The state of COVID-19 contact tracing following relaxation of the national lockdown: A qualitative study among surveillance response teams in Kampala, Uganda

Andrew Kuguminkiriza Tusubira[1&2], Steven Ssendagire[1], Angela Nakanwagi Kisakye[1&2], Elizabeth Muhumuza[1], Dorothy Akong[1], Winnie Agwang[1], David Kansiime[1], Stella Martha Migamba[1], Doreen Tuhebwe[1], Elizabeth Ekirapa Kiracho[1]

[1]Department of Health Policy Planning and Management, Makerere University School of Public Health, College of Health Sciences, Kampala Uganda, [2]African Field Epidemiology Network, Kampala Uganda

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&CORRESPONDING AUTHOR
Andrew K. Tusubira, Department of Health Policy Planning and Management, Makerere University School of Public Health, College of Health Sciences, Kampala Uganda.
andrewtusu@gmail.com

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ABSTRACT

Introduction: The surge in COVID-19 cases triggered a need for surveillance systems to implement new strategies that augment and accelerate manual contact tracing. In Uganda, COVID-19 cases increased exponentially following the relaxation of the national lockdown. However, little is known about how the surveillance system mitigated COVID-19 transmission during this period. We sought to understand how contact tracing was being conducted in Kampala district following relaxation of the national lockdown. **Methods:** We conducted a cross-sectional qualitative study, between November and December 2020, among surveillance response officials in the five Divisions of Kampala-Uganda. We purposively selected and interviewed 14 key informants from the Division health offices who included five Division surveillance focal persons, four data analysts and five laboratory personnel. Interviews were audio recorded and transcribed verbatim. We used a conventional approach for content analysis to identify emergent themes. **Results:** We found that adjustments were made in the contact tracing system to cope with the increasing number of COVID-19 cases. Online and mobile application technology systems including Go-data, WhatsApp, Open Data Kit and City Health Information System were adopted for collection, storage, analysis and reporting of contact tracing data. In one Division, community health workers were trained and engaged. Phone calls were adopted to supplement physical follow-up of contacts. We found managerial barriers such as delays in communication, limited skilled-workforce and insufficient laboratory supplies. Behavioral barriers including lack of cooperation from cases and contacts triggered by perceived stigma affected effective implementation and sustainability of the adjustments in contact tracing. **Conclusion:** Online systems and engagement of community health workers were adopted to optimize contact tracing coverage in Kampala. There is need to assess the effectiveness and outcomes of digital solutions to contact tracing in resource-limited settings. Besides, clear strategies should be designed to ensure the attainment of gains from community health workers when engaged in surveillance response activities.

Introduction

Contact tracing is the identification, listing and follow-up of persons who have come into contact with cases [1]. A COVID-19 contact is a person who has been exposed to a case through direct physical contact, contact with contaminated surfaces or sharing an enclosed space [2]. Contact tracing entails three main elements; contact identification, contact listing and contact follow-up [3]. Since COVID-19 is highly infectious, contact tracing is critical in breaking the chain of transmission through early identification of infected persons, isolation and management [4].

The initial surge of COVID-19 cases in Africa led to multiple public health measures to reduce the rate of transmission such as establishment of centers for quarantining cases, self-isolation for exposed persons, promoting physical or social distancing and hygiene as well as implementing national lockdowns [5]. In Uganda, after identification of the index case on 21st March, 2020, a national lockdown, which entailed travel bans; restricted in-country movements; dispersion of concentrated gatherings; closure of workplaces except essential service providers and a mandatory curfew, were imposed [6,7]. During the lockdown period, identified cases were isolated for treatment and their contacts subjected to institutional quarantine. A multi-disciplinary team of health professionals followed up the contacts physically at their designated quarantine centers. At that point there was limited interaction of cases with the public and community transmission was still low [6].

However, following the relaxation of the national lockdown on 21st May, 2020, which involved permitting in-country movements; reopening of workplaces and non-essential businesses including saloons, retail shops and shopping arcades; and the phased reopening of schools and places of worship , the number of COVID-19 cases increased exponentially from 457 cases on 31st May to 1,176 cases by 31st July 2020 and by 14th October 2020, 9945 cases and 95 deaths were reported by the ministry of health [8]. By the end of September, community transmission was expected to rise due to the increased exposure of the public. Efforts to identify cases, list and follow up on their contacts in highly populated areas, such as Kampala city following relaxation of the lockdown were implemented at national, district and community levels. Nonetheless, the processes of surveillance especially contact tracing were not well structured, with high rates of loss to follow up and limited analysis of contact tracing data to inform decision making [9]. Understanding the contextual issues that impend contact tracing and reinforcing factors was crucial to improve contact tracing, reduce disease transmission and inform epidemic surveillance strategies during community transmissions. With support from Training Programs in Epidemiology and Public Health Interventions Network (TEPHINET), the Uganda Field Epidemiology Training Program (FETP) based at Makerere University School of Public Health deployed residents and alumni to understand how contact tracing was being conducted in Kampala district following relaxation of the national lockdown.

Methods

Study setting

The study was carried out in Kampala capital city, which was among the epicenters for COVID-19 after the relaxation of the national lockdown. It was carried out in the five divisions of Kampala: Kawempe division, Central division, Nakawa division, Rubaga division and Makindye division **Figure 1**. The divisions are decentralized with each division being headed by a Division Medical Officer. Kampala has a population of 1.5 million people and being the capital city and business center of the country, it is highly crowded during the day, which facilitates the transmission of COVID-19 [10].

Study design

We conducted a qualitative descriptive study. The study was carried out between November and December, 2020 using key informant interviews.

Study participants

We interviewed division surveillance focal persons, data analysts and laboratory personnel who were directly involved in contact tracing activities between March and May, 2020. We excluded surveillance officers who were volunteers at the time of the study since they exhibited a high turnover, which risked the depth of information they would provide.

Sampling

We purposively selected the study participants basing on their knowledge and expertise in contact tracing. We used maximum variation sampling for selecting participants [11]. This was achieved by selecting participants from each division and different departments to obtain different perspectives from the participants. At least two key informants were selected from each division where one was a surveillance officer and the other data analyst or laboratory personnel. We therefore interviewed 14 key informants from the division health offices: five division surveillance focal persons; four data analysts and five laboratory personnel.

Data collection

The Uganda Field Epidemiology Training Program (FETP) recruited and trained five experienced FETP residents and alumni of public health with prior training in Social sciences, Biomedical sciences and Environmental health. Prior to data collection, we predetermined to collect data from at least three key informants from each division. We used pretested semi-structured key informant interview guides to collect data from the participants. We pretested the tools in Wakiso in a manner that replicates the anticipated procedure of data collection including consenting and conducting the interviews. We then revised the guide to ensure clarity and appropriateness in line with the objective of the study. The pretested key informant interview guide included the following sections: 1) Surveillance functions of focus at the division 2) alerts management and identification of cases and their contacts 3) follow up of contacts and 4) reporting mechanisms. FETP residents scheduled and conducted face-to-face interviews with selected participants in privacy. Interviews were conducted in English and were audio recorded. Audio records were transcribed verbatim and the transcripts proofread against their recordings to check for accuracy and completeness of transcribing.

Data analysis

We used a conventional approach to thematic content analysis to obtain inductively driven findings [12]. A multi-disciplinary team of four FETP residents and two mentors, with specialties in social sciences, environmental health and biomedicine (AKT, ANK, EM, DA, WA, DK) independently read three similar transcripts and generated the initial codes. The codes were discussed, refined and through consensus the team developed an initial code structure. The code structure was applied to other three new transcripts while giving allowance to new codes. The team held another meeting to come up with a working code structure. This code structure was applied to all transcripts using Atlas.ti version 8.5 while allowing new codes to emerge. Emerging findings were discussed by the team and investigators to develop subthemes and themes. We present representative quotes for each theme.

Ethical consideration

We sought ethical clearance from the Higher Degrees, Research and Ethics Committee, School of Public Health, Makerere University (study protocol number HDREC 885), the Uganda National Council of Science and Technology as well as authorities of the different divisions. Written informed consent was obtained from the study participants. The participants were also informed that they could leave the study whenever they wanted. Privacy and confidentiality were also observed during data collection.

Results

Two overall themes emerged from our analysis: 1) Adjustments in the contact tracing system to cope with the COVID-19 response at division level; and 2) barriers to effective implementation and sustainability of the new changes in contact tracing.

Adjustments in the contact tracing system to cope with the COVID-19 response at division level:

We found adaptions in the collection, storage, analysis and reporting of contact tracing data. Specifically, online systems such as Go data, WhatsApp and ODK were being used in the different divisions. Kampala Capital City Authority (KCCA) also developed an online-based data collection and reporting system called "City Health Information System (CHIS)" to ease reporting of contact tracing data by surveillance officers. One officer stated:

"There is a system called City Health Information System (CHIS) that has been rolled out to the divisions for the surveillance officers to use in tracking, tracing and line listing." KI KCCA city hall.

"The reporting, we are having WhatsApp, we have a forum where we send the report of the daily reporting situation report. Then we are also having the daily situation report which is a computer set up. So we are having two areas. WhatsApp and that one of the computer or for the mail sort of ODK designed for sending information." KI KCCA central division. In addition, phone calls rather than physical meetings were being used for contact tracing as narrated by one officer:

"We are implementing the aspect of following up contacts through phone calls...you ask them how they are, whether they have developed any symptoms and of course you are recording that." KI KCCA city hall.

In order to address the human resource needs, some divisions trained and engaged community health workers (CHW) such as Village Health Teams (VHTs), compliance officers and Local council leaders in contact tracing activities.

"So we have at least trained about I think 80 VHTs who are also helping us in surveillance, and we… Now for home based we have trained about 80. Then also for surveillance, we have also trained." KI-Kawempe division.

"So you have now to work with the VHTs and of course now we work with some of the compliance officers…the ones which were trained. We have the compliance officers which were trained by water, World Vision at workplace. Then we also have the VHTs who were trained. So those are the people now we are using." KI Kawempe division.

Lastly, the participants indicated that besides case investigation and management, the divisions used surveillance data to identify the patterns of COVID-19 infections and make reports. They also reported using the data for planning purposes in terms resource allocation.

"The data which we get from the patients assists us so much to analyze the situation on ground for example how many alerts, how many are coming in as new cases, how many are positive, how many have become negative. The data in fact assists us to plan for further actions: … Do we need health workers in this area? If there is need, then they come in to allocate health workers to assist. We also plan if there is need for ambulances, if the numbers are becoming big then we put more ambulances for picking and follow up and evacuating positive cases. So, the information we get each day really assists us to plan so much." KI KCCA Central division.

Corresponding barriers to effective implementation and sustainability of the adjustments were categorized into two: Managerial and behavioral challenges

One of the managerial challenges cited by the participants was inadequate logistics. In most cases, contacts were not tested due to inadequate laboratory supplies, fewer contacts were followed up due to limited transport and some contacts were forced to use public transport to health facilities for sample collection which risks increased transmission of the virus.

"Sometimes we call them (contacts) to come to the health facility because we don´t have available cars, they use taxis, boda boda just know they mix up with people and they end up spreading more in case they turn up with a positive case." KCCA Makindye 1. Also, surveillance officers were unable to call the contacts or send data to KCCA due to lack of airtime. *"We don´t have airtime to reach out to them in fact there are so many people we have not contacted."* KI KCCA Central

There was a great reduction in the manpower, which had been trained to support the surveillance activities due to withdrawal of surveillance teams supported by implementing partners. Consequently, very few trained people were doing contact tracing despite the increasing cases as noted by one of the participants:

"You yourself were here with us, but you´ve gone. Isn´t it so? UNICEF was here with us; they´ve gone. WHO was here; they´ve gone. So, we have remained as KCCA and yet we are few and also with other things, other…we do not have only contact tracing. We have other roles and responsibilities. So, we have now to budget our time." KI Kawempe division.

We found that there were delays in communication, which affected the quality and timeliness of surveillance data. Participants reported delayed release of results of confirmed COVID-19 cases, which led to delays in contacting the cases and their contacts.

"Initially we used to receive data at 10:00 am of the following day, it moved up to 6:00 pm, then to 9:00pm but now it can even take a week." KCCA interview.

"Another thing is that getting the results takes a long time compared to before like you wait five days to get the results so you can imagine how many he has interacted with in those five days. If you were tested last week on Monday and your results come back after two weeks, if results come back as positive, even you the person receiving that data that this person is positive, you feel small to communicate back." KI Nakawa SFP.

Behavioral challenges entailed reactions from the cases and contacts, which limited the use of phone calls for contact tracing. Some outstanding behavioral factors that barred contact tracing included: lack of cooperation from cases and contacts including refusing to disclose necessary information, giving wrong addresses, providing wrong numbers, some cases and contacts not picking their phones and others being rude and abusive. One of the participants reported;

"Especially, when the cases are not cooperative… If you ask a person and they do not want to disclose their family or where they´ve been, it´s so hard. Some people will not even direct you to where they stay or where they work so you´ll not even get any contact. Because at least if someone directs you to where they stay, when you reach there you can get more information from the neighbours. But if someone doesn´t cooperate at all, you will not get any sort of information." KCCA Nakawa Lab.

There was also a challenge of perceived stigma as reported by our participants, which hindered proper data collection and follow-up of contacts using phone calls. Participants stated that contacted persons believed that being associated with a COVID-19 case would lead to shame, embarrassment and negative reaction from the community. This was expressed through anticipation fears by contacts, including fear of being identified by neighbors as COVID-19 contact, fear of being sent to a quarantine center, fear of losing their job, and some feared being evicted by landlords.

"Most of the time the public was caught-up in some kind of stigma, like I don´t want to be associated with the case, the good thing am not a case, people never wanted to associate with the case." KI MOH.

"People fear a lot. In some workplaces, they say that if I am identified that I am positive, then I will be stopped from going to work yet that is the only way of my earning." KI Central division.

Discussion

In this study, where we sought to understand contact tracing for COVID-19, we found that adjustments had been made in the contact tracing system in order to cope with the surge in the COVID-19 cases. Adjustments were in the use of online systems for collection, storage, analysis and reporting of contact tracing data. Consequently, there were managerial and behavioral barriers, including inadequate logistics, limited skilled workforce and delayed communication, which affected effective implementation and sustainability of the adjustments in contact tracing.

We found that online-based data collection and reporting systems were being used together with the conventional physical contact tracing method. Due to the need to solve the challenges brought about by the increasing number of new cases, including an overwhelming workload of contact tracing teams, and desire to increase tracing coverage, online digital systems have been embraced in contact tracing for COVID-19 in several sub-Saharan countries [13,14]. Countries like Rwanda, Egypt and South Africa adopted digital contact tracing, which use mobile applications and cellphone tower data [4]. Although the digital contact tracing has been proven to increase tracing coverage in terms of reaching many people in a short time, it is important to assess how effective these strategies are and the cost and human capital implications.

We also found that phone calls rather than physical meetings were being used to contact and follow-up COVID-19 contacts. This is probably because of resource constraints in terms of human resource and logistics to meet the demand of the increasing number of cases. The use of phone calls in contact tracing is in line with other global practices. For instance, in United States, due to the overwhelming number of cases and contacts, phone calls were adopted instead of physical contact tracing. Follow-up was conducted via email or telephone for 14 days after exposure based on the contact's personal preference [15]. However in Ghana, the use of phone

calls was limited to only health workers who were knowledgeable and could monitor their temperature using calibrated thermometers but even then, contact tracers would physically visit them once in a while [2]. Therefore, the use of phone calls to follow-up contacts may increase coverage, but accuracy and trustworthiness of contact data might be uncertain and thus frustrating the aim of the contact tracing.

In order to address the human resource needs, community health workers such as Village Health Teams, compliance officers and Local council leaders were engaged in some contact tracing activities. Similar approaches were used in West African countries in response to the Lassa fever, Ebola, and other disease out-breaks [16]. An advantage of CHWs is that they are the best placed to demystify myths and perceptions related to pandemics, such as COVID-19, in the communities and address complacency [17]. However, increasing gains and outcomes might be further achieved when lay health workers are complemented with the professional health workers like in Nigeria and United States where non healthcare workers and medical students were trained to reinforce existing contact tracing teams [15,18].

The challenge of deficiencies in medical supplies during the pandemic in Uganda and in several other African countries like Tanzania, Democratic Republic of Congo (DRC), Mozambique and Zimbabwe probably reflects how these countries were less prepared for a prolonged response to such a pandemic [16,19]. Another challenge we found was lack of cooperation from cases and contacts, which was also encountered in Ghana and South Africa where contacts refused to pick phone-calls from the contact tracers [2,16]. This could be attributed to the lack of sensitization on COVID-19 from the onset of the pandemic. Since the public do not understand the importance of contact tracing, they were unlikely to cooperate with the surveillance officers. This can also be greatly linked to the perceived stigma reported by our participants. The fear to be associated with COVID-19 was common in even other countries like Ghana and India , where COVID-19 probable cases and health workers were evicted from their rented apartments; some were turned away from shops and some health workers were denied access to public transport [20-22]. Stigma can be attributed to unscientific beliefs triggered by rumors, and failure of the public to clearly understand the messages communicated [23]. The prevailing COVID-19 stigma probably signifies a need to include messages contravening stigma in the risk communication of outbreaks.

Our results should be interpreted with a limitation that our participants were providers of the surveillance services and not the consumers (such as cases and their contacts). Therefore, our data did not reflect the actual experiences of persons who were traced. However, in order to widen the scope of views and perspectives, we selected participants from different departments in each division. Also, another strength was that our data analysis involved a multidisciplinary team, consensus meetings and reviews which facilitated divergent interpretation and cross coder reliability.

Conclusion

While adjustments in contact tracing, such as use of mobile and online systems as well as involvement of Village Health Teams, compliance officers and Local council leaders were adapted to cope with the surge in COVID-19 cases, managerial and behavioral factors barred the implementation of these adjustments. Strategies to improve and sustain the adapted contact tracing systems should focus on addressing the identified barriers. Besides, plans on how Village Health Teams could be productive when engaged in surveillance activities should be incorporated in epidemic response. Further research can be done to quantify the effectiveness and outcomes of mobile and online based contact tracing systems in resource limited settings, so as to maximize their uptake.

What is known about this topic

- This study acknowledges that the surge in patients of the novel COVID-19 in Africa, and globally, led to multiple medical and non medical health measures to mitigate the spread of COVID-19.
- Implementing national lockdowns was one on the main strategies that limited human interraction and reduced transmission. However, we recognise that, there is evidence that there was an exponential increase in the number of COVID-19 cases

following the relaxation of lockdown in several African counries including Uganda.
- We demonstrate that during this period, the processes of surveillance, particularly contact tracing in low resource settings like Uganda, were not well documented.

What this study adds

- This study documents that several adjustments were made in the contact tracing system to cope with the increasing COVID-19 cases.
- We provide evidence that online systems and mobile application technology systems such as Go-data, WhatsApp, Open Data Kit and City Health Information System were adopted for collection, storage, analysis and reporting of contact tracing data.
- We add to literature that lay and community health workers were trained and engaged in order to address the challenge of limited human resource to respond to the pandemic.
- We also describe the barriers that affect the effective implementation and sustainability of these adjustments in contact tracing.

Competing interests

The authors declare no competing interests.

Authors' contributions

AKT, SS, ANK, DT and EEK conceptualized the study and made substantial contributions to the design and planning of the study. AKT, ANK, EM, DA, WA, DK, and SMM, participated in the data collection and analysis. All authors contributed to the interpretation of the data. AKT led the drafting of the first draft of the manuscript and all authors reviewed the manuscript drafts. All authors provided critical review of the manuscript and they all approved the final version of the manuscript.

Figures

Figure 1: Map of Kampala showing the five Division

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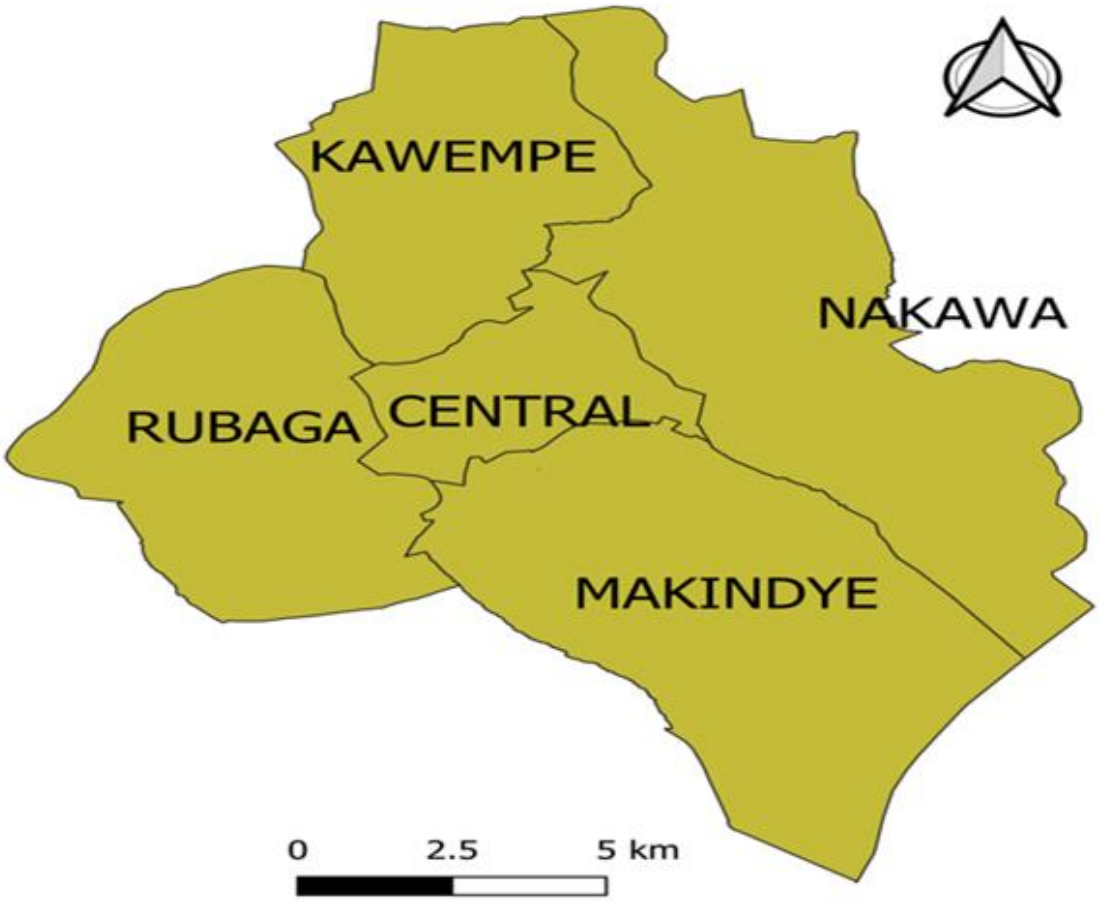

Figure 1: Map of Kampala showing the five Divisions