers are more likely to be more empathetic, approachable and open in their communication than males [22, 23]. This attribute makes them receive more reports of public health signals than their male counterparts. Although there seems to be a gender disparity in reporting, training of VHTs in communication skills could be beneficial to all community health workers.

Respondents with at least a secondary school level of education were more likely to report public health signals. That is VHTs with a secondary school level education have high literacy levels and as such possess stronger communication skills and knowledge on public health issues [24]. This makes them have higher reporting possibilities of public health signals than those with primary school level of education. A study conducted in Uganda in 2019 amongst community health workers demonstrated that attaining secondary level of education was associated with higher performance of community health activities [25] including regular reporting. Recruiters of VHTs could take the advantage of high literacy levels exhibited by secondary school level of education for good performance.

VHT members who worked for more days in a week reported more public health signals as compared to those who worked less days. This could possibly be because VHTs who worked more frequently may have had more opportunities of interacting with community members and were able to identify and report potential public health signals. The extensive daily interactions and ties of community health workers with their respective communities provides an avenue for building trusted relationships and health promotion [26, 27] which facilitates easy reporting of public health events and signals. Different motivation factors that have enabled VHTs smoothly carryout their daily routine activities have been identified. In our study one KI stressed that renumeration of VHTs with a monthly stipend, airtime or another form of motivation would improve performance. We recommend provision of incentives that facilitate the regular interaction of VHTs with community members where they serve.

Holding regular monthly VHT meetings was associated with reporting of public health signals in the EBS system. It is likely that regular meetings provide an opportunity for VHTs to share more about public health issues affecting their communities and how to detect and report signals. This study supplements the findings of an Ethiopian study which demonstrated that regular interaction through meetings amongst community health workers builds trust, team work and improves performance [28]. It is advisable that VHTs have regular meetings as a tool for performance review, planning and performance improvement.

Study limitations and strengths

We acknowledge several limitations in our study. Firstly, relying on self-reported data regarding the submission of public health signals in the Event-Based Surveillance (EBS) system introduces the risk of response bias, including the possibility of social desirability bias. Secondly, the cross-sectional design of the study restricts our ability to establish causal relationships between the study variables. However, despite these limitations, our study employed a mixed-methods approach, combining both qualitative and quantitative methods, which enhanced the robustness of our findings. Furthermore, the insights gained from this study offer valuable evidence to the Ministry of Health (MoH) regarding the primary drivers of reporting public health signals in the EBS system. This evidence can inform the development of policies aimed at supporting the effective implementation of the EBS system.

Conclusion

The results of our study reveal a low incidence of reporting public health signals in the EBS system by VHTs in Kabarole District during the initial eight-month period following system implementation associated with older age, female gender, increased workdays, secondary school and higher-level education, and regular attendance at monthly village health meetings. These findings offer important considerations for the Ministry of Health to enhance reporting practices among VHTs in the EBS system. Our recommendations include the implementation of routine supervision and mentorship programs focused on improving reporting skills, targeted communication training, recruitment of VHTs with secondary education, regular organization of village health meetings, and provision of incentives to support VHT activities, including the reporting of public health signals.

Conflict of interest

The authors declare that they have no conflict of interest.

Authors' contributions

RZ: participated in the conception, design, analysis, interpretation of the study and wrote the draft bulletin; RM, ZK, AK, RA, JFZ, HNN, PCK, BK, and LB reviewed the report, reviewed the drafts of the bulletin for intellectual content and made multiple edits to the draft bulletin; RM, BK, LB, JK, IM, and

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ARA reviewed the final bulletin to ensure intellectual content and scientific integrity. All authors read and approved the final bulletin.

Acknowledgements
We appreciate the VHTs who participated in this study. We are also grateful to the administration of Kabarole District Office for the support provided during this investigation. We also appreciate the Uganda Public Health Fellowship Program and the Ministry of Health, Public Health Emergency Operations Centre for the technical support and guidance offered during this study. Finally, we thank the US-CDC for supporting the activities of the Uganda Public Health Fellowship Program.

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Trends and distribution of hypertension in Uganda, 2016-2021

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Summary
Background: Hypertension increases the risk of both cardiovascular and cerebrovascular diseases, leading to the premature death of an estimated 9.4 million persons per year worldwide. The overall prevalence of hypertension among adults in Uganda increased from 24.3% in 2014 to 31.5% in 2016. Public health interventions such as the introduction of walkways and cycling lanes, promotion of consumption of healthy foods, cessation of smoking, and promotion of health seeking have been made towards reducing hypertension in Uganda through the Ministry of Health (MoH). We described the distribution and trends of hypertension in Uganda, 2016-2021 to gauge the impact of the instituted control measures.
Methods: We conducted a descriptive analysis of out-patient department (OPD) national, regional, and district-level aggregated surveillance data on hypertension abstracted from the District Health Information System (DHIS2). As per DHIS2, hypertension was defined as a blood pressure ≥ 140/90 millimetres of Mercury. We abstracted and analyzed the data using MS Excel and STATA. We calculated prevalence by dividing the number of cases with reported hypertension by the total number of outpatients attended to per 1,000 population. We used the Mann-Kendall Trend test to assess trends of hypertension, January 2016-December 2021. We described the spatial distribution of hypertension by region.
Results: Overall, a total of 3,534,001(average: 589,000) cases of hypertension were recorded during 2016-2021. There was an increasing trend in the prevalence of hypertension from 2016 to 2021 across Uganda (MK=13, p=0.02). Over the analysis period, both the Western Region (MK=13, p=0.02) and the Central Region (MK=13, p=0.02) had an increasing trend in the prevalence of hypertension. There was no observable trend in both the Northern and Eastern Regions.
Conclusion: There was an increasing trend of hypertension in Uganda. There is a need to study the associated factors and formulate new strategies to mitigate the increasing burden.

Introduction
Hypertension is a major risk factor for cardiovascular and cerebrovascular diseases, leading to the premature death of an estimated 9.4 million people annually. The World Health Organization (WHO) estimates about 22% of the population aged ≥18 years have hypertension [1-4].

Approximately 75% of the world's hypertensive population lives in low-income and middle-income countries (LMICs). The prevalence of hypertension in LMICs increased by 7.7% between 2000 and 2010 which presents a major concern [5]. The prevalence of hypertension is highest in the African region, with about 46% compared to 35% in the Americas, and 40% elsewhere in the world. Sub-Saharan Africa (SSA) contributes more than half (27.4%) of the African population affected [2, 5]. In 2019, the global prevalence of hypertension was stable with a decreased net effect in high-income countries and an increase in some low-income and middle-income countries. However, the prevalence increased in most low-income and middle-income countries. Hypertension prevalence was highest throughout central and eastern Europe, central Asia, Oceania, southern Africa, and some countries in Latin America and the Caribbean [6].

In Uganda, the most recent data on hypertension among adults was from the Uganda 2014 STEPwise approach to non-communicable disease risk factor surveillance (STEPS) survey [7] and national epidemiological study conducted in 2016 by Lunyera et al [8] showed the overall prevalence at 24.3% and 31.5% respectively. Notably, this STEPS survey recommended public health interventions to curb the prevalence of hypertension in Uganda. Public health interventions such as the introduction of walkways and cycling lanes, promotion of consumption of healthy foods, cessation of smoking, and promotion of health seeking have been made towards reducing hypertension in Uganda through the Ministry of Health (MoH). Despite these efforts to reduce the burden of hypertension, their impact has not been measured. We described the distribution and trends of hypertension in Uganda, 2016-2021 to gauge the impact of the instituted control measures.

Methods
Study setting, design, and data source
We conducted a descriptive analysis of out-patient department (OPD) national, regional, and district-level aggregated surveillance data on hypertension abstracted from the District Health Information System (DHIS2), 2016-2021. Uganda is located in the East African region with approximately 46 million people and 45% of this population being adults

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aged ≥18 years. It is divided in 15 administrative regions currently but were previously 4 namely: Northern, Western, Central, and Eastern Regions covering 136 districts with Kampala District as the capital. Uganda is a developing country with 75% of its population staying in rural areas. However, the urban population has increased over the last five years at a rate of approximately 6%. Hypertension-related services that include screening and management are provided from Sub-county level where health centre IVs are located to tertiary health facilities located at district, regional, and national levels. Screening of hypertension is not available at health facilities lower than health centre IV.

The DHIS2 is an open-source web based platform that is used to collect, report, and analyze aggregate data that is routinely generated across health facilities in Uganda. Uganda has 136 districts, which are distributed, across the 15 regions as designated by the Ministry of Health. The healthcare system comprises government and privately owned health facilities which are organized in a hierarchical order from Health Centre (HC) II (found at parish level), HCIII (found at county level/ sub-district), HCIV (found at county/health sub-district level), district hospital (found at district level), regional referral hospital found at regional level), and the national referral hospital (found at national level). The DHIS2 collects data on priority diseases, conditions, and events of public health importance including hypertension from the Health Management Information system (HMIS). The HMIS is a paper-based system in which health facilities record patient data on conditions of interest. These data are later entered into the electronic DHIS2 and aggregated from all health centres in the country.

Study variables, data abstraction, management, and analysis

We abstracted data regarding adult OPD attendance, hypertension status, reporting rate, at district, region, and national level for the years (2016-2021). Data were cleaned using MS Excel and imported into STATA version 16 software for analysis. We calculated the prevalence of hypertension per 1,000 OPD attendance. OPD attendance data was obtained from the monthly outpatient report Health management information system (HMIS) form 105. We calculated prevalence of hypertension at national, region, and district level. The prevalence of hypertension was calculated as the number of cases with reported hypertension divided by the total number of outpatients attended to. We demonstrated the trends of hypertension using line graphs. We used the Mann-Kendall Trend test to assess trends of hypertension from January 2016 to December 2021. Choropleth maps were drawn using QGIS software to show the spatial distribution of hypertension prevalence in the country. To further contextualize the findings, we also abstracted data on reporting rates, calculated as the percentage of complete submitted monthly reports over the study period divided by the number of expected reports.

Ethical considerations

The DHIS2 data are aggregated without individual identifiers. We sought permission to use the data from the Uganda Ministry of Health. This activity was reviewed by US CDC and was conducted consistent with applicable federal law and CDC policy. § §See e.g., 45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. §241(d); 5 U.S.C. §552a; 44 U.S.C. §3501 et seq. The office of the Center for Global Health, US Center for Disease Control and Prevention determined that this activity was not human subject research and with its primary intent being for public health practice or disease control.

Results

Reporting rates and overall prevalence of hypertension, Uganda, 2016-2021

During the analysis period (2016-2021), reporting rates for hypertension increased from 73% to 98%. There was a national overall increase in the prevalence of hypertension of 12% (MK=13, p=0.02). The greatest increase was between 2017 and 2018 (Figure 1).

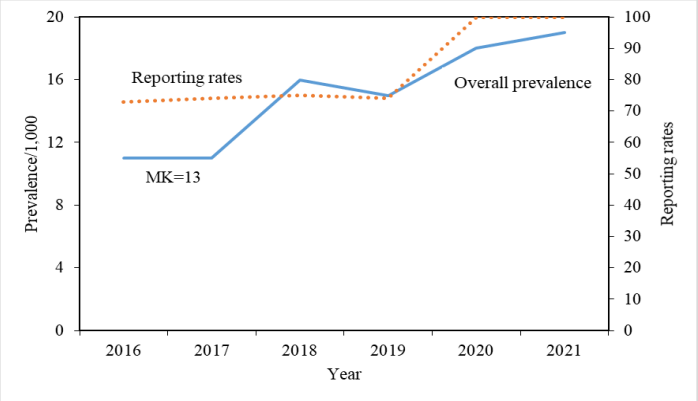

Figure 1: Reporting rates and overall prevalence of hypertension, Uganda, 2016-2021

The overall prevalence of hypertension increased significantly from 11 per 1000 in 2016 to 19 per 1,000 in 2021(MK=13, p=0.02) with a 13% annual increase (Figure 1 and Table 1).

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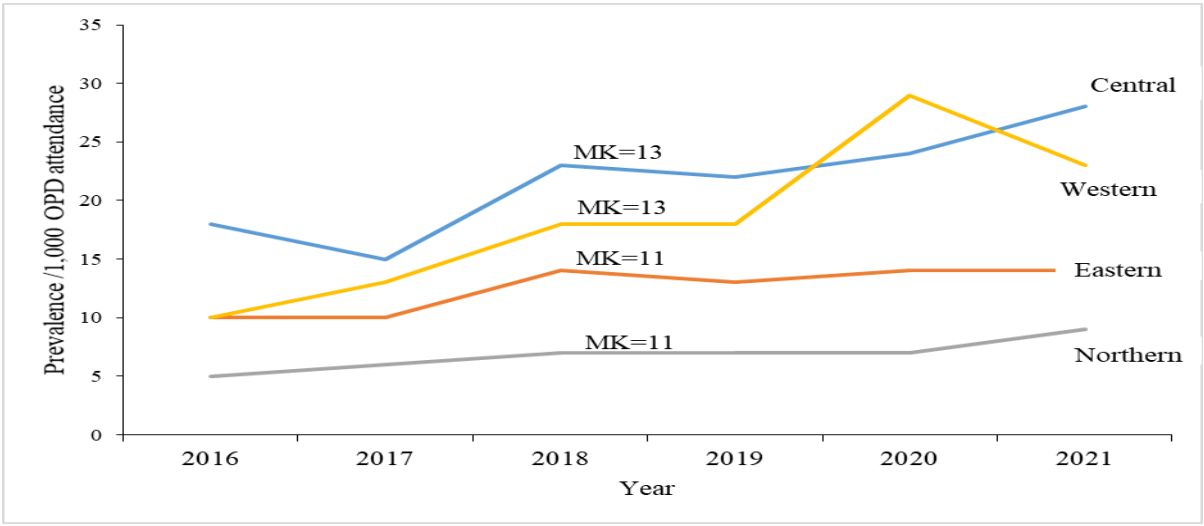

Figure 2: **Prevalence of hypertension per 1,000 Out Patient Department attendance, Uganda, by regions, 2016-2021**

Distribution of prevalence of hypertension, Uganda, by district level, 2016-2021

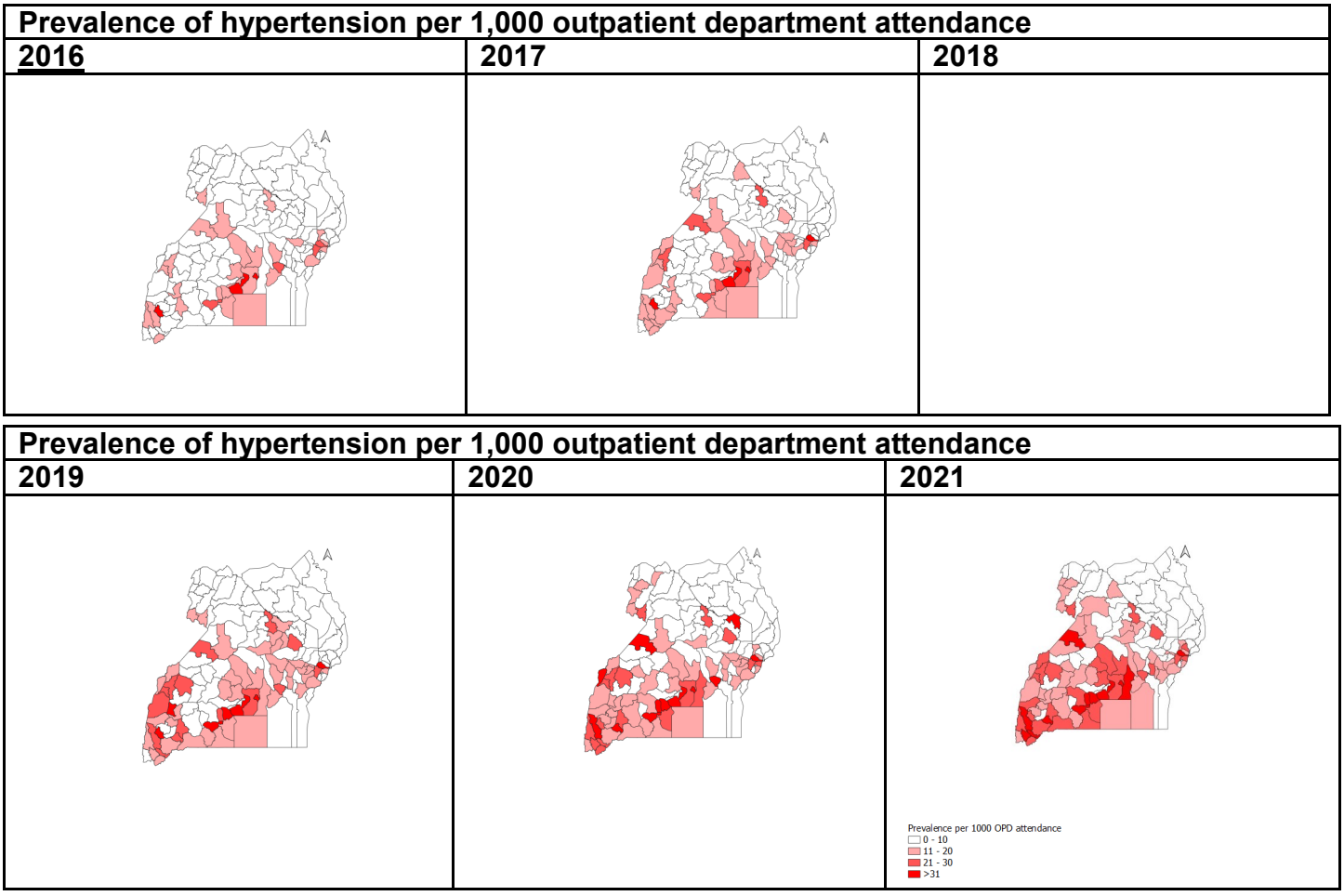

Figure 3: **Distribution of hypertension, Uganda, by district level, 2016-2021**

In 2016, only two regions, central (Kampala and Mpigi), and western (Mitooma) had districts with a prevalence of hypertension above 30 per 1,000 OPD attendance (Figure 3). By 2021, there were more districts and more regions namely; the western (Rukigi, Rukungiri, Hoima, and Rubanda) and central regions (Kampala, Mpigi, Lwengo, Kalungu, Mukono, Lwengo, and Bukomansimbi) with one district in the eastern region (Sironko) which had registered increasing trends in hypertension (Figure 3).

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Discussion

We sought to determine the trends and distribution of hypertension in Uganda, 2016 to 2021. We found a rise in the prevalence of hypertension from 11 per 1,000 to 19 per 1,000 OPD attendance with an overall rise in the prevalence of hypertension of 12%. Similarly, all regions had increases in the incidence of hypertension with the western region having the highest at 19%, followed by the northern region at 12%. The central and eastern regions had a lower rise in the prevalence of hypertension.

Our study has highlighted an increase in hypertension in Uganda as previously reported [4, 7, 9]. Relevant studies conducted around the time coinciding with our surveillance data period suggest that the increase could be attributed to the rising age of the population as well as the transition from lower to higher incomes leading to changes in lifestyles[7, 10]. The adoption of Western ways with rapid urbanization throughout the urban and rural areas of not only Uganda has led to changes in dietary patterns, including increasing consumption of food high in salt, and sugar-sweetened beverages [11, 12]. In addition, there has been a shift towards motorized transportation with consequential lower physical activity all contributing to higher rates of obesity and hence hypertension [4, 13].
Our finding that the western region has had the highest rise in the prevalence of hypertension compared to other regions could further show the shift of population to rapid urbanization as more previously rural communities become townships. This evidence is different from a study in Uganda by Lunyera et al [8] but consistent with studies done in rural Uganda by Kayima et al [4] and in rural South Africa [14].

The eastern and central regions consistently had a lower prevalence of hypertension than other regions from 2016 to 2021. This would not be explained by the regional variation of incomes in these two regions compared to the populations in the western and northern regions [10, 15]. This perhaps correlates to high consumption of fruit and vegetables, more physical activity due to lack of modern transportation, and less salt and sugar consumption [11, 12, 15, 16].

Study limitations

Reports of hypertension, together with demographics, among outpatients is entered into the National Health Management Information System and DHIS2 for patients visiting public health facilities. However, hypertension screening is not done routinely in public health facilities. Instead, it is only done for patients namely; with signs and symptoms suggestive of hypertension or who have a known diagnosis, attending antenatal care, and those for whom clinicians request blood pressure measurements for other reasons. The highlighted hypertension prevalence is likely an underestimate of the true prevalence of hypertension in Uganda.

Conclusion

These findings highlight the increasing burden of hypertension in Uganda. There is an urgent need to implement focused public health interventions such as increasing awareness of the causes of hypertension and promoting lifestyle modifications to reduce its burden, avoid unavoidable health events, and achieve a 25% reduction in hypertension by 2025.There is a need to increase awareness about the burden of hypertension and promote cost-effective and sustainable healthier lifestyles that will mitigate its risk to cardiovascular and cerebrovascular morbidity and mortality.

Conflict of interest

Authors declare that they had no conflict of interest

Authors' contributions: TK designed the study protocol, downloaded data from the DHIS2 dashboard, analysed the data, and compiled the bulletin. SZ, RM, DK, and AAR contributed to interpretation of results and writing of the bulletin and all approved the final draft.

Acknowledgments

The authors appreciate the biostatisticians and surveillance officers who ensure that reporting of surveillance data is routinely done at their respective districts. We appreciate the DHIS2 team at the Ministry of Health for managing the DHIS2 platform. We also appreciate the Uganda Public Health Fellowship Program and the Ministry of Health for the technical support and guidance offered during

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this study. Finally, we thank the US-CDC for supporting the activities of the Uganda Public Health Fellowship Program.

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Epidemiological characteristics and trends of measles cases reported through the case-based surveillance system, Uganda, 2016 – 2020

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Summary

Background: Despite 95% measles vaccine coverage in Uganda, measles is the most commonly-reported outbreak in the country. In 2015, as part of the regional measles elimination goal, World Health Organization (WHO) targeted ≥95% vaccination coverage and a measles incidence of <1 confirmed case per million population per year. We describe the epidemiological characteristics and trends of measles cases reported through the case-based surveillance system in Uganda to track progress towards elimination.
Methods: We used data from the active case-based measles surveillance system at the Uganda Virus Research Institute for 2016–2020. A suspected case was any person with fever and maculopapular (non-vesicular) generalized rash and cough, coryza or conjunctivitis diagnosed by a clinician OR any person in whom a clinician suspected measles. Laboratory-confirmed cases were suspected cases with IgM-positive results for measles. Epidemiologically-linked cases were suspected cases without laboratory confirmation but linked in place, person, and time to a confirmed case. Clinically compatible cases were suspected cases without adequate investigation. We calculated measles incidence during the study period and disaggregated it by year, age-group, sex, region, and vaccination status.
Results: Among 5,047 cases, 2,120 (42%) were clinically compatible, 1,715 (34%) were laboratory-confirmed, and 1,212 (24%) were epidemiologically linked; six (0.1%) died. Half (n=2,595, 51%) were male. Children <5 years were more affected than persons aged ≥5 years (451 vs 65/1,000,000) (p<0.0001). In total, 3,367 (67%) were vaccine-eligible; of these, 1,821 (54%) were unvaccinated. Annual incidence was 7, 29, 66, 23, and 27/1,000,000 from 2016–2020; incidence reduced after a national vaccination campaign in 2019. Overall incidence was higher among the unvaccinated than vaccinated (40 vs 36/1,000,000) (p<0.0001).
Conclusion: The measles incidence across the study period was consistently >1/1000,000, putting Uganda off track for measles elimination. Only half of the cases were vaccinated, which might suggest an overestimation of vaccination history or a challenge with vaccine effectiveness. There is likely need for intensification of regular mass measles vaccination and further studies to investigate vaccine effectiveness.

Introduction

Measles remains a significant cause of morbidity and mortality among young children globally despite the availability of a safe and effective vaccine [1]. While vaccination has considerably reduced deaths attributable to measles worldwide, it is still common in many low-and-middle-income countries, particularly in parts of Africa and Asia [2]. Globally, an estimated 9.7 million cases and over 140,000 deaths were reported in 2018, almost 50% of which were attributable to only four countries in sub-Saharan Africa [2].

In Uganda, measles is the most commonly reported outbreak despite 95% national vaccine coverage [3]. Measles surveillance in Uganda is conducted through the Integrated Disease Surveillance and Response (IDSR) framework . Within this framework, measles is listed as one of the immediately notifiable diseases that all health facilities in the country are required to report to the next level using the standard case definition specified in the IDSR guidelines. In the passive surveillance system, data is collected from suspected measles cases during visits to health facilities, and routinely reported as part of a general aggregate summary along with other notifiable diseases [5]. This is then submitted on a weekly, monthly, and quarterly basis to the Ministry of Health (MoH) through the electronic Health Management Information System (eHMIS) [4]. To complement the passive surveillance system, Uganda adopted a case-based surveillance system in 2003 where a suspected measles case is to be investigated with laboratory testing for measles-specific immunoglobulin (IgM) at the national EPI lab of the Uganda Virus Research Institute (UVRI) [6].

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The UVRI receives blood specimen from all health facilities through the laboratory sample transport hub system and it must be accompanied with a case-based form or line list filled in by the health worker investigating [7]. This information is then entered into excel and shared with key stakeholders for operational use.

In 2015, as part of the regional measles elimination goal, World Health Organization (WHO) AFRO region targeted ≥95% national vaccination coverage, and a measles incidence of <1 confirmed case per million population per year. In view of these targets, we describe the epidemiological characteristics, and trends of measles cases reported through the case-based surveillance system in Uganda to track progress towards elimination.

Methods

Study setting, design, and data source

We conducted a descriptive analysis using measles case-based surveillance data, 2016-2020, generated by all health facilities from Uganda at the Uganda Virus Research Institute (UVRI). Uganda had an estimated population of 46,210,758 in 2022 and a growth rate of 3.1% per annum [8]. The life expectancy on average is 64 years with an infant mortality rate of 43 per 1,000. Administratively, Uganda is stratified into 135 districts; with a health system comprised of decentralized healthcare services, overseen by district health teams across all districts and the central MoH [9]. The data reported through the case-based measles surveillance system comprises demographic information, clinical history, specimen submitted, investigator details, and results. The first four sections are completed by the investigator while the results section with final classification is completed upon testing by the laboratory staff.

As per the Uganda National Technical Guidelines for IDSR [10]; a suspected measles case is any person with fever and maculopapular (non-vesicular) generalized rash and cough, coryza or conjunctivitis (red eyes) as diagnosed by a clinician OR any person in whom a clinician suspected measles. A laboratory confirmed measles case is defined as suspected measles cases which had laboratory results indicating measles IgM positive. Cases confirmed by epidemiological link are suspected measles cases that did not have a blood specimen taken for serologic confirmation and were linked in place, person and time to a laboratory confirmed case. Clinically compatible cases are suspected measles cases which had not been adequately investigated. Discarded measles cases are suspected cases with negative laboratory results for measles IgM. We considered the sum of laboratory-confirmed, epidemiologically linked, and clinically compatible as measles confirmed cases, as recommended by WHO.

Study variables and data analysis

Data on measles cases for each of the years (2016 -2020) was merged into one excel sheet for cleaning and analysis. Descriptive statistics including frequency, proportions, and percentages were calculated and tabulated.

We used a line graph to illustrate trends of cases, disaggregated by classification for each of the study years. We drew choropleth maps using QGIS to show the annual incidence of measles in the various districts. We divided the annual sum of measles cases by the corresponding year's projected population estimates of reporting districts based on the 2014 census, and calculated the annual incidence rate per million.

We calculated measles incidence and disaggregated it by year, region, vaccination status, and age-group. We calculated age-specific measles incidence rates using reported cases within that age-group as the numerator and the respective projected population estimates as the denominator. The incidence rates were presented on a trend line graph.

We also plotted cases using five-year age-groups against vaccination status and corresponding incidence for each of the study years.

Ethical approval

Our study utilized routinely generated surveillance data submitted to the UVRI. The Uganda Public Health Fellowship Program is part of the National Rapid Response Team, and has been granted permission to access and analyse surveillance data to inform decision making in the control and prevention of outbreaks and public health programming. Additionally, the MOH has also granted the program permission to disseminate the information through scientific publications. We sought administrative permission to access the data from the Uganda National Expanded Program on Immunization (UNEPI) and UVRI. We stored the abstracted data set in a password-protected computer. In addition, the Office of the Associate Director for Science, U.S. Centers for Disease Control and Prevention, determined that this study was not a human subjects research with the primary intent of improving use of surveillance data to guide public health planning and practice.

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Results

Distribution of measles cases by final laboratory categorization as reported from the case-based surveillance system, Uganda, 2016-2020

During the five-year study period (January 2016 – December 2020), a total of 5,047 cases were identified; 2,120 (42%) were clinically compatible, 1,715 (34%) were laboratory-confirmed, and 1,212 (24%) were epidemiologically linked (Table 1).

Table 1: Distribution of measles cases by final laboratory categorization as reported from the case-based surveillance system, Uganda, 2016-2020

Year	Number of districts reporting measles cases	Laboratory confirmed (%)	Epidemiological link (%)	Clinically compatible (%)	Total
2016	40	129 (51)	10 (4)	113 (45)	252
2017	68	180 (18)	482 (48)	336 (34)	998
2018	119	640 (25)	351 (14)	1,589 (61)	2,580
2019	100	626 (70)	203 (22)	78 (8)	907
2020	43	140 (45)	166 (54)	4 (1)	310
Total		**1,715**	**1,212**	**2,120**	**5,047**

Characteristics of measles cases reported from the case-based surveillance system, Uganda, 2016 - 2020

Of the 5,047, fifty-one percent of the cases were male. Median age was 5 years (Range: 0-67). Children in the 0-4 age-group formed the majority of cases (59%) followed by the 5-9 age-group (22%). The majority were from rural districts (91%). Seventy-six percent were outpatient visits, while 24% were inpatients among whom 6 died (Case Fatality Rate: 0.1%). In total, 3,367 (67%) were vaccine-eligible; of these, 1,821 (54%) were unvaccinated (Table 2).

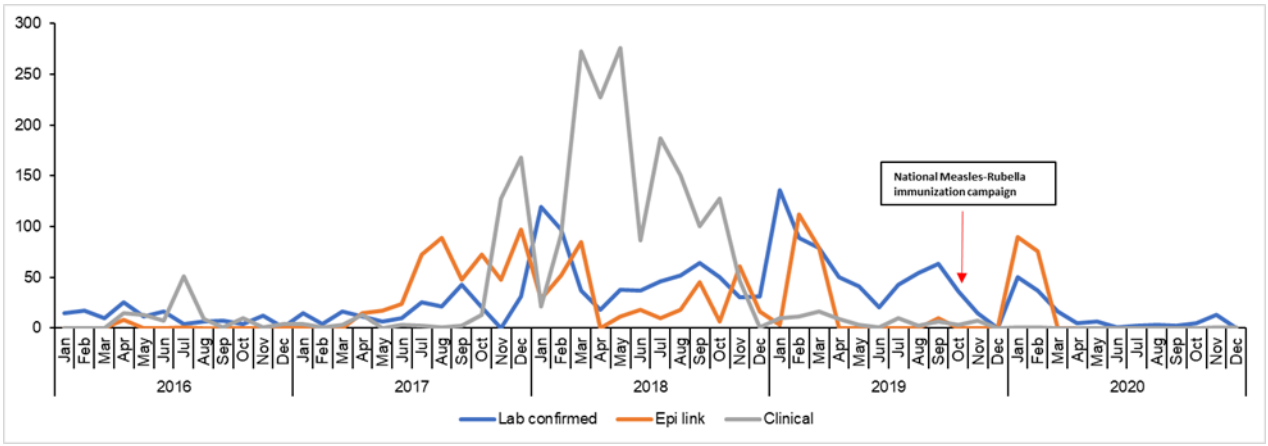

Figure 1: Trend of measles cases from the case-based surveillance system, Uganda, 2016-2020

Dates of onset ranged from January 2016 to November 2020; In 2017, the incidence gradually increased and peaked towards the end of the first quarter of 2018 (Figure 1).

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Table 2: Characteristics of measles cases reported from the case-based surveillance system, Uganda, 2016 - 2020

Characteristic	Frequency (N=5,047)	Percentage (%)
Sex		
Male	2,595	51
Female	2,452	49
Age-group		
0-4	2,987	59
5-9	1,088	22
10-14	475	10
15-24	378	7
25-39	97	2
40≥	22	0
Geographic area		
Rural	4,617	91
Urban	430	9
Department of care		
Outpatient	3,849	76
Inpatient	1,196	24
Missing	2	0
Disease outcome		
Alive	5,041	100
Dead	6	0
Vaccination status (eligible)	1,821	53
Unvaccinated	1,546	47
≥ 1 dose		

Annual incident rates of measles cases by age-group, case-based surveillance system, Uganda, 2016-2020

The overall incidence for the study period was 133/1,000,000. Annual incidence increased from 7/1,000,000 in 2016 to 29/1,000,000 in 2017, and was highest in 2018 at 66/1,000,000. Incidence reduced to 23/1,000,000 following a national vaccination campaign in 2019, and slightly increased to 27/1,000,000 in 2020. Children <5 years were more affected than persons aged ≥5 years (Incidence: 451 vs 65/1,000,000) ($p<0.0001$), and consistently reported a much higher incidence rate compared to the overall, and those aged ≥5 years (Figure 2).

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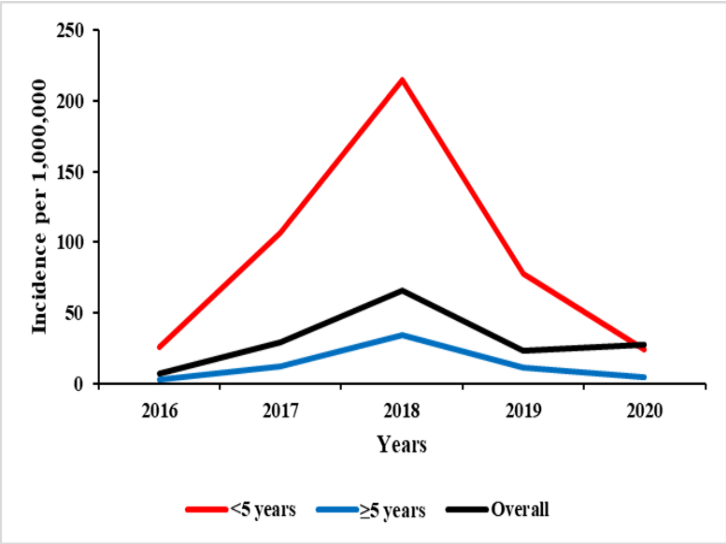

Figure 2: Annual incident rates of measles cases by age-group, case-based surveillance system, Uganda, 2016-2020

Annual incidence rates of measles cases by vaccination status, case-based surveillance system, Uganda, 2016-2020

Among the unvaccinated, mean age was 2 years and 922 (51%) were male. The overall incidence was higher among the unvaccinated (40/1,000,000) than vaccinated (36/1,000,000) ($p<0.0001$). When stratified by year, it was higher among the vaccinated in 2016 and 2018 (Figure 3).

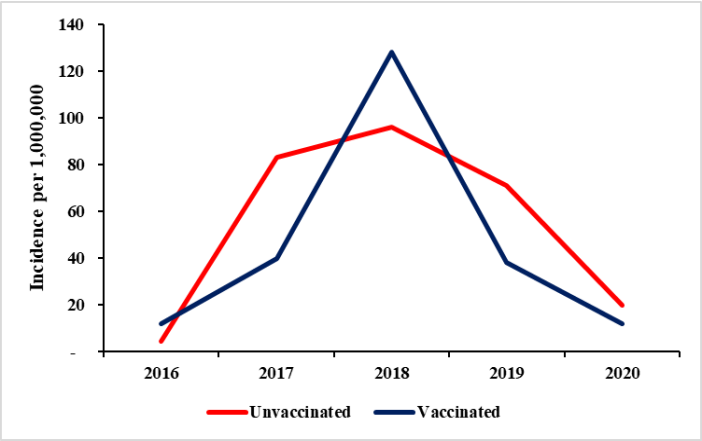

Figure 3: Annual incidence rates of measles cases by vaccination status, case-based surveillance system, Uganda, 2016-2020

Age distribution, vaccination status, and incidence of measles cases from the case-based surveillance system, Uganda, 2016-2020

Age and incidence generally had an inverse relationship, as age increased, the incidence rate went down and vice versa. However, in 2020, there was a higher incidence rate in the 15-24 age-group in comparison to the 5-14 age group (Figure 4).

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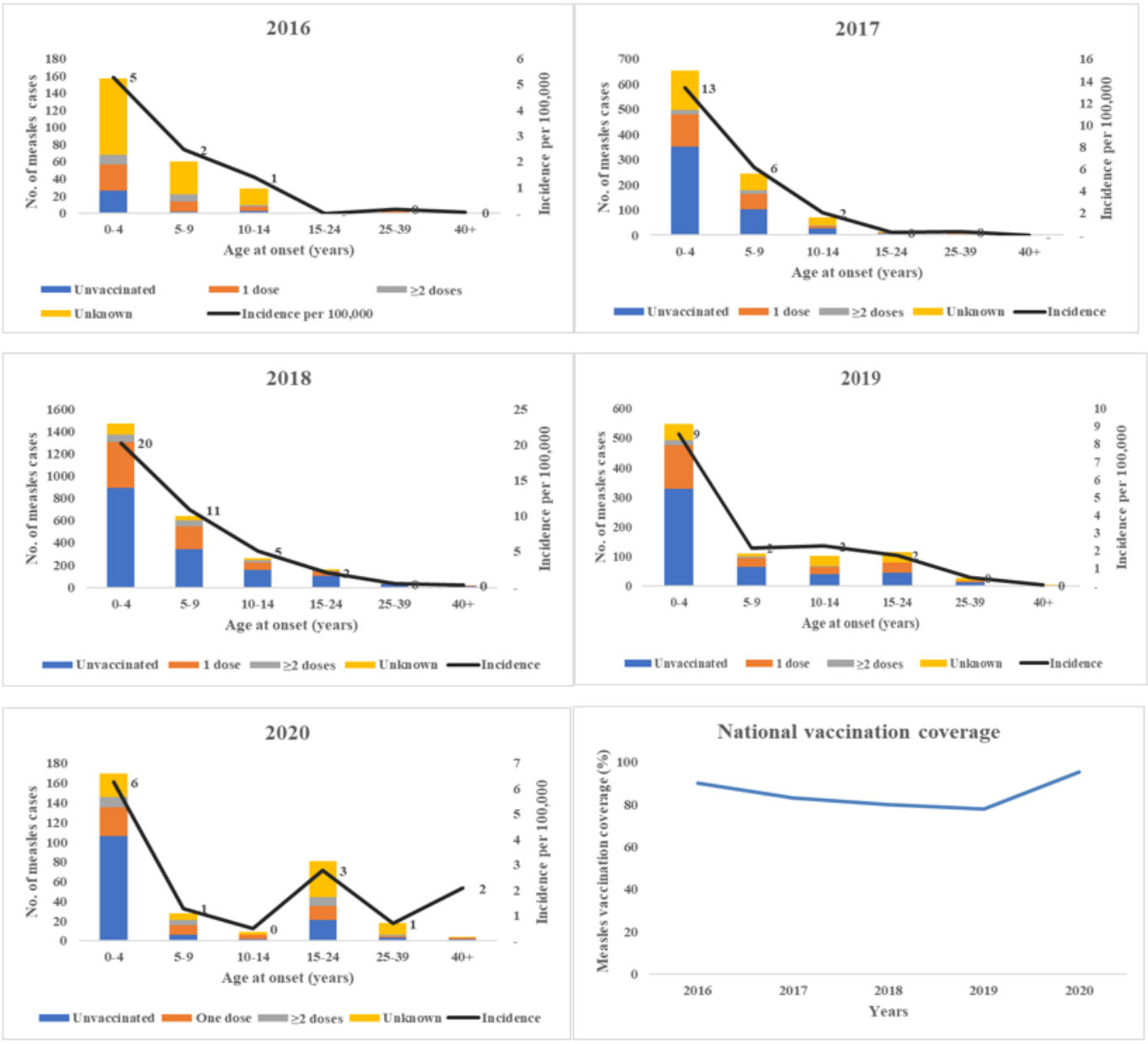

Figure 4: Age distribution, vaccination status, and incidence of measles cases from the case-based surveillance system, Uganda, 2016-2020

Incidence of measles cases among persons aged less than five years by district, case-based surveillance system, Uganda, 2016-2020

No particular region registered a consistently high incidence rate over the years. However, the Central region featured in the years 2016-2019, and Lyantonde District consistently reported an incidence rate of ≥16 per 100,000 from 2016-2019. There was a countrywide outbreak in 2018 that affected all regions but the central and eastern regions had more districts reporting higher incidence rates that other regions (Figure 5).

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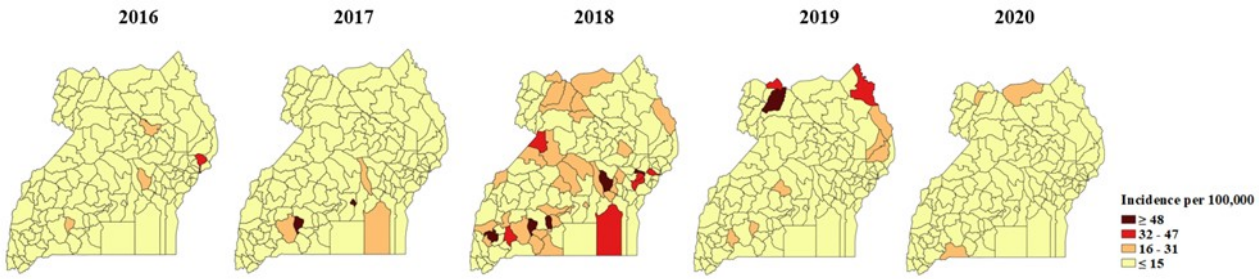

Figure 5: Incidence of measles cases (<5 years) by district, case-based surveillance system, Uganda, 2016-2020

Discussion

This study set out to describe the epidemiological characteristics and trends of measles cases reported through the national case-based surveillance system in Uganda (2016-2020) to track progress towards elimination.

With a 1:1 ratio, there was no discernable difference in sex among the cases, meaning it was not necessarily a risk factor for measles; a finding consistent with other studies describing the epidemiology of measles in the African region [11, 12]. On the other hand, we found a significant difference in geographic location of cases. An overwhelming majority of them came from rural settings, as has been reported in previous outbreaks in Kasese, Lyantonde, Nakaseke, and Buvuma districts of Uganda [4, 13-15], and in other countries both within and outside the African region [5, 16]. This reinforces the general understanding that measles, like most infectious diseases, is largely correlated with a low standard of living.

The annual incidence ranged from 7-66 per million population across the study years. The African Region of the WHO developed a strategic plan, which included a number of targets to be achieved by 2020, as part of the measles elimination goal [17]. This included achieving a measles incidence of less than one confirmed measles case reported per million population per year [17]. Based on our results, Uganda was off track for elimination as our incidence rate was consistently far higher than the recommended target.

Children aged <5 years consistently reported a higher incidence rate than those aged ≥5-years emphasizing the vulnerability of young children to measles. Measles tends to disproportionately affect children under five years of age, who are who are often the most susceptible to severe complications and death [18]. These findings are consistent with results of studies conducted on the epidemiology of measles in Uganda [13, 19], and globally [20, 21]. This age-related discrepancy reinforces the importance of prioritizing measles vaccination for young children.

Of the total cases, 67% were eligible for vaccination, with 54% of these individuals remaining unvaccinated. This denotes an immunity gap, possibly due to the accumulation of susceptible individuals, and may explain why Measles outbreaks are the most commonly reported in Uganda. This finding highlights the need for enhanced efforts to reach eligible but unvaccinated individuals, and improve vaccination coverage to reduce measles incidence [5]. Notably, there were variations in incidence among the vaccinated and unvaccinated populations in different years, with higher incidence among the vaccinated in 2016 and 2018, suggesting potential gaps in vaccine effectiveness or coverage.

Study limitations

Our study had some limitations. Given that our analysis was restricted to case-based data, it represents a lower estimate of the total number of measles cases, particularly clinically compatible cases, in comparison to the aggregate summaries reported through the electronic Health Management Information System as seen in similar studies in Nigeria and Ethiopia [22, 23]. However, the laboratory confirmed cases depict an accurate national picture of confirmed cases as measles samples from all parts of the country are submitted to UVRI for analysis.

Secondly, for those whose data on vaccination status was available, it relied on recall in absence of a vaccination card and could have led to over or under-estimation of vaccination status.

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Conclusion

The measles incidence across the study period was consistently >1/1000,000, putting Uganda off track for measles elimination. Only half of the cases were vaccinated, which might suggest an overestimation of vaccination history or a challenge with vaccine effectiveness. There is likely need for intensification of regular mass measles vaccination and further studies to investigate vaccine effectiveness and/or coverage.

Conflict of interest

The authors declare that they had no conflict of interest.

Author contribution

ZK led the conception, design, analysis, interpretation of the study and wrote the draft bulletin; ZK, BNS, SNK, BA, and JK supported data analysis; RM and LB reviewed the report and provided technical support in improving the write up.

Acknowledgements

The authors thank the staff of the Uganda Public Health Fellowship Program for the technical support and guidance offered during this study. The authors also extend their appreciation to the National Public Health Emergency Operations Centre (NPHEOC) and the UNEPI for their permission and support in assessing the data utilized in this study.

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Factors associated with Loss to Follow-Up among adults aged 40 years and above living with HIV in Mid-Western Uganda, 2020–2022

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Summary

Background: Expanded access to Antiretroviral Therapy (ART) has improved the longevity of persons living with HIV (PLHIV), and continuation of treatment is key to successful treatment outcomes. However, there are limited data on loss to follow-up (LTFU) amongst older PLHIV in Uganda. We determined the occurrence of LTFU and associated factors among adults ≥40 years living with HIV in mid-western Uganda.
Methods: We analyzed data for PLHIV aged ≥40 years submitted to the Inter-agency Collaborative for Program Improvement (ICPI) database from January 2020–December 2022 in Bunyoro and Tooro sub-regions in mid-Western Uganda. The ICPI database is a national platform to which all US President's Emergency Plan for AIDS Relief (PEPFAR)-supported partners/agencies involved in HIV care submit aggregated data every three months. The database classifies patients who were ever enrolled on ART as LTFU if they have not returned for refills for >90 days from their last missed appointment and are not reported as dead or transferred to another ART clinic. Multiple logistic regression was conducted to identify factors associated with LTFU.
Results: Among 62,794 PLHIV aged ≥40 years from 2020–2022, 35,194 (56%) were female and 41,946 (67%) were aged 40-49 years. In total, 1,508 (2.4%) were LTFU, among whom 814 (54%) were male and 936 (62%) were aged 40-49 years. Being male (adjusted odds ratio [aOR]=1.3; CI: 1.2 -4.8), aged ≥50 years (aOR=1.8; CI: 2.0-6.7), and having registered for treatment at a regional referral hospital (versus all lower-level health facilities) (aOR=1.5; CI: 1.4-6.0) were associated with LTFU.
Conclusion: Although LTFU among PLHIV ≥40 years was low during 2020–2022, males aged ≥50 years and people who registered for treatment at regional referral hospitals still faced increased odds of LTFU. Targeted efforts that track and follow up PLHIVs in this demographic group who receive treatment from regional referral hospitals could reduce further LTFU.

Introduction and background

The introduction of Highly Active Antiretroviral Therapy (HAART) has led to improved longevity among persons living with HIV (PLHIV). As a result, the number of older PLHIV has increased in the world today [1]. Globally, there is an estimated 5.7 million PLHIV ≥50 years of age, and the majority live in sub-Saharan Africa (SSA) [2]. The increase in older persons living with HIV (PLHIV) is partly attributed to the accelerated scale-up of access to anti-retroviral treatment (ART), which led to a decline in HIV-related morbidity, mortality, and new HIV infections, shifting the proportion of disease burden from younger adults to older age groups [3].

Older PLHIV are a vulnerable group because they face dual stigma, that is, age-related and HIV-related stigma [4]. Ageism and stereotyping directed towards people as they grow old is likely to cause social discrimination. On the other hand, the HIV-related stigma and discrimination associated with PLHIV causes social exclusion [5]. This in turn affects their adherence to treatment and retention in care and as such leads to a higher risk of disease progression, increased morbidity and mortality [6].

Retention in care of PLHIV is a critical aspect in HIV management programs and as such a loss to follow-up (LTFU) undermines the effectiveness of such interventions and facilitate the onward transmission of the HIV virus. LTFU is a situation where PLHIV who have previously been receiving ART care suddenly become unaccounted for within a specified period [7]. There is evidence that loss to follow up (LTFU) among patients with HIV in care leads to poorer clinical outcomes and higher risks of opportunistic infections and death [8-11]. Despite this, SSA continues to experience sub optimal long -term ART retention rates [12]. In Uganda, the incidence of LTFU from HIV care has been reported to range from 9 to 20% [13, 14]. It is hypothesized that the prevalence may be higher in the advanced-age population where patients may feel stigmatized, discriminated, and lack social support [15].

Although several studies have examined determinants of LTFU broadly among PHLIV, limited attention has been given to the specific sub group of

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of adults aged 40 years and above. Data from a local non-government organisation (NGO) dealing in HIV care and treatment in mid-western Uganda, suggest that the number of lost patients exceeds those enrolled in care by approximately 6,000 per year. However, data on the incidence and attributes to LTFU among older people ≥40 years is limited. We determined the occurrence and determinants of LTFU among adults in ART care ≥ 40 years living with HIV in mid-western Uganda, 2020-2022 to inform control and prevention interventions.

Methods

Study design and setting

We conducted a retrospective ecological study which involved analysis of routinely collected program data on HIV care and treatment submitted to the Interagency Collaborative for Program Improvement (ICPI) data-base from January 2020–December 2022 in mid-western Uganda.

Mid-Western Uganda comprises Bunyoro and Tooro sub-regions. Bunyoro Sub-region is made up of 9 districts: Buliisa, Hoima city, Hoima, Kagadi, Kakumiro, Kibaale, Kikuube, Kiryandongo and Masindi. Tooro Sub-region is made up of 10 districts: Bundibugyo, Bunyangabu, Fort Portal city, Kabarole, Kamwenge, Kasese, Kitagwenda, Kyegegwa, Kyenjojo and Ntoroko.

HIV care services are provided by the Ministry of Health (MoH) through the ART accredited health facilities. Every ART clinic at a health centre is headed by a medical doctor or clinical officer (who provides diagnosis and treatment), nurses, counsellors (who counsel patients on adherence and other psychosocial needs), a data management team (which does data entry and manages the ART clinic database), and volunteers (who organize the patient files and do patient follow-up).

The ICPI data-base comprises of HIV care data from the 19 districts that make up mid-western Uganda. The ICPI is a platform where all partners/agencies involved in HIV care that are supported by the US President's Emergency Plan for AIDS Relief (PEPFAR) submit aggregated data. The data is submitted on a quarterly basis (every three months) in an aggregate form without any individual patient identifiers.

All the ART clinics in the region receive donor support from PEPFAR and work with the Ugandan government and a local non-government organisation (NGO) called Baylor Uganda Limited. This support involves scaling up of HIV services through clinical mentorship, training of health care workers, renovation of facilities and technical assistance in monitoring and evaluation.

Generation of HIV surveillance data

Data are collected by clinicians as part of their routine medical care. At the health facility level, patient information from patient medical records is entered into the electronic data base by trained data personnel. It contains personal information like name, age, sex, patient number, marital status, level of education, weight, height, CD4 cell count, date of ART enrollment among others. Routine data quality audits are done every 3 months to ascertain completeness and accuracy. These data are then summarized and submitted to the ICPI data base in aggerate form without individual patient identifiers. Data from different health centers are sent to the district and later merged into regions.

Study variables

The primary outcome variable was LTFU which was defined as failure of a patient enrolled in care to show up after missing treatment for more than one quarter (90 days) after initiation on ART and has not been reported dead or transferred out to another ART clinic [16]. Patients who showed up after being declared LTFU were classified as alive and active on treatment. Patients were classified as dead if they appeared in the data base as dead. Death at health facilities is certified with evidence of a death certificate or through information by next of kin. Patients were also classified as 'Transferred out' if they were officially transferred to other ART accredited clinics outside the mid-western region by use of a referral form.

Independent variables included age group, sex, sub-region of residence and health facility level. Heath facility levels included those from the lowest level to the highest level in the region in the hierarchical order [17]. That is, the lowest health centers being HCIIs (found at parish level), followed by HCIIIs (found at sub-county level), HCIVs (found at county/health sub-district level), and district hospitals (found at district level) and the highest health facilities being regional referral hospitals (found at region level).

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Data abstraction and analysis

Data were entered into Excel and exported to Stata version 16 software (Stata Corporation, College Station, Texas, USA) for analysis. Different variables for the years of 2020, 2021, and 2022 were captured. These years were considered because we wanted to determine the level of LTFU after the COVID-19 response period (2020–2021). A data abstraction form was used to extract information on age-group, sex, sub-region, and level of health facility.

We summarized categorical data like sex, age-group, level of health facility, and subregion by frequencies and percentages. Loss to follow-up was calculated by the number patients LTFU divided by the total number of patients enrolled during the study period and was expressed as a percentage. Multiple logistic regression analysis was conducted to identify the factors associated with LTFU. In the analysis, LTFU was dichotomized into binary outcome (yes/no) where yes were patients LTFU and no were patients retained in care. The association between independent variables and the outcome variable was presented as odds ratios (ORs) and 95% confidence intervals (CIs).

Ethical Considerations

The study utilized routine surveillance data reported by health facilities in the ICPI platform which is also aggregated with no individual patient identifiers. However, permission to access the database was sought from the US Centers for Disease Control and Prevention (CDC) office in Uganda and the Ministry of Health. The Center for Global Health, US Center for Disease Control and Prevention also determined that this activity was not human subject research and its primary intent was for public health practice or disease control. This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy. [§§]See e.g., 45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. §241(d); 5 U.S.C. §552a; 44 U.S.C. §3501 et seq. The study team did not interact with any human subjects and all the data were de-identified at health facilities and obtained as aggregate data in the data base. All the investigators did not have any access to individual patient information. Data were only accessed by the study team.

Results

Loss to follow-up amongst persons living with HIV, mid-western Uganda, January 2020–December 2022

We abstracted 62,794 patients' records, of which 35,194 (56%) were female, 41,946 (67%) were between age group 40-49 years and 36,546 (58%) were from Tooro region.

Among the patients enrolled in the study within the review period, 60,646 (96.6%) remained in care while 1,508 (2.4%) were LTFU, 377 (0.6%) died, and 263 (0.4%) were transferred out of the region (Figure 1).

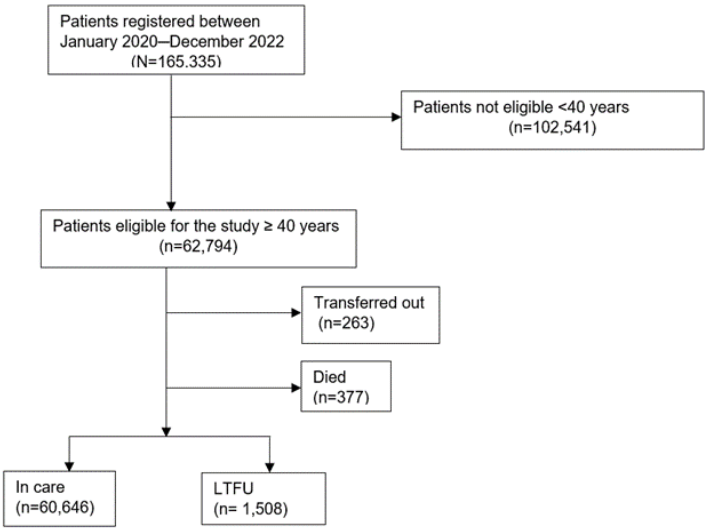

Figure 1: A flow diagram describing how patients were included in the study

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Characteristics of persons living with HIV who were lost to follow-up, mid-western, Uganda, January 2020–December 2022

Among those LTFU, 814 (54%) were male, majority 936 (62%) were in the 40-49 age group, and 824 (55%) were from Health Center IIIs (Table 1).

Table 1: Characteristics of persons living with HIV who were lost to follow-up, mid-western, Uganda, January 2020–December 2022, (N=1,508)

Characteristic	Number	(%)
Sex		
Male	814	(54)
Female	694	(46)
Age group		
40-49	936	(62)
≥50	572	(38)
Sub-region		
Tooro	879	(58)
Bunyoro	629	(42)
Health facility level		
Regional Referral	118	(8)
District hospital	137	(9)
Health Center IV	366	(24)
Health Center III	824	(55)
Health Center II	63	(4)

Factors associated with loss to follow-up amongst persons living with HIV from January 2020–December 2022 in mid-western, Uganda (N=62,154)

At bivariate analysis, sex, age, and higher-level health facility were statistically significant while sub-region was not.

In multivariable analysis, being male (adjusted odds ratio [aOR]=1.3; CI: 1.2-4.8), being aged ≥50 years (aOR=1.8; CI: 2.0-6.7), and having registered for treatment at a regional referral hospital (versus all lower-level health facilities) (aOR=1.5; CI: 1.4-6.0) were associated with LTFU (Table 2).

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Table 2: Factors associated with loss to follow-up amongst persons living HIV, mid-western, Uganda, January 2020–December 2022, (N=62,154)

Characteristic	Lost to Follow-up				Bivariate analysis		Multivariate analysis	
	Yes (n=1,508) n	(%)	No (n=60,646) n	(%)	OR (95%CI)	P Value	Adjusted OR (95% CI)	P Value
Sex								
Male	814	(54)	27,282	(45)	2.6(1.2-6.4)	0.028	1.3(1.2-4.8)	0.032
Female	698	(46)	33,364	(55)	Ref		Ref	
Age in years								
40-49	936	(62)	40,938	(67)	Ref		Ref	
≥50	572	(38)	19,708	(33)	2.4 (1.1-5.4)	<0.001	1.8(2.0-6.7)	<0.001
Sub-region								
Tooro	879	(58)	32,140	(53)	Ref		Ref	
Bunyoro	629	(42)	28,506	(47)	1.3(0.2-1.5)	0.941	1.1(0.6-4.7)	0.502
Health facility level								
Regional referral	118	(8)	9,092	(15)	2.7 (1.2-4.7)	0.011	1.5 (1.4-6.0)	0.037
District hospital	137	(9)	16,956	(28)	1.5 (1.7-6.6)	0.018	2.2 (1.4-8.1)	0.027
Health Center IV	366	(24)	9,096	(15)	2.7 (0.9-14.1)	0.276	1.6 (0.2-1.8)	0.076
Health Center III	824	(55)	22,465	(37)	Ref		Ref	
Health Center II	63	(4)	3,037	(5)	3.0 (0.7-2.9)	0.077	0.4 (0.6-9.7)	0.151

Discussion

We assessed the occurrence of LFTU and the associated factors amongst PLHIV ≥40years enrolled in care from January 2020–December 2022 in mid-western, Uganda. The occurrence of LTFU among adult PLHIV in care was determined at 2 out of 100 persons. LTFU was associated with being male, being aged ≥50 years, and having registered for treatment at a regional referral hospital (versus all lower-level health facilities). This study provides an insight on the occurrence of LTFU amongst the PLHIV ageing population in mid-western Uganda.

The occurrence of LTFU amongst PLHIV ≥40years in ART care was found to be approximately 2 in 100 individuals. This is low compared to what was reported in other studies. A retrospective study that was conducted in central Uganda in 2019 which also analyzed routinely collected HIV care and treatment program data from 2014—2016 reported a cumulative LTFU incidence of 7.5 per 100 person years[18]. The authors attributed the high incidence of LTFU to limited counselling and patient support services. Similarly a study done in Zimbabwe reported an incidence rate of 5.8 per 100 person years[19]. The reason for low LTFU in our study could be attributed to patient support services that involve tracking of patients enrolled in care and following up on those that have missed their appointments or missed drug refills [20, 21]. Keeping a record of patients in ART care and tracking them is an effective way of identifying individuals who are at risk of LTFU and helps to intervene in a timely manner. Low LTFU is generally a good outcome as it indicates that a higher proportion of individuals is adhering and retained in care.

Although the study had a higher number of females, males were more likely to be LTFU as compared to females. The reason is probably because women have a better health seeking behavior and are more likely to take care of themselves once sick [22, 23]. Another reason for higher LTFU in males than females could be that men may experience HIV-related stigma and discrimination and as such less likely to disclose their HIV status to health workers and or family members [24]. This fear of disclosure and stigma can contribute to nonadherence to treatment and lead to LTFU. Findings of this study are similar to other studies which have reported higher LTFU among men [25-27].

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It is important to generate gender specific based interventions aimed at increasing the retention of older men in care.

Despite the fact that the proportion of older persons in our study was low, we observed that they were at a higher risk of LTFU than younger persons. This is probably because of poor access to healthcare by this age group due to unavailability of specialized geriatric clinics in HIV care [28-30]. The unavailability of geriatric services creates barriers for older patients hence leading to missing appointments and dropping away from care. It is important to establish geriatric friendly services in HIV care clinics and as well as establish mechanisms of tracking and following up this demographic group with an aim of retention in care. Geriatric friendly services may include incorporation of treatment of non-communicable diseases (NCDs) treatment in ART clinics. Advanced age is a risk factor of developing NCDs especially diabetes and hypertension and this risk is higher amongst older PLHIV [31]. Studies about the integration of NCD care with HIV care in Uganda have yielded positive results including high retention in care and better clinical outcomes [32, 33]. It is therefore important to integrate NCD care in HIV care and treatment as a way of offering geriatric friendly services.

Participants who received treatment from higher level administrative health facilities like the regional referral hospital and district hospitals were more likely to be LTFU when compared to those that received treatment from lower-level health facilities like HCIV and HCIII. This is possibly because higher level facilities tend to be located in urban centres, experience high patient volumes and have longer waiting times [34]. As result, health workers are less likely to engage patients at a more personal level and this reduces patient engagement, interpersonal communication and subsequent follow-up. These findings are consistent with a study which conducted in Zimbabwe which showed that higher level health facilities experienced more occurrences of LTFU [19]. The authors in this study argued that some HIV patients could seek treatment from areas far away from their places of residence (which are usually high-level health facilities located in urban centres) due to fear of stigma and discrimination. This increases on the patient load experienced at these facilities and hence leading to inadequate care including follow-up. It is important that interventions addressing stigma and discrimination at community level be strengthened and encourage uptake of ART services at lower-level health facilities.

Study limitations and strengths

We acknowledge some limitations in our study. First this was an ecological study which looked at aggregated population-level data rather than individual-level data. There was unavailability of some key demographic, clinical and laboratory information and other variables that could predict LTFU like weight, level of education, marital status, CD4 cell count, and presence of commodities. As a result, we could not establish casual relations to account for individual factors that may have influenced the outcomes. Secondly, this being a retrospective study, it entirely relied on historical data collected from a routine clinical care database. There could have been challenges of data accuracy and completeness recorded during data entry from patient records into the database. Despite these challenges, we utilized routinely collected data from the HIV care and treatment program which undergoes periodic data quality audits. The study includes data from a large sample of 19 districts in mid-western Uganda. This large sample size improves the statistical power and enhances the generalizability of our findings.

Conclusion

Our findings suggest that LTFU among adult PLHIV who are ≥40 years was low. LTFU was associated with being male, being aged ≥50years, and receiving treatment from a higher-level health facility. This study provides an insight on the occurrence of LTFU and associated factors amongst PLHIV ageing population which the MoH can use to improve adherence and retention in care in this age group. We recommended strengthening of the existing systems like tracking and proactive follow-up of patients in order to further reduce the LTFU occurrences. Additionally, creation of interventions and initiatives that address stigma and discrimination amongst older men could improve their engagement in care. Finally, we recommend establishment of geriatric friendly services at ART centres including integration of NCDs in HIV care.

Conflict of interest

The authors declare that they have no conflict of interest.

Authors' contributions

RZ: participated in the conception, design, analysis, interpretation of the study and wrote the draft bulletin; RM, PCK, RA, DK, BK and LB reviewed the report, reviewed the drafts of the bulletin for intellectual content and made multiple edits to the draft bulletin; RM, DK, BK, LB, JK, IM, and ARA reviewed the final bulletin to ensure intellectual content and scientific integrity. All authors read and approved the final bulletin.

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Acknowledgements
The authors thank the staff of the Uganda Public Health Fellowship Program for the technical support and guidance offered during this study. The authors also extend their appreciation to the Baylor Uganda team for the support they offer to the various ART centers in health facilities in mid-western Uganda. The authors appreciate the several data management teams in the ART centers at health facilities who ensured reporting of HIV program data from their respective districts, as well as the team managing the ICPI platform; your hard work enabled the availability of data we used for this analysis. Finally, we thank the US-CDC for supporting the activities of the Uganda Public Health Fellowship Program.

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Upcoming events and updates

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Upcoming events

World Health Awareness Days and International Health Days, January-March 2024

Introduction

Global public health awareness days raise awareness, publicity, and profile of particular diseases or disease conditions among the general population. Every year, different organizations and communities actively promote and support World Health Days observed globally.

30th January - World Neglected Tropical Diseases Day

On 31 May 2021, the World Health Assembly (WHA) recognized 30 January as World Neglected Tropical Disease (NTD) Day. This decision formalized 30 January as a day to create better awareness on the devastating impact of NTDs on the poorest populations around the world. The day is also an opportunity to call on everyone to support the growing momentum for the control, elimination and eradication of these diseases.

4th February - World Cancer day

World Cancer Day aims to promote awareness on cancer as a public health issue and to strengthen actions towards improving access to quality care, screening, early detection, treatment and palliative care. It is about understanding the inequities in cancer care and taking actions to make the necessary progress to address them.

3rd March- World Birth Defects Day

March 3 is recognized annually as World Birth Defects Day. About 3%–6% of infants worldwide are born with a serious birth defect every year. Birth defects are important causes of newborn and childhood deaths, chronic illness and disability. An estimated 303 000 newborns die every year, worldwide, due to birth defects. In addition to mortality, birth defects cause long-term disability, which has significant impacts on individuals, families, health-care systems, and societies. The day is used to raise awareness about the impact of birth defects worldwide, reduce stigma and increase opportunities for prevention and care.

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24th March - World Tuberculosis (TB) Day

Each year, approximately 90,000 people in Uganda get sick of TB, a figure that would be much higher if it had not been for the landmark discovery by Dr. Robert Koch. We commemorate the date when Dr. Koch announced in 1882 that he had discovered the bacterium that causes TB, which opened the way towards diagnosing and curing this disease. At the time of Dr. Koch's announcement, TB was raging through Europe and the Americas, causing the death of one out of every seven people. Koch's discovery opened the way towards diagnosing and curing TB. The day is designed to build public awareness that tuberculosis today remains an epidemic in much of the world.

Updates:

Outbreaks and events of public health importance responded to by Uganda Public Health Fellowship Program, October-December 2023

As part of the National Rapid Response Team, the Uganda Public Health Fellowship Program fellows routinely participate in responding to public health emergencies including outbreaks and other events of public health importance. The fellows' response is primarily through conducting investigations and generating evidence-based control and prevention interventions. During this quarter, the fellows responded to the following outbreaks and events: Anthrax outbreak in Kyotera; Measles outbreak in Kiryandongo District; Tuberculosis characterization and surveillance in six regions in Uganda, and a strange disease in Bundibugyo District.

Uganda Public Health Fellowship Program scoops three awards at the 8th African Field Epidemiology Network (AFENET) conference, held in Mombasa, 5-10 November 2023

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The African Field Epidemiology Network (AFENET) in collaboration with the Kenya Field Epidemiology and Laboratory Training Program organized the 8th AFENET Scientific Conference with a theme: "Strengthening Public Health Systems in Africa Towards Enhanced Global Health Security: The Role of Field Epidemiology and Laboratory Training Programs". This conference that takes place every 2 years had last been held in 2018 due to covid-19 pandemic interferences. The 8th conference was long overdue, Field Epidemiology Laboratory Training Programs (FELTP) residents, graduates, and the entire public health community as well as multi-lateral agencies had accumulated a wealth of knowledge and eager to share experiences in field epidemiology and other facets of global health security.

The Uganda Public Health Fellowship Program (PHFP) actively participated and contributed to this knowledge sharing platform. Overall, twenty-nine (29) abstracts were presented by the PHFP, 26 of these abstracts were from the advanced field epidemiology track, two abstracts from the Uganda intermediate FETP, and one abstract from the Uganda frontline FETP.

Uganda advanced FETP fellows and graduates posing with the Intermediate FETP Coordinator, Doreen Gonahasa (2nd row 1st right), the Advanced FETP Coordinator, Mr. Daniel Kadobera (2nd row 2nd right), the Frontline FETP Coordinator, Dr. Irene Kyamwine (2nd row 1st left), and the advanced FETP Field Coordinator, Dr. Benon Kwesiga (2nd row 2nd left) during the 8th AFENET conference in Mombasa, Kenya.

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Besides the scientific presentations, Uganda participated in the international night, an evening event that was designated to cultural exhibition by the various attending countries. The team was dressed in “kikoyi” theme attires and made a dance performance from the Buganda culture (central Uganda). At the end of the evening, Uganda emerged the best group to showcase their culture.

Uganda advanced FETP fellows posing with the CDC Resident Advisor, Dr. Julie R. Harris (4th right) and the Intermediate FETP Coordinator, Doreen Gonahasa (2nd right) during the international night event.

At the end of the conference, Uganda scooped three awards that included: Best oral presentation advanced (2nd runner-up) by Patrick King, best oral presentation intermediate, and best contributing program to the Journal of Interventional Epidemiology and Public Health (JIEPH); a journal published by AFENET.

An advanced FETP fellow Patrick King posing with his award of best oral presentation advanced (2nd runner up) received during the 8th AFENET conference held in Mombasa, Kenya from 5th-10th November 2023