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The role of community pharmacies in early detection of suspected COVID-19 cases in 2020: lessons from Dar es Salaam, Tanzania

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ABSTRACT

Tanzania reported its first COVID-19 case on 16 March 2020. We conducted event-based surveillance of COVID-19 suspect cases among pharmacy clients presenting with respiratory symptoms and influenza-like illness to increase early and rapid detection of COVID-19 cases and mitigate transmission. We conveniently sampled 103 pharmacies from Dar es Salaam, the epicentre for the COVID-19 pandemic in Tanzania at the time. Between 23 April 2020 and 18 May 2020, 67% of the pharmacies (69/103) reported an observed increase in the number of clients presenting with respiratory symptoms and influenza-like illness compared with the 1 month before the COVID-19 outbreak. In the 1-month surveillance period, the participating pharmacies recorded 75 alerts of COVID-19 suspect cases and referred all suspected COVID-19 cases to rapid response teams for additional symptomatic screening and SARS-CoV-2 testing. A key implementation challenge was that some clients identified as COVID-19 suspected cases were hesitant to provide follow-up information for linkage to rapid response teams. Addressing concerns among drug dispensers in the participating pharmacies and informing them of the benefits of the surveillance activity were important implementation components. Our approach demonstrates the overall feasibility of rapidly implementing an event-based surveillance system for an emerging health threat through an existing network of pharmacies within the community. The approach and tools used in this surveillance activity could be adapted in similar settings to detect and generate alerts of disease outbreaks in the community that other surveillance systems may otherwise miss.

SUMMARY BOX

⇒ The ability of countries to rapidly detect and respond to suspected cases of an emerging disease outbreak is a critical global health security priority.

⇒ Immediately after the first few cases of COVID-19 were reported in Tanzania, the government of Tanzania and its partners piloted event-based active surveillance of COVID-19 suspect cases among clients presenting with respiratory symptoms and influenza-like illness in 103 pharmacies.

⇒ Between April and May 2020, pharmacies reported a subjective increase in the number of clients presenting with respiratory symptoms and influenza-like illness seeking care and self-medication in pharmacies in Dar es Salaam. The pharmacies participating in the surveillance also reported increasing demand for over-the-counter medications for relieving respiratory symptoms.

⇒ This surveillance activity has demonstrated the feasibility of leveraging existing networks of pharmacies in the community to generate alerts for an emerging disease outbreak. Our experience in Tanzania offers essential lessons for the design and integration of similar surveillance approaches in current and future health emergencies.

INTRODUCTION

The Tanzania Ministry of Health (MoH) announced the first case of COVID-19 on 16 March 2020.[1] The government of Tanzania immediately instituted a number of mitigation measures to limit transmission of SARS-CoV-2 as per WHO guidelines.[2] Early response measures included enhanced case screening at ports of entry, quarantining all incoming international passengers, enacting by-laws mandating installation of hand hygiene facilities in public places and institutions, reinforcing physical distancing, as well as an enhanced case surveillance including contact tracing.[3 4] Although there was no lockdown in Tanzania,[3] the government prohibited large public gatherings such as weddings. -schools and higher learning institutions were closed for several months. On 4 April 2020, MoH recommended and encouraged wearing of

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face mask in public areas. Notably, MoH had recommended wearing of face masks before such guidance was issued by the World Health Organization (WHO).[5 6]

By early April 2020, cases of COVID-19 associated with probable community transmission were reported in Dar es Salaam, the commercial capital of Tanzania and the epicentre of the initial outbreak.[7] The MoH defined probable community transmission (as of 3 April 2020), as infections among persons without a known exposure by travel or close contact with a patient with confirmed COVID-19. Per WHO recommendations,[8] Tanzanian COVID-19 testing guidance was based on meeting the criteria for suspected COVID-19. Persons with clinical findings of respiratory illness and, travel to an affected country or an epidemiological link to a laboratory-confirmed COVID-19 case; or any persons hospitalised for severe respiratory disease and no alternative diagnosis were eligible for COVID-19 testing. Due to increasing local COVID-19 transmission and the low number of COVID-19 suspected cases seeking care in health facilities, there was a need to establish surveillance in local communities to increase the early and rapid detection of unreported cases. Therefore, the MoH and partners established active surveillance of COVID-19 suspect cases targeting clients seeking care for respiratory and influenza-like illnesses within pharmacies in Dar es Salaam.

Community pharmacies are businesses that dispense and sell medicines or other pharmaceutical products in retail as well as provide some healthcare services.[9] In Tanzania, pharmacies improve access to affordable, quality medicines and pharmaceutical services across rural and periurban settings.[10 11] Medicines including over-the-counter drugs, selected antimicrobials and prescription-only medicines are also be purchased in drug shops which have been accredited; also known as accredited drug dispensing outlets (ADDOs).[10 12 13] Most consumers prefer to seek care and purchase medicines in pharmacies and ADDOs as opposed to seeking medical care at healthcare facilities because of shorter waiting times, proximity to home and more reliable drug availability.[10 12] Pharmacists and drug dispensers receive training and accreditation from the government[14] and are recognised as community-level healthcare workers who can assess health conditions, sell appropriate medication and refer clients to health facilities for further evaluation.[10 14] Early in the COVID-19 pandemic in Tanzania, we anticipated that a substantial proportion of the population might seek care in pharmacies if they experience respiratory symptoms or influenza-like illness. We expected that pharmacies would be a potential source of alerts for COVID-19 suspect cases as they are often the first point of contact for symptomatic patients.[10 14] Self-medication is common in Tanzania and elsewhere before and during the COVID-19 pandemic.[15–18] Against this background, we designed the surveillance activity early in the COVID-19 pandemic targeting individuals with respiratory symptoms and influenza-like illnesses seeking medication or health advice from pharmacies.

We intended for our pharmacy surveillance to complement the reporting of COVID-19 suspect cases within the existing platforms in the district and regional COVID-19 rapid response teams in Dar es Salaam. Our surveillance also aimed to gauge the extent of potential COVID-19 cases in the community. In this paper, we describe the trends—based on 1 month of data—in the number of persons with respiratory symptoms seeking care in pharmacies and the demand for medication for alleviating respiratory symptoms and influenza-like illnesses reported by pharmacies. We also document the COVID-19 public health and social measures adopted in pharmacies during the COVID-19 outbreak in Dar es Salaam. Lastly, we highlight key strengths and challenges associated with the surveillance activity that have implications for syndromic surveillance conducted through pharmacies during health emergencies.

PLANNING AND IMPLEMENTATION OF SURVEILLANCE ACTIVITIES

The COVID-19 surveillance in pharmacies was designed and implemented by an interdisciplinary team of public health professionals from the Muhimbili University of Health and Allied Sciences, Amref Health Africa, MoH, US Centers for Disease Control and Prevention in Tanzania. The team included district surveillance officers and district pharmacists. We purposively selected pharmacies (including ADDOs) from two municipal councils in Dar es Salaam (Kinondoni and Ilala). Kinondoni council was selected because it reported most of the initial COVID-19 confirmed cases in Dar es Salaam.[19] The Ilala municipal council was selected because it is densely populated and hosts the Dar es Salaam city centre and the largest public market in the country. The surveillance team obtained a register of pharmacies and ADDOs from the district pharmacists. In each municipality, we purposively selected at least 50 pharmacies. To maximise clients' variation, we included pharmacies located near health facilities and those in high-traffic areas (eg, bus stops).

Surveillance tools and data collection

We developed tools for recording and reporting COVID-19 suspect cases in pharmacies and ensured that the data capture format would synchronise with existing surveillance platforms (online supplemental annex 1). The tools included the MoH COVID-19 suspect case definition at the time of the surveillance (box 1)[20] and a list of symptoms to identify COVID-19 suspect cases. We trained the surveillance team on using the surveillance tools. The trained team piloted the tools.

Two surveillance teams, one for each municipal council, visited the pharmacies. The teams trained pharmacy staff (eg, drug dispensers, pharmaceutical assistants, pharmaceutical technicians and pharmacists) who were present

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Box 1 COVID-19 case definitions (April 2020)

Suspect case:
⇒ A patient with acute respiratory illness (fever and at least one sign/symptom of respiratory disease, eg, cough, shortness of breath), and having been in contact with a confirmed or probable COVID-19 case in the last 14 days prior to symptom onset.

Probable case
⇒ A suspect case for whom lab test result is inconclusive as reported by the laboratory.
⇒ A suspect case for whom testing could not be performed for any reason.

Confirmed case.
⇒ A person with laboratory confirmation of COVID-19 infection, irrespective of clinical signs and symptoms.

in the pharmacies on data collection and reporting tools. The team guided the pharmacy staff in reporting symptoms of the suspect cases and submitting their mobile contacts to the district rapid response teams.

The surveillance team conducted brief discussions and collected information on the estimated number of persons with respiratory symptoms or influenza-like illnesses who have sought care, medical advice or medication. The team asked about the observed changes in the numbers of people seeking symptoms relieving medication such as paracetamol and influenza/cough syrups. The surveillance team used an observation checklist to assess pharmacies' COVID-19 infection prevention control practices. They specifically assessed the presence and use of hand hygiene facilities by clients, surface decontamination practices, wearing face masks and maintaining a physical distance among clients inside the pharmacies. At the end of the assessment, the surveillance team provided education on COVID-19 misinformation, appropriate use of face masks and infection prevention control practices to staff and clients.

Screening of clients and initiating rapid response

Using the tool in online supplemental annex 1, pharmacies screened all clients who presented with respiratory symptoms or influenza-like illness. A data flow diagram shown in figure 1 was used to guide pharmacies on the steps and procedures for recording clients' information meeting the COVID-19 suspect case definition. Suspect cases were informed of the surveillance activity and requested consent to record their mobile phone numbers. The pharmacies shared the contact information with the district rapid response teams, which recorded them as COVID-19 alerts and followed up with them per national guidelines. Those who refused to provide their phone numbers were provided with the mobile contacts of the rapid response teams and encouraged to contact them.

From 18 May 2020, the MoH changed the surveillance data flow system which prompted pharmacies to stop recording COVID-19 suspect case alerts in our surveillance forms. Instead, the MoH asked persons presenting with respiratory symptoms or influenza-like illness in pharmacies to perform self-screening using a digital, mobile phone-based toll-free USSD code*199#. These changes followed the launch of the national health information

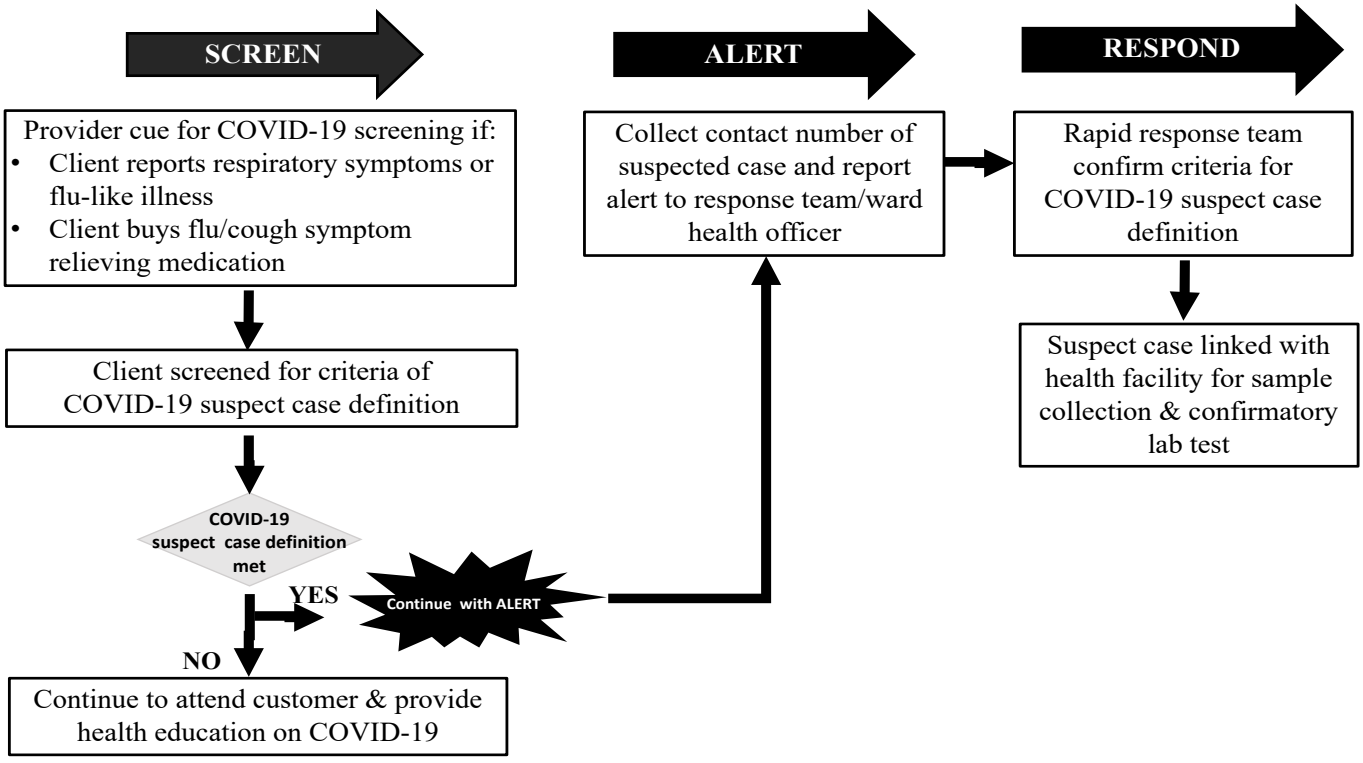


Figure 1 Pharmacy surveillance data flow diagram.

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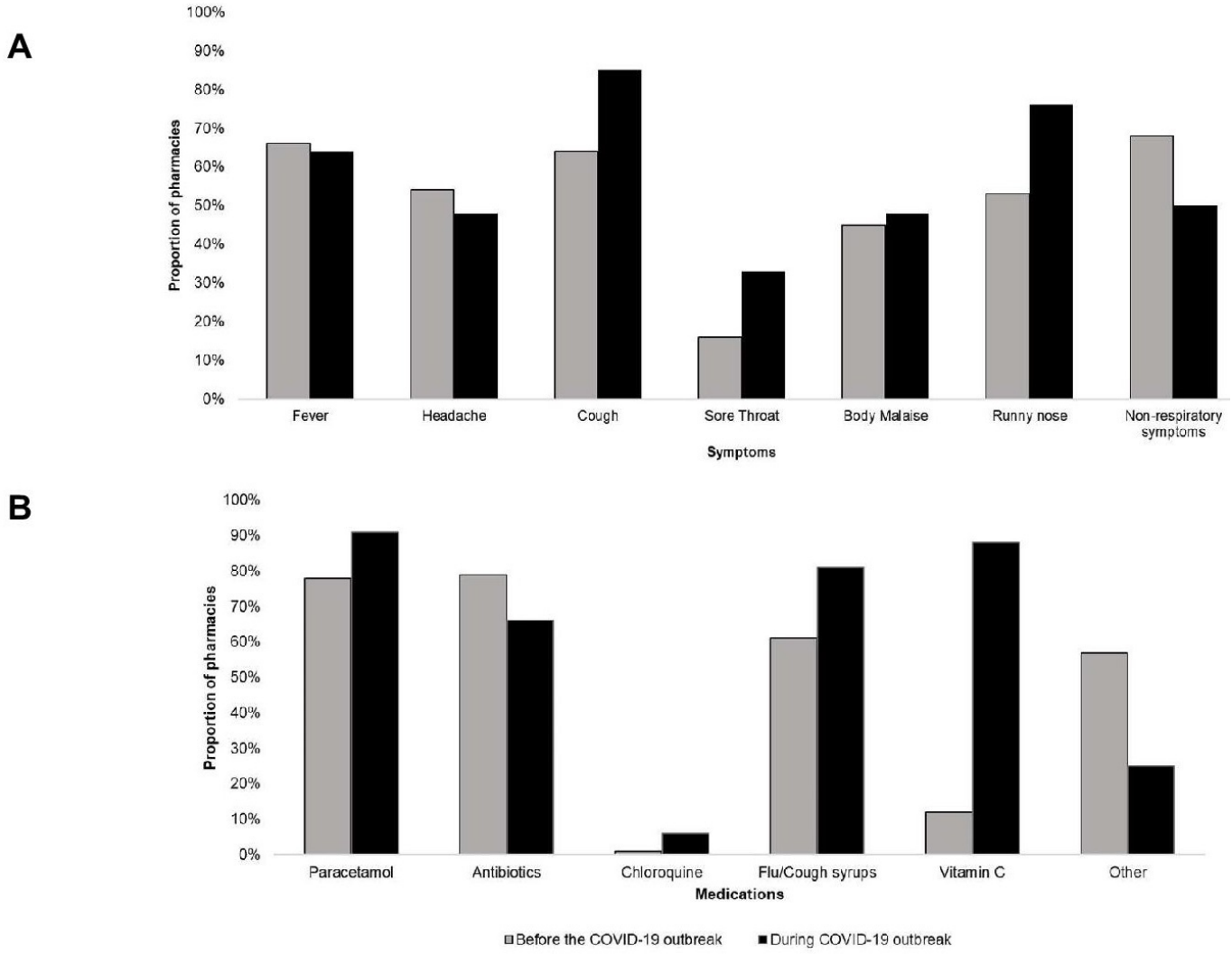


Figure 2 Bar chart showing (A) symptoms reported and (B) medications sought commonly sought by clients visiting pharmacy before and during the COVID-19 outbreak in Dar es Salaam (N=103).

hotline at the MoH, which the government created to harmonise the recording of COVID-19 alerts to ensure a coordinated response. Therefore, data presented in this paper only include COVID-19 alerts recorded at participating pharmacies in the very early months of the pandemic from 23 April 2020 to 18 May 2020.

FINDINGS

A total of 103 pharmacies participated in the surveillance, 51 from Kinondoni and 52 from Ilala municipal councils. Respondents were asked to mention commonly reported symptoms that prompted clients to visit pharmacies and ADDOs in-line with most sold drugs 1 month before COVID-19 and during COVID-19. These were largely subjective reports based on the experience of drug sellers and in some cases reference was made to records of daily sells of drugs. Figure 2A,B summarises commonly reported symptoms and medication in these pharmacies before and during the COVID-19 outbreak.

Sixty-seven percent (69/103) of the pharmacies reportedly observed an increase in the number of clients presenting with respiratory symptoms and influenza-like illness in April 2020 compared with the month prior to the COVID-19 outbreak. The most common symptoms reported by clients were cough (81%, 83/103), runny nose (75%, 77/103), and fever (61%, 63/103) (figure 2A). Of the 103 pharmacies, 88% (91/103) reported an increase in demand for paracetamol, while 81% (83/103) reported an increase in demand for influenza/cough syrups (figure 2B).

Through discussions, pharmacies reported increasing demand for medications that clients perceived to reduce the risk or severity of COVID-19. For instance, 90% of the pharmacies (93/103) reported a rise in demand for vitamin C. Other drugs with increased demand included zinc, multivitamins and chloroquine.

Alerts of COVID-19 suspect cases recorded in pharmacies

Between 23 April 2020 and 18 May 2020, 75 COVID-19 alerts were recorded from individuals presenting with

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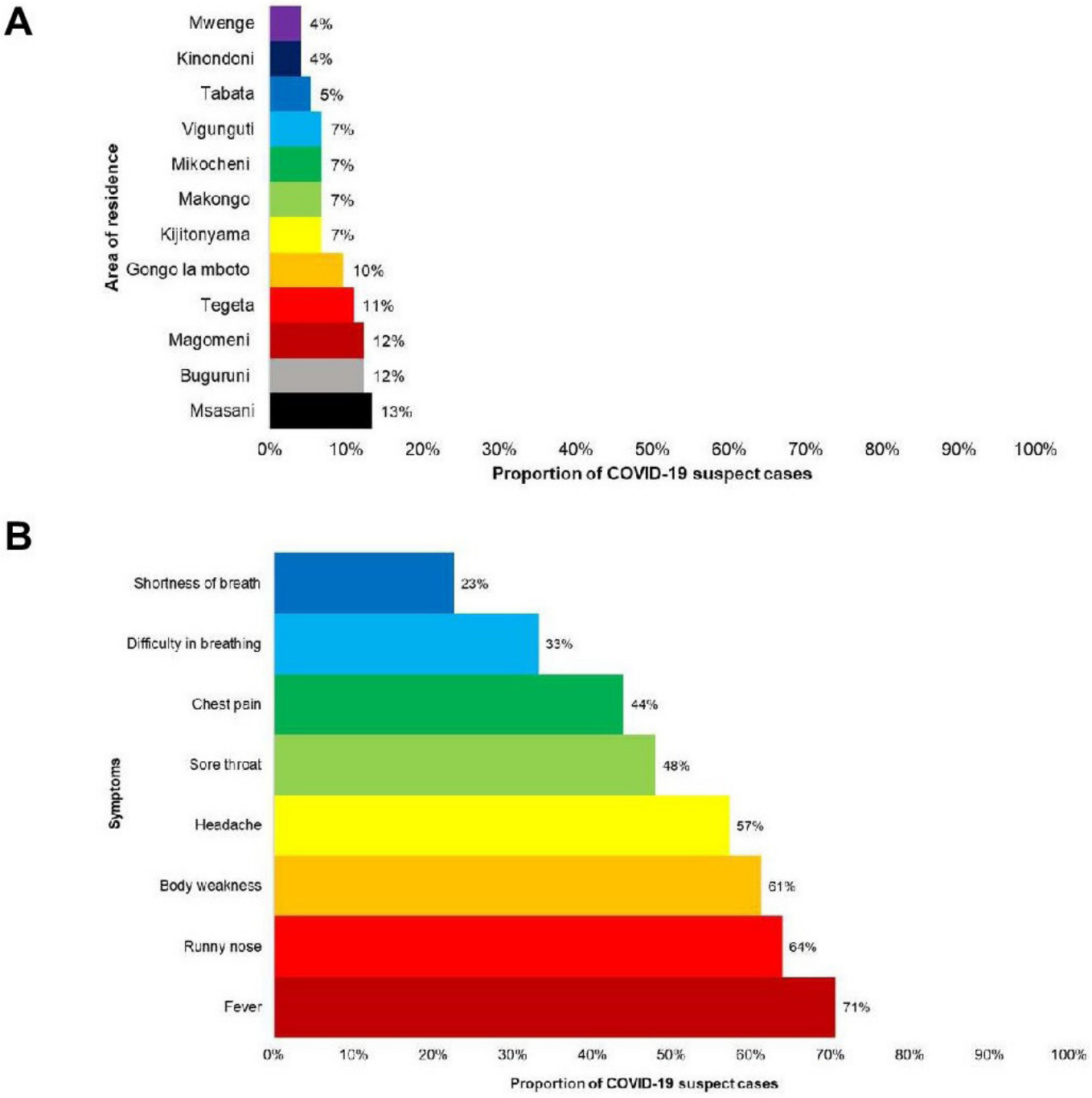


Figure 3 (A) Proportion of COVID-19 suspect cases reported from pharmacies in each ward (N=73). (B)Proportion of commonly reported symptoms among COVID-19 suspect cases reported from pharmacies(N=75).

respiratory symptoms and influenza-like illnesses. Of the 75 alerts reported, 17% (13/75) had a recent travel history from a foreign country. On the other hand, 4% of the alerts (3/75) reported having had close contact with a known COVID-19 confirmed case. Msasani ward had the highest number of alerts reported, followed by Buguruni, Magomeni, and Tegeta (figure 3A). The commonly reported symptoms among clients for whom alerts were generated included fever (71%), runny nose (64%) general body weakness (61%) and headache (57%).

COVID-19 public health and social measures adopted in the pharmacies

Nearly all pharmacies (99%, 102/103) had provided means for hand hygiene to customers that include soap and running water, alcohol-based hand sanitisers and chlorinated water. Only one pharmacy had not provided a hand hygiene service (figure 4B).

The use of face coverings among staff in the pharmacies was nearly universal 91% (94/103). Other personnel wore face shields, gloves and aprons (figure 4A). More than half of the pharmacies (58%, 60/103) had placed

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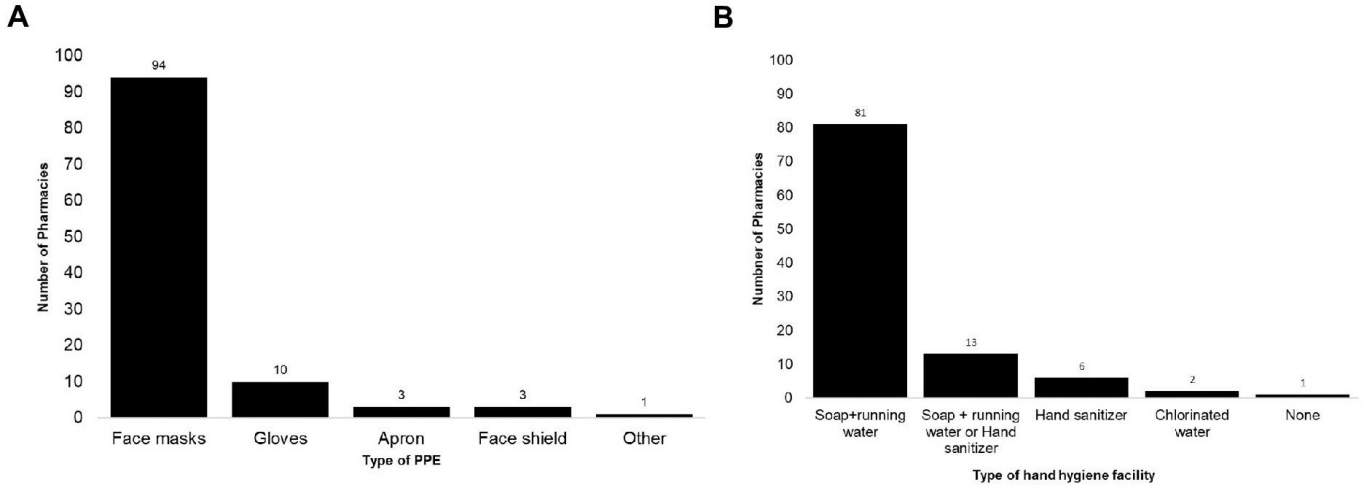


Figure 4 (A) Type of personal protective equipment(N=103). (B) Type of hand hygiene facilities used in pharmacies(N=103).

a glass/plastic shield as a contact barrier or a barricade rope for reinforcing the physical distance between the drug dispenser and the clients. Similarly, more than half of the pharmacies (54%, 56/103) minimised crowding within the store by asking clients to line up outside the facility while waiting.

LESSONS LEARNT

This surveillance activity was conducted as a rapid pilot in the early months of the COVID-19 outbreak in Tanzania to help detect potential COVID-19 cases among individuals presenting with respiratory or influenza-like illnesses in pharmacies in Dar es Salaam. We learnt three critical lessons from implementing this surveillance: (1) simple innovations in pharmacy surveillance hold untapped potential for integrating disease surveillance and response; (2) pharmacies were receptive to joining the surveillance network, but the fear of losing clients was a significant concern and (3) linking of suspect cases to rapid response teams was initially feasible but encountered subsequent challenges that made it impractical.

Simple innovations in pharmacy surveillance hold untapped potential for integrating disease surveillance and response

We quickly integrated pharmacy surveillance into the COVID-19 surveillance efforts in the early months of the pandemic, which provided critical insights regarding trends of potential COVID-19 cases in the community. Generally, the data collected suggest an increase in the number of clients presenting with respiratory or influenza-like illnesses during the COVID-19 outbreak between April and May 2020 in our network of participating pharmacies. There was also a suggestive concurrent increase in demand for fever and influenza/cough symptom-relieving medications. This observation corresponds to global trends at the time, indicating an increase in the number of people seeking online information on self-medication for COVID-19-related symptoms early in the pandemic.[21] The ubiquity of COVID-19-related information via online and offline platforms coupled with intensified media coverage often led to misinformation among the population.[22 23] WHO has characterised this phenomenon as 'infodemic'.[24 25] The infodemic environment may have influenced the treatment-seeking behaviours we observed. For instance, internet misinformation may have influenced the sudden increase in chloroquine demand observed during the early period of the COVID-19 outbreak in Dar es Salaam. There was also a notable increase in the demand for Vitamin C among clients in pharmacies, a trend also reported elsewhere during the COVID-19 outbreak.[26] In Togo, for instance, a survey found that over a third of the population self-medicated to prevent or treat COVID-19, with vitamin C being the most used product.[18] An increase in demand for vitamin C might be explained by the spread of misinformation about its preventive and curative properties against COVID-19.[26 27]

Monitoring the trends in drug dispensing in retail pharmacies[28] and patterns of internet searches for self-medication[29] may inform context-specific syndromic surveillance to detect and respond to emerging public health threats. Supporting the digitalisation of drug dispensing records may help speed up their aggregation and monitoring of trends that surveillance teams can triangulate with other electronic medical records, such as symptomatic trends in outpatient health facilities. Innovative syndromic surveillance approaches have been documented in high-income country settings during the COVID-19 pandemic among the general population[30] and healthcare workers.[31] Building the capacity for public health authorities to combine and monitor drug dispensing data with local hospital records in real-time provides additional opportunities for adaptive syndromic surveillance that may be feasible in low-resource settings.

Pharmacies were receptive to joining the surveillance network but the fear of losing clients was a major concern

Our experiences in Tanzania demonstrate the feasibility of establishing a community event-based surveillance network through pharmacies. We found a very high

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willingness among owners of pharmacies to participate in the surveillance activity. At the same time, it became evident that they held concerns regarding the potential loss of clients and subsequent loss of revenues. A vital aspect of the surveillance activity was screening and identifying clients who meet the COVID-19 suspect case definition for linkage to rapid response teams for SARS-COV-2 testing and COVID-19 diagnoses. Individuals who had a positive SARS-COV-2 test result were required to be placed in a government-run quarantine facility in Dar es Salaam. Clients were reluctant to provide their contact information for follow-up by the rapid response teams, partly because they feared the potential consequences if they tested positive.

Given that we only implemented our surveillance in select pharmacies, owners worried that clients who feared testing and linkage to response teams might go to purchase drugs in non-participating pharmacies. Filling the surveillance tools needed time and attention and, therefore, may have a prolonged waiting time for clients. Expectedly, pharmacies with the limited staff needed to attend to more than one client at a time. Therefore, the pharmacists could not probe one client for a prolonged period, mainly due to confidentiality concerns when other clients were present in the facility. We learnt from this experience that pharmacies' engagement with clients was critical to getting them to volunteer their contact information for follow-up with rapid response teams. However, competing for revenue-generating priorities severely constrained such engagement to promote COVID-19 screening.

Linking COVID-19 suspect cases to rapid response teams was initially feasible but encountered subsequent challenges that made it impractical

Several limitations in the design and implementation of the surveillance activity impacted our continued ability to link COVID-19 suspected clients to rapid response teams. First, the alerts generated by the pharmacies did not include demographic information such as age, sex and residential area. We intentionally omitted such information to minimise personal information queried from clients to encourage their participation. Demographic information was subsequently collected by the rapid response teams when they reached out to the reported alerts. Second, some drug dispensers had inadequate skills for probing symptoms when screening for the criteria of the COVID-19 suspect case definition. This practice may have resulted in a subjective interpretation of the symptoms. While professional boards accredit drug dispensers and are considered knowledgeable workers, they may not have sufficient clinical skills for probing their clients' medical complaints.

Using a digital self-screening with a built-in algorithm for comprehensively probing COVID-19 symptoms may have offered a better chance for accurately capturing symptoms without a subjective interpretation by pharmacy staff. Moreover, there was an unprecedented fear and panic in the community in the early phase of the COVID-19 pandemic. Some clients may likely have exaggerated their symptoms because of this fear. At the same time, others may have withheld information about their symptoms to avoid linkage to rapid response teams for potential COVID-19 triaging and testing.

CONCLUSIONS

We learnt from the experience in Tanzania that there was a high willingness among pharmacies to participate in the COVID-19 surveillance. We further observed good collaboration with pharmacies who devoted time to learn about the COVID-19 suspect case definition, willingness to screen clients, and readiness to notify rapid response teams when suspect cases were identified. The training of pharmacies on the COVID-19 suspect case definition may have reduced missed opportunities for early detection in the early phase of the outbreak in Dar es Salaam. Pharmacies were willing to participate in the surveillance even though it interfered with their business and sometimes risked the loss of revenue when clients threatened to leave. Our lessons in Tanzania provide a foundation for implementing similar approaches integrated into public health surveillance during health emergencies.

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