Clinical Infectious Diseases

VIEWPOINTS

Coronavirus Disease 2019 (COVID-19) Response in Zimbabwe: A Call for Urgent Scale-up of Testing to meet National Capacity

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Control of coronavirus disease 2019 (COVID-19) heavily relies on universal access to testing in order to identify who is infected; track them to make sure they do not spread the disease further; and trace those with whom they have been in contact. The recent surge in COVID-19 cases in Zimbabwe is an urgent national public health concern and requires coordinated efforts to scale up testing using the capacity already in existence in the country. There is a need for substantial decentralization of testing, investment in better working conditions for frontline health workers, and the implementation of measures to curb corruption within government structures.

Keywords. COVID-19; testing; diagnostics; Zimbabwe; capacity.

Coronavirus disease 2019 (COVID-19), caused by infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was first identified in Wuhan City, Hubei Province, China, in December 2019 [1]. The disease has now spread to 216 countries and territories around the world, with over 22.5 million confirmed cases and over 790 000 deaths globally as of 19 August 2020 [1]. COVID-19 symptoms, which usually appear 2–14 days after exposure to the virus, include fever or chills, dry cough, tiredness, shortness of breath, and sometimes dyspnea [1]. Reverse transcription polymerase chain reaction (RT-PCR) is the gold standard for a laboratory diagnosis of SARS-CoV-2 infection [2].

Zimbabwe has not been spared by COVID-19. The first COVID-19 case in Zimbabwe was reported on 21 March in the resort town of Victoria Falls [3]. By 31 March, 7 more people had tested positive, with 1 reported death [3]. There was a steady increase in the number of cases in the months of April to July. In August, a surge in cases was reported, rising from 3659 on 1 August 2020 to 5378 on 18 August 2020 [3]. As of 18 August 2020, there were 141 reported COVID-19–related deaths [3]. Figure 1 presents the COVID-19 attack rate in Zimbabwean provinces. As illustrated in the map, there has been an uneven spread of the virus in Zimbabwe, and the Harare, Bulawayo, and Matebeleland South provinces are currently the COVID-19 hotspots in the country.

Various mitigation strategies have been put in place, including a 3-week Phase 4 (total) lockdown from the end of March to mid-April. Following the Phase 4 lockdown; the country entered a Phase 2 lockdown with relaxed restrictions. This resulted in accelerated transmission, as prevention behavior slackened [4]. In response, on 23 July, the government increased lockdown restrictions, including by introducing a dusk-to-dawn curfew. Further mitigation strategies include strides to increase the testing capacity, training health workers on COVID-19 patient care, and increasing the number of quarantine and isolation centers through authorization of some private facilities [4].

Testing is an important strategy to contain or slow the progression of the pandemic in society [5]. The early detection of SARS-CoV-2 in infected people is important for limiting the transmission through isolation of cases, contact tracing, and quarantine of contacts [1]. Currently in Zimbabwe, testing is supposed to be done on suspect cases as per the World Health Organization (WHO) case definition, and contacts of confirmed cases and further patients should be identified through respiratory disease surveillance [4]. However, testing has been prioritized for people with a risk of developing severe disease, symptomatic health workers, and the first symptomatic individuals in a new area or new cluster where no cases have been reported previously [4]. There is an urgent need to scale-up COVID-19 testing to meet the current capacity and to ensure equal and equitable testing availability to all who want and/or need it.

Fear of stigma and discrimination and labeling are deterring many from seeking testing [6, 7]. This is coupled with a fear of

Received 1 August 2020; editorial decision 24 August 2020; accepted 27 August 2020; published online August 31, 2020.

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Clinical Infectious Diseases® 2021;72(10):e667–74

DOI: 10.1093/cid/ciaa1301

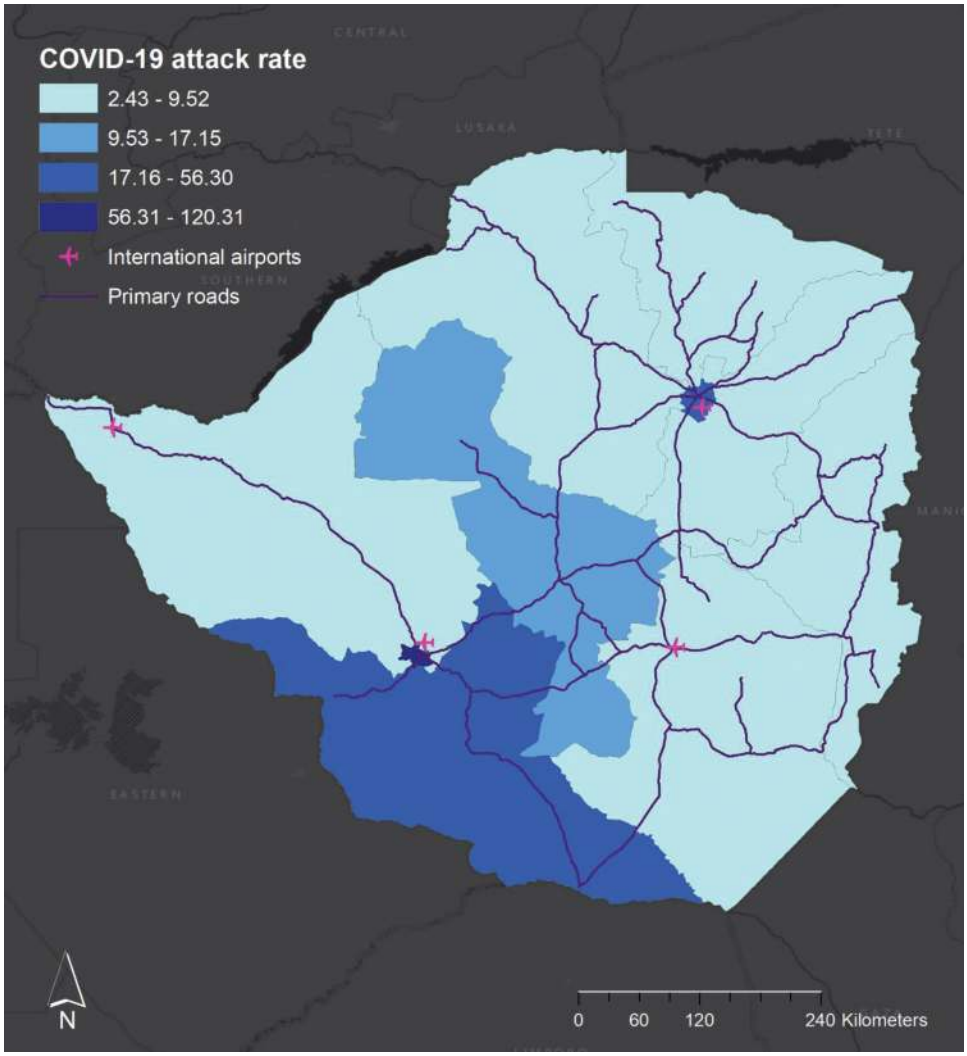

Figure 1. COVID-19 attack rate per 100 000 people, as of 28 July 2020. Abbreviation: COVID-19, coronavirus disease 2019.

the unknown and hesitance of coping with isolation, should an individual test positive [8]. In the context of this novel virus, the content of COVID-19 information education communication (IEC) material is also rapidly evolving, as clinical symptoms of the disease and the various mitigatory and containment measures are updated. IEC on the benefits of testing [9] and associated counseling is minimal.

CURRENT COVID-19 TESTING CAPACITY IN ZIMBABWE

A precise analysis of COVID-19 in Africa, as a continent, continues to be hindered by limited testing and reporting of cases. The wide variance in the testing capacity, commitment to testing, and reporting of COVID-19 cases and deaths means those countries that are undertaking the most tests or reporting the highest number of cases may not necessarily be those countries most impacted or at risk from the pandemic [10]. In Zimbabwe, the testing of the SARS-CoV-2 virus has evolved over time. Trained medical laboratory scientists and technicians perform COVID-19 testing in Zimbabwe. Training on testing is provided by Ministry of Health and Child Care, supported by various organizations, such as the WHO and the Africa Centres for Disease Control and Prevention, among others. The country follows the WHO guidelines on testing [11]. Initially, confirmatory PCR testing was done at the National Institute of Communicable Diseases in South Africa [4]. Over time, laboratory support for PCR tests was extended to 5 public laboratories in the country that had existing platforms for human immunodeficiency virus (HIV) testing, and to date multiple other districts' provincial and private laboratories have been authorized to test for the SARS-CoV-2 virus. Provinces are showing marked differences in their COVID-19 testing levels, and although there is a high density of testing sites in the current COVID-19 hotspots like Harare and Bulawayo, the testing capacity of these provinces in relation to their population density is rather low (Figure 2), whereas Matabeleland North and South had the largest testing capacity in relation to their population density.

Testing has been done in the form of rapid antibody testing and PCR testing. Rapid antibody testing has been used as a screening test at the borders and workplaces, whereas PCR has been used as a diagnostic test for all symptomatic people, hospitalized patients, and people who are positive with rapid antibody testing. As of 18 August 2020, a total of 84 741 PCR tests have been done [3]. The testing sites have employed various molecular platforms, with the district and provincial laboratories mostly relying on GeneXpert (Cepheid) analyzers. Table 1 presents the distribution of PCR platforms and assays, with an account of the throughput if assuming an 8-hour work shift. Combined, the laboratories have a capacity of 9658 PCR tests daily. As of 18 August 2020, the country is conducting an average of 1200 diagnostic PCR tests per day [3]. This available data for Zimbabwe shows inadequate testing levels that do not meet the current capacity. The WHO issued a warning of a "silent epidemic" to African governments, calling for testing to be prioritized and to be delivered on a much greater scale than it is at the moment [12]. The next section discusses barriers to widespread COVID-19 testing in Zimbabwe, focusing on procurement, health system funding, health workforces, and standards at quarantine facilities.

BARRIERS TO WIDESPREAD COVID-19 TESTING IN ZIMBABWE

Procurement and Supply Chain–Related Issues

Figure 3 shows the trend of COVID-19 tests conducted and the reported number of PCR-positive cases since March 2020. There was a steady increase in the number of tests conducted in March, with a peak at the end of April. This trend has been due in part to persistent challenges with the procurement and supply chain of COVID-19 test kits [13]. A shortage of reagents and consumables, among them Gene Xpert cartridges, nasopharyngeal swabs, Viral Load Transport medium, and other reagents for PCR testing, has hampered COVID-19 testing in Zimbabwe. This has severely impacted the testing capacity,

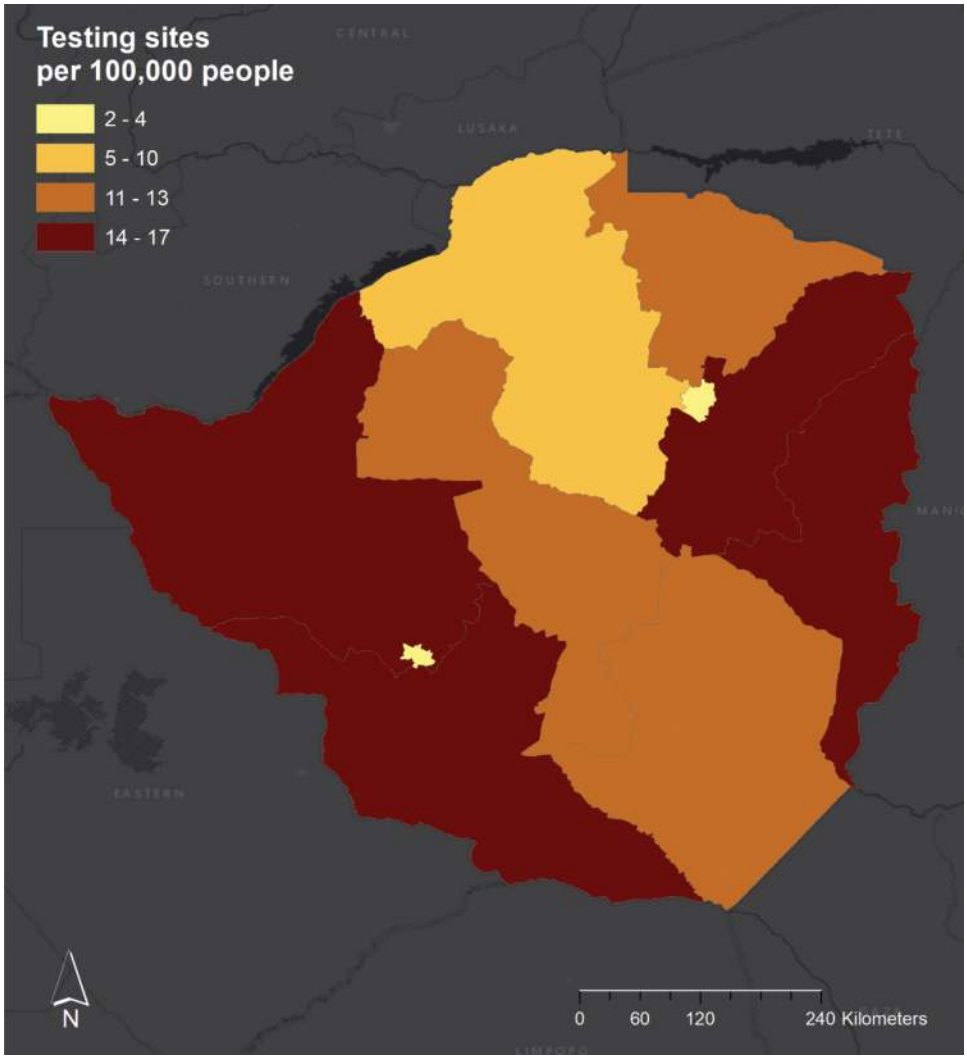

Figure 2. Testing sites per 100 000 people for each province in Zimbabwe.

Table 1. Coronavirus Disease 2019 Testing Facilities in Zimbabwe and 8-Hour Platform Throughput

Province	Facility name	Molecular platform/assay	8-hour shift throughput
Harare	National Microbiology Reference Laboratory	Abbott Real Time SARS-CoV-2 Assay	376
		QuantStudio 3 Real-time PCR System	276
	National Virology Reference Laboratory	Applied Biosystems 7500	200
	Parirenyatwa Central Hospital	Cepheid Gene Xpert	32
	African Institute of Biomedical Science and Technology	Applied Biosystems 7500	276
	Premier Clinical Laboratories	AccuPower SARS-CoV-2 Real-time RT-PCR Kit (Bioneer)	96
	CIMAS	Cepheid Gene Xpert	32
	Biomedical Research Training Institute	QuantStudio 3 Real-time PCR System	276
	Lancet	AccuPower SARS-CoV-2 Real-time RT-PCR Kit (Bioneer)	96
Manicaland	Mutare Provincial Hospital	Cepheid Gene Xpert	32
		Abbott Real Time SARS-CoV-2 Assay	376
Mashonaland Central	Bindura Provincial Hospital	Cepheid Gene Xpert	32
Mashonaland East	Chikurubi Prisons	Cepheid Gene Xpert	32
	Marondera Provincial Hospital	Cepheid Gene Xpert	32
	Kadoma General Hospital	Cepheid Gene Xpert	32
Mashonaland West	Chinhoyi Provincial Hospital	Cepheid Gene Xpert	32
Masvingo	Masvingo Provincial Hospital	Cepheid Gene Xpert	32
Matebeleland North	Victoria Falls Hospital	Cepheid Gene Xpert	32
	St Luke's Hospital	Cepheid Gene Xpert	32
		Abbott Real Time SARS-CoV-2 Assay	188
	Hwange Colliery Hospital	Cepheid Gene Xpert	32
Matebeleland South	Beitbridge Hospital	Cepheid Gene Xpert	32
	Gwanda Hospital	Cepheid Gene Xpert	32
		Abbott Real Time SARS-CoV-2 Assay	188
	Plumtree Hospital	Cepheid Gene Xpert	32
Midlands	Gweru Provincial Hospital	Cepheid Gene Xpert	32
Bulawayo	Thorngroove Infectious Disease Hospital	Cepheid Gene Xpert	32
	National Tuberculosis Reference Laboratory	QuantStudio 3 Real-time PCR System	276
	Diagnostic laboratory Services	Gentier 48s Real Time PCR	48

Abbreviations: PCR, polymerase chain reaction; RT-PCR, reverse transcription polymerase chain reaction; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

leading to high turnaround of results, thereby impacting service delivery. The global demand for the kits and reagents has seen manufacturing countries prioritize their homelands [14, 15]. According to Médecins Sans Frontiers research, diagnostics company Cepheid is charging 4 times more than it should for its COVID-19 tests [16]. Cepheid has set the price for each test at $19.80 in 145 developing countries, including Zimbabwe, when the tests could be sold at a profit for $5 each [16]. Given that the majority of testing sites in Zimbabwe rely on the Cepheid platform for COVID-19 testing [4], the cost per kit may also deter widespread testing for private facilities that purchase their own test kits. Further, it is worth noting that the closure of borders and grounding of most cargo ships and flights also had adverse impact on importing the kits to Zimbabwe. Corruption in procurement of COVID-19 reagents has also emerged, resulting in some tenders being cancelled, further delaying the procurement process [17]. This also brings into disrepute the credibility of the government in handling donor funds, thus derailing or even stopping some donations that may have been earmarked for the country.

Health System Funding-related Issues

Another important major barrier to widespread COVID-19 testing in Zimbabwe has been the chronically underfunded health system. The testing has relied on donors from Jack Ma, The United States Centers for Disease Control and Prevention, and other partners [18] who have made substantial contributions to the effort to boost the COVID-19 testing in Zimbabwe. In the early phases of the pandemic, sample transportation was a major challenge [7]; consequently, the Ministry of Health and Child Care (MoHCC), in collaboration with its partners, put in place a transport system that leverages an existing HIV program to ferry samples to the laboratories. However, in a country with severe shortages of fuel, the challenge of sample transport persists in some areas.

Health Worker–Related Issues

Zimbabwe has also experienced a "brain drain," as more skilled medical laboratory scientists have continued to evade district and provincial hospitals in favor of better working conditions in neighboring and overseas countries

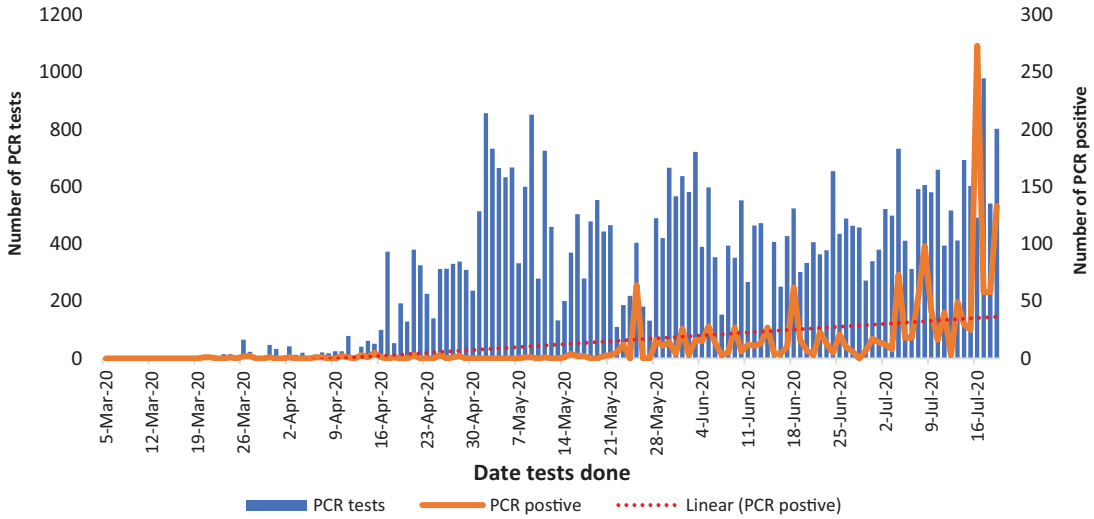

Figure 3. Trend in number of COVID-19 tests conducted and reported PCR positives as of 19 July 2020 (source: MoHCC Zimbabwe [3]). Abbreviations: COVID-19, coronavirus disease 2019; MoHCC, Ministry of Health and Child Care; PCR, polymerase chain reaction.

[19]. According to the Health Services Board, 64% of medical laboratory scientist positions in public laboratories were vacant as of December 2019 [20]. This implies that even most laboratories may not meet their daily capacity, because there aren't enough people there to prepare and process the samples. Further, this also negatively impacts the quality of testing in the public laboratories, which have been left to be manned by less skilled cadres. The government-employed nurses and doctors have been on strike due to low remuneration, coupled with salaries that are continuously eroded by hyperinflation.

A new threat has emerged, with a surge in the number of health workers testing positive for SARS-CoV-2. As of 28 July, 323 health workers had tested positive for SARS-CoV-2 [21]. The subsequent isolation of the confirmed cases and quarantine of those colleagues who have been in close contact with confirmed cases has reduced the number of health workers available to serve patients [22].

The health workers have also reported a lack of the personal protective equipment (PPE) that is essential for discharging their duties, especially during this COVID-19 crisis [7, 23]. The strike, low morale, and quarantines of the infected health workers are causing increased fatigue among the few health workers, thereby compromising the quality of service.

Quarantine Facilities–Related Issues

The country initially experienced a significant number of imported cases from neighboring South Africa through both designated and undesignated ports of entry [3]. The undesignated port of entry has presented a major challenge, as the people using these ports of entry are not documented and tested before they interact with other people in the society [24]. Even for those individuals who followed the right procedures for entry into the country, cases of individuals escaping from the quarantine centers have been reported [25]. There is a growing body of evidence that calls for quarantine centers to scale up provision of proper counselling, support, and treatment to the returnees [8, 26]. When people are well informed and knowledgeable about the merits of the whole process, they are more likely to comply. A joint team comprised of MoHCC, the International Organization for Migration, and the WHO assessed the suitability and appropriateness of 37 quarantine facilities across the country during the period of 17–21 May 2020. The assessment revealed a lack of guidance of how the facilities should be operating [27]. In some facilities, roles and responsibilities were not clearly defined [27]. The occupants were not practicing maximum safety measures to avoid or limit transmission within the facilities [27]. There was no guidance on infection prevention and control (IPC) issues at the facilities, and PPEs were in short supply [27]. There is an urgent need to train quarantine staff on COVID-19, ensure safety and maintenance of hygiene, provide regular screening and testing of quarantine staff, develop and distribute standard operating procedures and guidelines for IPC at the quarantine facility, and procure and provide adequate supplies required for IPC [28]. Currently, COVID-19 diagnostic testing is mandatory at Day 8 of quarantine [28]. There is need to consider COVID-19 testing upon arrival at the quarantine site. Recently, local cases have also been on the increase, and beginning in July the number has surpassed imported cases [3]. This is an illustration that the pandemic has moved into a profile which is localized, and therefore this has an implication on testing targets and patterns. Further, this trend underscores the need to continuously engage the community [29, 30] to adhere to various containment and mitigation strategies in place to reduce infections.

RECOMMENDATIONS TO IMPROVE COVID-19 TESTING LEVELS TO MEET THE CAPACITY IN ZIMBABWE

Political Will and Resource Allocation

As the outbreak accelerates in the country, the call to ramp up COVID-19 testing to meet the current capacity in order to better control the pandemic cannot be overemphasized. To rapidly improve testing capacity, there is a need for provision of adequate resources [31], coupled with motivated health workers. Political will plays an important role in ensuring that testing capacity is increased, as decisions will be made at the highest level and implemented cascading downwards. In this regard, domestic rechanneling of resources from other line ministries to health will be crucial, as external aid support is likely to diminish.

Protect Health Workers

Since the inception of the pandemic, the government has recruited additional health workers and introduced a COVID-19 allowance. While the government has made efforts to reshuffle staff around clinics to focus on those facilities with the highest COVID-19–related workloads, there is a need for the development of programs for periodic debriefing and burnout prevention for frontline workers. Frontline health workers who are testers also need psychosocial support, especially if they are witnessing increased positive rates of testing or if they are witnessing highly distressed patients at the time of testing [32]. Dealing with the anxiety of frontline health workers is just as important as dealing with client anxieties. The government may also consider stepping up efforts to reengage skilled health workers who have moved to other sectors of work, to ease the strain on the core health-care complement.

Utilize Available Regional Procurement Platforms

There is a need for better coordination in the procurement of COVID-19 test kits [31]. The recent launch of the Africa Medical Supplies Platform is promising. The platform unlocks immediate access to an African and global base of vetted manufacturers and procurement strategic partners, and enables African Union Member States to purchase certified medical equipment, such as diagnostic kits, PPE, and clinical management devices, with increased cost effectiveness and transparency. This platform, coupled with the African Continental Free Trade Area facility, has the potential to reduce the cost of reagents and improve the supply chain process.

Leverage Existing Infrastructure and Resources While Exploring Cost-saving Test Approaches

Zimbabwe is a recipient of important financial support for the HIV pandemic, and these resources can be leveraged in the COVID-19 response. The United States government's substantial HIV-related investments in Zimbabwe have also focused on laboratory infrastructure [33, 34]. The US government has employed a 2-pronged approach. First, it has provided support to the national laboratory capacity focused on HIV viral load testing and provided Quality Assurance and Quality Control (QA/QC) programs through its laboratory-focused implementation partners. Second, its HIV surveillance focused support to the MoHCC through the Zimbabwe Population-Based HIV Impact Assessment (ZIMPHIA) 2015–16 and ZIMPHIA2020 projects [35]. These 2 projects have upgraded the infrastructure at MoHCC laboratories, trained laboratory scientists, and provided equipment to facilities. Finally, Zimbabwe is also a recipient of a grant of approximately US$5 million from the United Kingdom Department of Health and Social Care, under its Fleming Fund Grants Programme to support national medical laboratory capacity [36]. The grant is enhancing the country's laboratory capacity for disease surveillance, increasing QA/QC, providing equipment, and renovating laboratory infrastructures [36]. All these donor investments could be leveraged further to improve COVID-19 testing levels. However, the diversion of financial resources, particularly from HIV and tuberculosis (TB) programs, should be done carefully, as disruption to HIV and TB testing may potentially have greater impacts on morbidity and mortality than COVID-19 in the Zimbabwean context. Given that Cepheid XPert machines are used throughout much of the country for TB testing, the country could benefit from using a single platform like Xpert for COVID-19 testing, and using economy of scale to cut costs on procurement of both the platforms and the reagents.

Address Issues of Corruption in the Health System

There is a need to urgently address issues of graft that have been reported in the procurement process [37]. In the context of the COVID-19 pandemic, civil society organizations (CSOs) can play an important role in demanding enhanced transparency and good governance in Zimbabwe by contributing to increased public debate on issues surrounding the formulation and implementation of COVID-19 financial resources. CSOs and development partners need to adopt creative means to track, monitor, and shadow report on disparities and anomalies that emerge in resource and commodity utilization, on a frequent basis. The Zimbabwean COVID-19 response could benefit from CSOs' cooperation with national and international human rights agencies [38] and donors, to guide the effective tracking and shadow reporting. CSOs can also be engaged to support testing efforts in motivating and mobilizing communities to take up COVID-19 testing.

Increase Testing Through Community Interventions

There is a need for a sustainable scale-up to ensure community literacy is increased, and to mobilize acceptance of testing [9]. IEC dissemination, preferably in vernacular languages, should be available via radio, TV, and digital social media platforms. In the context of quarantines of returnees, wide access to COVID-19 IEC dissemination is fundamental to remove any stigma against returnees, which has the potential to cause an underground divide, with a likelihood of ultimately countering prevention efforts. Further, there is a need for training of

health workers to ensure proper pre- and posttest counseling is offered, both to the persons being tested and their families, to alleviate anxiety and deter self-stigma or external stigma and discrimination [39].

COVID-19 Pooled Testing for Cohesive Groups

We recommend that Zimbabwe embrace pooled testing [40] for cohesive groups, such as health-care workers. This approach is particularly useful in these groups, where a single positive typically requires quarantine of the entire group. Pooled testing has also been shown to be useful among asymptomatic and presymptomatic COVID-19 patients, who are an important source of transmission [40].

CONCLUSION

Zimbabwe's limited testing capacity has been mainly due to inadequate investment by its government, over the years, to the health system. The government must increase its own financial investment in the response to COVID-19 and not be solely dependent on international donors. The recent surge in COVID-19 cases is an urgent public health concern and requires coordinated efforts to ramp up testing to meet the capacity already in existence in the country. There is a need for substantial decentralization of testing from the current provincial level to the district level. Zimbabwe needs to invest in better salaries and working conditions for its frontline health workers, and decisively deal with graft within its structures.

Note

Potential conflicts of interest. The authors: No reported conflicts of interest. All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest.

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