Profiling border health surveillance at selected points of entry in Uganda

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ABSTRACT

Introduction: Surveillance of notifiable diseases at Points of Entry (PoE), such as airports and ground crossing borders has become increasingly important in light of the ravaging epidemics and pandemics. As Uganda shifted its focus to other infectious diseases at different PoE, documenting reporting tendencies was essential to inform public health decisions. **Methods:** A cross-sectional study using both secondary and primary data was conducted at 53 PoE during the COVID-19 pandemic. Secondary data was obtained from the electronic Integrated Diseases Surveillance and Response (eIDSR) system, and monthly aggregated data was used to determine the PoE that were consistently reporting from September 2021 to February 2022. All PoE were thereafter subjected to an online survey to assess some of the factors that led to a high performance of those that constantly reported. **Results:** Fourteen PoE (26.4%) had consistently submitted their reports in the e-IDSR system over the six months. Of the 14, 8 were high volume PoE, 3 were medium volume, and 3 low volume PoE. One PoE had regularly zero reported for the six months. Twenty-five PoE had consistently submitted their reports for five months than the six months expected output that was considered. Of the 53 PoE targeted for the online survey, 16 responded, and 9 were among the 14 that constantly reported. Out of the 9, 5 were high volume PoE, 8 were able to submit their report directly in the e-IDSR system, and 7 had internet connection accessible from the PoE. Significantly more POE that consistently reported had only 1 reporting tool compared to those POEs that didn't report consistently (p=0.04). Similarly, more POE that consistently reported had internet access and POE owned reporting gadgets compared to those that didn't report consistently (p=0.049 and p=0.048 respectively). **Conclusion:** Reporting is important for surveillance and informs timely decision-making and action in the prevention, detection, and response to Public Health Emergencies. Limiting the number of reporting tools and the support received by PoE staff in terms equipment, and logistics remain key factors that influence reporting.

Introduction

Global health security is not just a health priority but a concern that if not paid attention to can devastate lives, health sectors, and economies which in the end keeps countries from developing [1]. Outbreak mitigation and response remains then a necessary component for global stability and also needed for free movement of travelers and goods. To achieve this, the International Health Regulations (IHR, 2005) gives a binding ground to allow collaboration of nations to ensure that diseases are contained within territories where they have emerged. That collaboration is important because some emerging diseases cannot be managed with available drugs or vaccines, and their containment can only be achieved through other public health actions [2].

Good surveillance systems are therefore needed to help in early detection of epidemic prone diseases before their outbreaks go out of control as stated in the global health security agenda [3]. Member states that are signatories of the IHR 2005 are required to have surveillance systems with good performance in reporting, and a holistic approach from detection to response [4]. In that regard, countries should build capacities at their Points of Entry (PoE) to be able to detect and report events that may constitute potential public health emergencies of international concern (PHEIC) [5]. Screening of travelers remains very relevant and a turning point during major outbreaks since movement of travelers can lead to the spread of a disease outside the country of its origin and cause a threat worldwide [6].

Some good surveillance reporting practices have been noted. Among the incentives for good reporting performance, was the sender receiving feedback on submissions which elicits the feeling that the reported data is relevant to support outbreak preparedness and response is critical for the personnel involved in surveillance activities. In the same way, it is important to have a surveillance focal person responsible for data reporting and a mechanism to remind the responsible person to submit the data on time [7]. On top of that, the availability of the required infrastructure and tools like reporting forms improves critically the quality of the data and positively influences the ability to report - though electronic reporting systems are believed to be more efficient. On the other hand, it is important to note that the use of multiple reporting systems can be challenging and can reduce the performance of the person reporting. Additionally, a high workload leads to poor quality of the data, which means that an adequate number of staff is needed to fulfill this role [4, 7]. Similarly, high turnover of staff negatively impacts on data reporting since it may lead to the lack of continuity of knowledge and creates a gap in the system which needs to be filled every time a new staff comes on board [8].

At crossing border points with high volume of movement, it is important to screen all travelers despite the fact that it can increase the time spent at the border. Efforts are therefore needed to fast track the screening process since delays at high volume POE can lead to the spread of the disease among to travelers and even beyond [9, 10].

In the Africa region, countries like Uganda are vulnerable to epidemic prone conditions and commitment to enforcing border control measures is therefore needed. Uganda´s location in the great lakes region makes it vulnerable to infectious epidemiological diseases like Ebola Virus Disease, Rift Valley Fever, Measles, Yellow fever, Anthrax, and the porousness of some unofficial PoE creates more susceptibility to importation and exportation of these diseases [11]. However, Uganda is mitigating these risks through the implementation of the Integrated Disease Surveillance and Response (IDSR) strategy since 2001 just after its adoption in late 1990´s as a new strategy for disease surveillance for the WHO Africa region. The adoption of IDSR as a regional strategy for disease surveillance and outbreak response has certainly helped African countries in outbreaks mitigation [7, 12].

In the wake of the COVID-19 pandemic, most countries found it beneficial to enforce enhanced border surveillance and in the case of Uganda, PoE surveillance was an import part of the pandemic response. Capitalizing on the strides achieved during the pandemic, and as the country transitioned its focus to other notifiable diseases at PoE, it was important to keep the reporting trends active. This study aimed therefore at profiling border health surveillance at selected points of entry and identify best practices that can be promoted in the country to strengthen border health surveillance.

Methods

This was a cross-sectional study and used both secondary and primary data. Secondary data was obtained from the electronic Integrated Diseases Surveillance and Response (e-IDSR) system which is based on the District Health Information Software 2 (DHIS2) technology; the national surveillance repository and reporting system for all the PoE. A total of 92 PoE were registered in the eIDSR system but during the COVID-19 pandemic 53 POE were activated–meaning they were given the required capacity to screen travelers, and a daily and weekly aggregate report from the collected data was generated for analysis to inform strategic actions in the response. The 53 PoE were categorized using the total number of travelers crossing the border point - as recorded in the eIDSR; into 10 high volume, 17 medium volume, and 26 were low volume PoE. In this study, monthly aggregated data of screened travelers was used to determine the PoE which were constantly reporting for a six-month period, starting from September 2021 to February 2022. The time interval was chosen since during the period, the number of COVID-19 cases detected at different PoE had reduced sensibly and efforts were being engaged to sustain surveillance for other notifiable diseases. The data was extracted from the system in a Microsoft Excel format and analysis was limited to only the 53 POE that were activated at the time of the study. Only the PoE that reported the number of screened travelers per month for the entire six-month period (September 2021-February 2022) were considered as constantly reporting. The presence of an empty cell for any of the six months in the monthly aggregate data was considered as not reporting. Apart from the reporting trend for the secondary data, focus was also given to the volume of travelers crossing the PoE, and the region where the PoE is located.

To understand the drivers of reporting performance, all the PoE were subjected to an online survey to assess some of the factors that could explain differences in reporting performance. The data was collected from 1 March 2022 for a period of 4 weeks using an online questionnaire that was shared with the PoE in-charge on their emails and other online platforms used for quick communication. Follow-up calls were made and email reminders were sent to targeted respondents to increase the participant response rate. Descriptive data analysis was done to compare PoE that had reported constantly over the six months period and those that did not. All the questions considered for analysis were close ended, and analysis was done in STATA version 14. Consent was obtained from the online survey respondents. The consent form was attached to the online tool used for data collection and permission to access the POE surveillance data was granted by the National Border Health Unit of the Ministry of Health of Uganda.

Availability of data

Data used for this study is accessible through the eIDSR system, and permission to access the data is granted by the Ministry of Health, Uganda.

Ethical considerations

This study was approved by the Border health unit, Ministry of health and respondents consented to respond to online questionnaire.

Results

Characteristics of Points of Entry based on Secondary data from DHIS2

Out of the 53 operational PoE, 14 (26.5%) had consistently submitted their reports in the e-IDSR system for the six months study period. Of the 14, 8 (57.1%) were high volume PoE, 3(21.4%) were medium volume and 3 (21.4%) were low volume PoE. One PoE was located in the Central region, 3 (21.4%) in the Eastern region, 5 (35.7%) in the Western region, and 4 (28.5%) in the Northern region. One PoE had constantly reported zero as the number of travelers screened over the six months. Twenty-five (47.2%) PoE had consistently submitted their reports for five of the six months cut-off that was considered.

Characteristics of Point of Entry from the online survey

Sixteen (30.2%) of the 53 PoE responded to the online questionnaire (**Figure 1**). Of the 16 who responded, 9 (56.3%) were among those that reported constantly; 8 PoE (50%) were high volume PoE, and 4 (25%) were functional before the COVID-19 pandemic. Nine (56.3%) had 2 or more

staff that knew how to report in the e-IDSR system and 11 (68.8%) were reporting directly in the e-ISDR system. On the other hand, 5 (31.3%) PoE were sending their report to another surveillance officer who had to enter the data into the system, and that was either the District surveillance Focal person or a National Border Unit surveillance officer. Lastly, 5 (31.3%) PoE were reporting using a staff personal gadget, a telephone or a tablet (Table 1).

Health surveillance and reporting at PoE

The data from the online survey showed that 9 of the 16 (56.3%) PoE that responded were among the 14 PoE that constantly reported over the six months. Among these 9 POE that constantly reported: 5 (55.6%) were high volume PoE, 7 (77.8%) reported that they received feedback on their performance, 8 (88.9%) reported that they were able to submit their report directly in the e-IDSR system, 7 (77.8%) had internet connection available at the PoE and 8(88.9 %) had a gadget belonging to the PoE that was used for reporting (Table 2). When we compared the 9 POE that consistently reported with the 7 that did not, a statistically significant difference was only noted between those facilities that had only 1 reporting tool compared to those that used two or more reporting tools (p=0.04). The following variables had borderline statistical significance: type of report submission platform - other platforms vs eIDSR (p=0.05), internet availability-no vs yes (p=0.05) and use of personal gadget vs POE gadget for reporting (p=0.05).

Discussion

Reporting is important for surveillance and informs timely decision-making in the prevention, detection, and response to Public Health Emergencies. In this paper, we present the factors that influenced reporting tendencies at different PoE in Uganda in the post-COVID-19 era and we analyze efforts made by the country to build and sustain surveillance for cross-border movement using tools like the eIDSR. In recent decades, global threats like COVID-19 have prompted countries to develop their capacity to detect and report public health threats in line with the International Health Regulations (IHR, 2005) [4]. Our research findings indicate that both staff members who reported regularly and those reported occasionally, had received feedback on their performance. Meanwhile, feedback on performance is known as a motivator for the staff on ground in charge of reporting [7] and this should be promoted as best practice. This is because it has a positive impact on the productivity, self-evaluation and engagement of staff members to keep improving their performance. Additionally, the study showed that good reporting rates was not different for staff who received regular support supervision and those who did not. However, support supervision directly affects motivation to learn, to perform and to deliver better results [13].

It is important to ensure that there is regular support supervision for PoE where reporting rates are consistently low. Furthermore, PoE with a larger number of individuals knowledgeable about the reporting system were at a better advantage. Certainly, the challenge arises when only one staff member is able to report and they are not available at the time for reporting [7, 10, 14]. This can be improved if the number of people able to report in the system is not limited to allow any PoE staff to focus on this essential task, while sharing the responsibility with other colleagues.

Having more than one reporting tool was found to be a challenge in our study and this has been reported as a hindrance elsewhere and is generally a challenge for teams doing surveillance work in the field [7, 15]. Many surveillance systems are specific to targeted conditions, leading to competing interests among those who have to report using multiples surveillance tools. In our context, the eIDSR was found to be more efficient and led to better reporting tendency when used as a unique space for reporting rather than being combined with several other reporting systems. This highlights an important point to consider for the eIDSR to be fully implemented as a strategy with an impact on surveillance and response [12, 16].

Meanwhile, other factors identified in the study were also found to be important for sustaining the reporting tendency. These factors included the availability of internet and devices for reporting. This means that the rollout of an online reporting platform like eIDSR, although an important milestone in improving reporting, generally requires enabling factors [16]. Therefore, it is necessary to consider the reporting systems and all the requirements needed for their implementation. In

our case, the eIDSR, being an online platform, would need to be accompanied by devices such as tablets and internet access to function effectively.

Besides the factors affecting reporting, there was a PoE that constantly reported zero, to mean travelers were not using that specific crossing points. Zero reporting is key in surveillance - not only does it show an active system, but one can assess and monitor why no data regarding the screening of travelers is being submitted [15]. Meanwhile, the figure zero was questionable since the period that was considered had the movement of goods and people coming back to normal around the country. This could be an indication of poor reporting practices in abide of avoidance of consequences of non-reporting from different levels of authority. Meanwhile, on a general point of view, zero reporting remains better than not reporting because it can allow further discussion and investigation of which challenges are the reason for the figures if they do not reflect the reality on ground. This may lead to the support in terms of training, equipment, and logistics which are key factors that influence reporting [14].

Lastly, only two PoE in the western region reported being functional before the COVID-19 pandemic though only one reported constantly with active screening of travelers coming from the Democratic Republic of Congo. This is where the Ebola outbreak was present in 2018 near the Ugandan border, and the presence of that threat in that region was the main cause of enhanced activities. With the susceptibility of these PoE to receive a high-risk traveler and the fact that border communities have regular movements from one side to another, continuous screening was necessary [17]. However, the current results reflect the determination to sustain good practices countrywide and certainly this will have a positive impact on detection and containment of infectious diseases at different PoE in Uganda.

The limitation noted in this study was the low response rate to the online survey despite several attempts to motivate the PoE staff to answer the questionnaire. The strength of this study, on the other hand, was the consideration of a countrywide secondary dataset that allowed to perform an unbiased comparison of different regions´ performance. In addition, the follow-up step to collect primary data provided a better understanding of the drivers of PoE reporting performance.

Conclusion

The COVID-19 pandemic has clearly boosted the capacity at different PoE in Uganda than it was before. For the next level in this process of building sustainability in surveillance at different PoE, the best practice for good reporting should be used as a way to improve the quality of the reporting system. Reporting is important for surveillance and informs timely decision-making in the prevention, detection, and response to Public Health Emergencies. This study showed varying capacity in effective reporting which is pivotal in prevention, detection, and early response to public health threats at PoE. Limiting the number of reporting tools and the support received by PoE staff in terms equipment, and logistics remain key factors that influence reporting.

What is known about this topic

- Movement of travelers can lead to the spread of infectious diseases
- In the Africa region, countries like Uganda are vulnerable to epidemic prone conditions and efforts to control borders are much needed
- Member states signatory of the IHR, 2005 are required to have surveillance system with good performance in reporting, with a holistic approach, from detection to response

What this study adds

- The COVID-19 pandemic has positively influenced PoE surveillance in Uganda
- Best practices to sustain PoE reporting include having one reporting system like the eIDSR, the availability of internet, and providing a gadget to use for reporting
- Zero reporting is key in surveillance because it shows an active system and one can assess why no data is being submitted

Competing interests

The authors declare no competing interests.

Authors´ contributions

MJML: Conception, Design, Conduct, Analysis, Read and approved the final report. MM: Conception, Design, Conduct, Analysis, Read and approved the final report. JOK: Conception, Design, Conduct, Analysis, Read and approved the final report. SS: Review data, Analysis, Read and approved the final report. SHG: Data collection, Review results, Read and approved the final report. HM: Data collection, Review results, Read and approved the final report.

Tables and figures

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Figure 1: Uganda map showing the geographic distribution of POE that responded to the online tool and number of months they constantly reported

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Table 1: Characteristics of the Points of Entry that responded to the Online survey, N=16	
Characteristics	**n (%)**
Reported Consistently	
Yes	9(56.2)
No	7(43.8)
Volume of travellers	
High	8(50.0)
Medium and Low	8(50.0)
Support supervision	
Every month	9(56.3)
After more than a month	7(43.8)
Active BHU before COVID-19	
No	12(75.0)
Yes	4(25.0)
Received performance feedback	
No	4(25.0)
Yes	12(75.0)
Trained staff on the reporting tool	
0-1	7(43.8)
2 or more	9(56.3)
Report submission	
Other surveillance staff	5(31.3)
eIDSR	11(68.8)
Number of reporting tools	
1	4(25)
2 or more	12(75)
Network/internet availability	
No	7(43.8)
Yes	9(56.3)
Gadget used for reporting	
Personal	5(31.3)
PoE gadget	11(68.8)
* eIDSR: Electronic Integrated Diseases Surveillance and Response System, POE-Point of entry. BHU: Border Health Unit.	

Table 2: Characteristics of the 16 Points of Entry the Responded to the Online Survey (N=16)				
Characteristics	**Constantly submitted the surveillance report, n (%)**		**Chi square**	**P value**
	Yes	**No**		
Volume of travellers				
High	5(55.6)	3(42.9)	0.254	0.6143
Medium and Low	4(44.4)	4(57.1)		
Support supervision				
Every month	5(55.6)	5(71.4)	0.4233	0.5153
More than 1 month	4(44.4)	2(28.6)		
Border Health Unit active before COVID-19				
No	8(88.9)	4(57.1)	2.116	0.1458
Yes	1(11.1)	3(42.9)		
Receive performance feedback				
No	2(22.2)	2(28.6)	0.08466	0.7711
Yes	7(77.8)	5(71.4)		
Trained staff on the reporting tool				
0-1	3(33.3)	4(57.1)	0.907	0.3409
2 or more	6(66.7)	3(42.9)		
Report submission				
Other surveillance platforms	1(11.1)	4(57.1)	3.883	0.04877*
Directly in the eIDSR	8(88.9)	3(42.9)		
Number of reporting tools				
1	6(66.7)	1(14.3)	4.39	0.03615*
2 or more	3(33.3)	6(85.7)		
Network/internet availability				
No	2(22.2)	5(71.4)	3.874	0.04904*
Yes	7(77.8)	2(28.6)		
Gadget used for reporting (phone, tablet, computer)				
Personal	1(11.1)	4(57.1)	3.883	0.04877*
PoE gadget	8(88.9)	3(42.9)		
eIDSR: Electronic Integrated Diseases Surveillance and Response System, POE:Point of entry, *P value ≤0.05.				

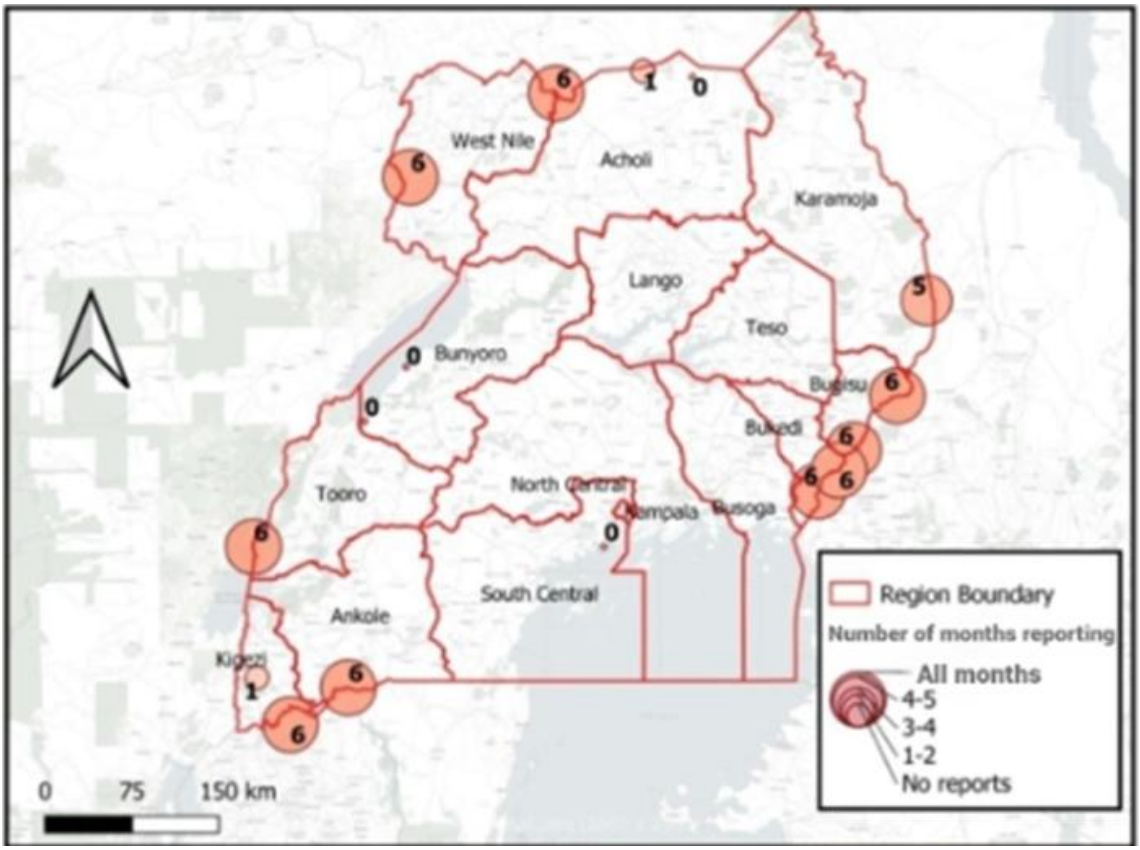

Figure 1: Uganda map showing the geographic distribution of POE that responded to the online tool and number of months they constantly reported