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A B S T R A C T

Africa can be “left behind” after other advanced continents recover from the coronavirus disease 2019 (COVID-19) pandemic as reflected by the global pandemic of HIV/AIDS. In this paper, we summarize potentially adaptable, effective and innovative strategies from China, Italy, and the U.S. The purpose is to help African countries with weaker healthcare systems better respond to the COVID-19 pandemic. China, being the first to report COVID-19 infection swiftly swung into anti-epidemic actions by the use of innovative risk communication and epidemic containment strategies. Italy and U.S., the next rapidly hit countries after China, however, experienced sustained infections and deaths due to delayed and ineffective response. Many African countries responded poorly to the COVID-19 pandemic as evidenced by the limited capacity for public health surveillance, poor leadership, low education and socioeconomic status, among others. Experience from China, Italy and U.S. suggests that a better response to the COVID-19 pandemic in Africa needs a strong public health leadership, proactive strategies, innovative risk communication about the pandemic, massive tests and isolation, and scaling-up community engagement. Lastly, African countries must collaborate with other countries to facilitate real-time information and experience exchange with other countries to avoid being left behind.

1. Introduction

The coronavirus disease 2019 (COVID-19) with no prediction has been a threat and challenge to global health. Striking the world at the time it did, led to so many unforeseen drawbacks arising from the need to divert funds, manpower and resources towards the battle against the virus. 1 January 30, 2020 remained remarkable as the World Health Organization (WHO) declared the COVID-19 epidemic a public health emergency of international concern. 2,3 As of December 5, 2020, over 66 million confirmed cases and over 1.5 million deaths have been recorded globally. 4 At a mortality rate estimated at 2%-4%; seemingly higher than that for the influenza pandemic, the disease was tagged very high risk by the WHO risk assessment report. 2

The outbreak of COVID-19 was in late December 2019 with symptoms including fever, malaise, dry cough and shortness of breath. 5 Geriatrics and people in immunocompromised states or with underlying health problems have been reported to be at greater risk of encountering debilitating health consequences. The etiology was speculated to be linked to a popular seafood market in Wuhan city of China. 5

The established transmission modes include respiratory droplets and person-to-person contact. Most researchers estimate that the incubation period ranged from 1 to 14 days, with an average of 5 days. 6 Following the outbreak, health care workers resorted to palliative care using existing drugs, 6 and several strict measures were conceptualized and implemented to detect, curb and control the spread of the disease. 7 These measures include heightened surveillance and rapid identification of suspected cases, followed by patient transfer and isolation, rapid diagnosis, tracing, and follow-up of potential contacts. Social distancing, use of masks and improvement in personal hygiene have also been emphasized. 6,9 Those measures were adopted from existing guidelines established from experiences garnered during previous disease outbreaks.
like the severe acute respiratory syndrome (SARS) and Middle East res-
piratory syndrome.

Although not fully anticipated, some preparedness against epidemics
and pandemics is expected at the global and regional/country levels, to
avoid the disastrous effect; as evidenced in past outbreaks such as the
Black Death and influenza virus pandemics. "Upsurge of the infection
emanating from intensified international travel, trade and migration,
as well as increasing human population density and contact between
humans and wild animals, highlights the need to be proactive against
potential outbreaks.

In spite of the substantial efforts geared towards global health
surveillance and capacity development, a huge proportion of the
world, mostly the developing countries, are not equipped to handle the chal-
enges and consequences of many pandemics, including COVID-19.

Based on the report by WHO-supported Joint External Evaluation, not
many countries are wholly compliant with the International Health Reg-
ulations (2005), a marker for evidence-based capacity to alleviate public
health risks.

Africa recorded over 2 000 000 confirmed cases and over 53 000
deaths after its first case in Egypt on February 14, 2020. This has
led to the emergence of queries as to how long the situation can be
properly managed based on the gaps and inadequacies in the health,
infrastructure, manpower and finance in the developing nations.

To further emphasize the threat of COVID-19 transmission in Africa,
the spread of the disease has been projected at 10 million cases within
three to six months.

Nigeria confirmed its first case of COVID-19 on the 27th of Febru-
ary, 2020 and has witnessed a further spread across more states within
the country. With a dense population of about 200 million people and
other socio-economic factors of concern, Nigeria is particularly vul-
nerable for severe set-back by the pandemic.

From evaluation of the 2013–2016 Ebola virus epidemic, evidence supports that the severity of
COVID-19 might be exacerbated by frail state of the health systems in
West Africa. Our current response to the COVID-19 outbreak indicates
that we have not learned valuable lessons from the previous outbreaks
as the extra mortality was to a large extent determined by the lack of
quality healthcare.

In low and middle income countries (these lapses arise from
and revolves around our limited capacity for public health surve-
lance and outbreak response, including deficiency in supply of test-
ing kits, treatment, quarantine and isolation facilities, etc.

Aside problems involving immediate pandemic prevention and control, in-
adequacies include the lack of funds towards medical research and
education, deplorable state of health amenities, poverty arising from
unemployment/under-employment, lack of basic social amenities, poor
leadership/governance, all of which could culminate into disastrous
consequences amidst the COVID-19 outbreak.

To fight against the COVID-19 for better outcomes, this study ex-
ploring adoptable, effective and innovative strategies from China, U.S.
and Italy. We will focus on the allocation of funds towards health care
and medical research, disease surveillance and control measures, risk
communication and health promotion; public aid and social support,
and commitments of the government. This review will help inform
health policy and implementation of an effective and sustainable inter-
vention for the prevention and control of the COVID-19 pandemic now
and potential against future epidemics/pandemics.

2. Lessons from China, Italy and U.S.

With no immediate vaccines and antiviral medication for COVID-
19, China being the epicenter of the outbreak swiftly swung into action
in managing the epidemic. Typical measures include the use of existing
traditional public health epidemic containment strategies of testing, iso-
lolation, quarantine, physical distancing, and community containment.
These tactics immediately yielded positive result in containing the out-
break. China’s actions gave us hope to control the COVID-19 spread
without a vaccine or antiviral therapy.

Italy and U.S., the next two epicenters immediately after China,
however, suffered from rapid increases in cases of infections and
high COVID-19-related deaths even at the early phase of the pan-
demic. The situation in Italy remains a public health emergency
of great concern, with speculations that the causalities are on the high
side because a greater proportion of its citizens are well advanced in
age.

As observed in Italy, factors responsible for this dire situation are a
complex mix of poor risk communication to the populace which led to
a false sense of security, political considerations of infringement on
people’s right to freedom, initial hesitation of the government to carry
out community wide containment and especially, non-compliance of the
citizens to prevention and control measures. An important lesson
from this is that in any pandemic or epidemic, delayed response stem-
ing from unpreparedness and or political biases will no doubt worsen
an already critical condition.

Similarly, the U.S. is well-known as a wealthy country, armed with
numerous high technological and biological tools to fight an outbreak.
However, the country remained highly vulnerable to the COVID-19 epi-
demic. Obvious factors include but are not limited to delays in travel
restrictions from Europe, delays in measures to enforce social distanc-
ing and face masks across the country, and a downplay of the effects
of the virus by the U.S. government.

With threat of the same epidemic, different countries had very dif-
ferent results. This creates a situation to investigate and possibly adopt
approaches. From China and other advanced nations to control and pre-
vant COVID-19 in Africa.

2.1. Diversion of resources to health care and research

In China, health workers were sent from different provinces to
Wuhan City, the epicenter of the outbreak; several large field hospi-
tals were erected to match up with the teeming number of infected
COVID-19 patients while infected patients were managed through
supportive care and treatment of symptoms funds were released by
the central government for research into pharmaceutical counter mea-
sures (vaccines and antivirals). In a relatively short time, China was
able to provide the genome sequence of the novel coronavirus. This fa-
cilitated the production of diagnostic tools for use across the globe
and the release of national standardized guidelines for diagnosis and
treatment.

Lombardy—the first hit region in Italy, responded to the outbreak
by increasing the capacity of the intensive care unit (ICU) in prese-
lected hospitals based on their emergency preparedness framework from
lessons learnt during the 2009 influenza pandemic. To reduce risk of
within-hospital transmission, ICU cohorts were created in areas separate
from other ICU beds. In light of shortage of facilities to match up with
the increasing number of persons critically ill from suspected COVID-19
infection, mechanical ventilation was provided in triage areas pending
the time of confirmation of diagnosis of the virus. Additionally, non-life-
threatening procedures were cancelled to make available more person-
nel and facilities to receive other patients. With increased stress on
their health care system emergency funds and other resources were
released by the Italian central government and stricter community con-
tainment measures were adopted.

However, the U.S. government downplayed the threat of the COVID-
19 pandemic during its early stage despite the awareness of the problem
across the globe. A likely reason could be that U.S. leadership false as-
suming no greater threat of this pandemic than influenza. Other
reasons include decentralized governance with main duty for health being
led by individual states and lack of coordinated actions at the national
level. Furthermore, there was inadequate production of testing kits and
insufficient personal protective equipment (PPE) which led to under-
detection of the cases and further spread of the virus.
2.2. Border control measures

After knowing the widespread of the novel coronavirus infection, China immediately put most strict community containment measures in place; including temporary shutting down borders of a metropolitan city with a population of more than 10 million to restrict both domestic and international travels.\textsuperscript{42-43} although some travel bans were selectively lifted later after the epidemic was under control by and large, other measures were still in place to prevent potential new waves of infections. At the seaports and airports, international travelers are subjected to immediate testing, temperature checks, in addition to compulsory quarantine for two weeks at government designated facilities.\textsuperscript{44}

On the contrary, there was an inconsistent measure for travel ban, and promoting face masks and social distancing in the U.S. The U.S. government banned the travel from China during the early period of the epidemic, but they were reluctant to ban the travel from Europe. This inconsistent measure contributed to the first rapid increase of the epidemic in New York and other states on the east coast. The lack of travel ban in the U.S. has been driven primarily by a bid to prevent an economic downturn and to satisfy public sentiments.\textsuperscript{41} This could have contributed to the high number of cases in the country.\textsuperscript{41}

Similarly, despite an early detection of the virus in Italy, the country employed a strategy of selective lockdown rather later to restrict travel around the Lombardy. This selective point travel ban caused mass relocations of people from this city to many other areas within the country as well as many other countries outside of Italy, further facilitating the spread of the virus and fueling the pandemic.\textsuperscript{45-46} In Italy, Lombardy is one of the wealthiest city and contributes largely to the nation’s economy.\textsuperscript{45} It hindered the government from taking action sooner. This delay in action caused an exponential increase in the epidemic, thereby increasing the difficulties in curbing the spread of the virus.

2.3. Risk communication, health promotion and education

Timely and appropriate communication of COVID-19 risk may also play an important role in controlling the pandemic in China. There was a dissemination of relevant information across board on the facts, myths, and appropriate behaviors that should be adapted during the epidemic.\textsuperscript{47-48} This communication was carried out across all levels of public administration and via multiple routes including social media platforms, daily text messages. All messages are from one source: Chinese Centre for Disease Control and Prevention (China CDC). Other means for risk communication include, phone calls from public health officers, posters, and erection of billboards at strategic places.

In addition to the broad risk communication, education messages are also spread with special emphasis on hygiene practices- frequent hand-washing, proper home ventilation, cough etiquette; and compulsory use of face masks.\textsuperscript{49} Frequent disinfection of public places is a general practice in China, and this measure was heightened in the course of the epidemic.\textsuperscript{50}

Similarly, Italy provided relevant information to health workers and other vulnerable groups; guidelines for preventive measures in community settings, and helplines for easy communication.\textsuperscript{51} Contrariwise, in the U.S., there was slowness in the dissemination of relevant information to the general public, which caused disarray amongst the public and underestimation of the potency of the virus.\textsuperscript{41} This has been linked to the fear of the impact of the COVID-19 pandemic on the economy, leading to the reduced promptness in implementing the appropriate measures to curb the spread of the virus.

2.4. Public aid, social support and price regulation

To ease financial burdens of all individuals in the community, and to encourage honest self-reporting of infection, the Chinese government made all tests and treatments free of charge since the onset of the outbreak.\textsuperscript{52} Although, medical services are currently being co-paid for by patients who are infected with the virus, testing remains free for all citizens.\textsuperscript{52} Meanwhile, the government closely monitored the cost of daily needs, especially food products to prevent price hiking. Relief materials were supplied to poor communities by volunteers, charity organizations, and corporate bodies.

In the U.S., collaborative efforts between the national health commission and non-governmental organizations ensured that online psychological crisis response. Government supports were also provided for healthcare workers, patients and healthy individuals.\textsuperscript{53-54} Last, social support services and financial compensations were provided by the U.S. government to vulnerable groups to encourage adherence to important anti-epidemic measures, including isolation and quarantine.\textsuperscript{55} Similarly, the Italian government provided psychosocial services during the lockdown.\textsuperscript{56}

2.5. Disease surveillance

The disease surveillance system hosted by China CDC was effective in gathering data on the threats of COVID-19\textsuperscript{47} and response from the massive anti-epidemic actions through early warning, provision of up-to-date data on prevalence and incidence, description transmission characteristics, and information sharing between health care workers in different regions of China.\textsuperscript{57} The country was able to notify WHO about the outbreak faster than it did with SARS almost two decades ago.\textsuperscript{58} This improvement in disease surveillance reflected the preparedness of China for managing urgent epidemics like COVID-19.\textsuperscript{59}

Likewise, the U.S. CDC utilized surveillance networks to track and provide regular updates and data on the prevalence of COVID-19 cases in the country which informs the country’s public health response to the disease.\textsuperscript{60} However, the CDC’s action against COVID-19 in the U.S. impeded by political issues, reduced their efficiency in monitoring the epidemic. In Italy, the national disease surveillance system worked efficiently, and it allowed the country to detect the pandemic early detection and disseminate information to its citizens effectively.\textsuperscript{52}

2.6. Strong political will/commitments of the government

A massive anti-epidemic measure can be possible only if the government takes a proactive approach and makes commitment to implement it. In addition to enforcing strict comprehensive and thorough prevention and control measures, the Chinese government acted under the robust leadership of The Communist Party of China. They put people’s lives before economy. In addition to their own people, China has been of tremendous support to WHO, with a donation of $50 million USD to the organization.\textsuperscript{61}

Contrarily, the U.S. federal government failed to implement a centralized strategy to harmonize the response of its local governments to the outbreak. Although, the State governments took up the responsibility, they were limited in implementing many anti-epidemic measures due to lack of constitutional power to exercise authority between jurisdictions and unified guidance for inter-state collaboration.\textsuperscript{52} Inconsistent governmental actions encouraged the non-compliance to the COVID-19 control measures among its citizens, thereby exacerbating the widespread of the epidemic.\textsuperscript{52}

On the other hand, the Italian government was proactive in their response by declaring a state of health emergency, entrusting the Civil Protection Department to coordinate the response nationally and enacting decrees to ban social gathering.\textsuperscript{51} This measure might have played some role in fighting against the COVID-19 epidemic in the country.

3. Way forward for low- and middle-income countries (LMICs)

Since the first COVID-19 cases were reported in Africa, the continent has worked hand-in-hand with the WHO, Africa CDC, and other local health agencies to contain the outbreak. A number of measures
were implemented, including community lockdowns, air traffic restrictions, setting up and strengthening of surveillance teams, setting up and equipping laboratories for testing, making and implementing plans for quarantining suspected cases, implementing policies on social distancing, risk communication and constant provision of updates on the outbreak. Without doubt, these measures have worked for China. But a question remains for resource limited LMICs, that is, how feasible are these measures to them?

Practicability of these successful anti-epidemic measures is being hindered in LMICs by a number of factors as described at the beginning of this article. Prior to the COVID-19 pandemic, LMICs depended funding from foreign agencies and organizations to fight against other prevalent diseases such as HIV/AIDS, malaria, and tuberculosis.63 The COVID-19 pandemic has added more disease burden, thereby causing further strain in the health care systems.64 According to the World Bank, sub-Saharan Africa spent 5.2% of its GDP on health, and this was by far lesser than the average global 9.9% of GDP.65 Gabon, Angola, and Eritrea had the lowest health expenditure as a percentage of GDP in sub-Saharan Africa with values of 2.78%, 2.79%, and 2.87% respectively.66

With these in mind, LMICs must adopt or develop anti-epidemic measures suitable to their social, economic, political and health standing in order to control the COVID-19 epidemic.

In adopting the lockdown protocol in LMICs, movements were limited within the countries as was seen in restriction of gatherings involving many people (such as churches, mosques, night clubs, casinos, ceremonies, and schools) during the pandemic period. With a GDP increase of only 3.6% in 2019, Africa still has a lot of individual living in poverty.66 A lot of its population run individual small-scale businesses. Instituting a lockdown measure would mean the cutoff of the means of survival for those individuals. It is therefore worth suggesting that governments of individual countries device the best ways to deal with the outbreak that fit their context or population’s needs and status. There should be a plan where these people can still work and be protected. If a lockdown is inevitable, volunteer groups could be formed in the communities to help people purchase necessities since most people will not have the resources to purchase enough items to last for more than a week. These volunteer groups will be adequately trained and their routine will be regimented to ensure their safety as well as the safety of those they serve. In this way, LMICs may be able to reduce the number of persons who need to go out. Additionally, adequate measures should be taken to sustain good and sound mental health status during lockdown.67,68 Furthermore, air traffic restrictions should be enforced earlier enough to further delay or reduce the importation of cases.

Effort should also be devoted to increase awareness of COVID-19 in different communities in Africa via offline and online technologies.69-70 National disease control agencies, non-governmental organizations (NGOs), and healthcare institutions of individual countries need to work towards educating the masses about the epidemic and prevention of the disease during the isolation and lockdown periods.

Education and risk communication should be tailored to the needs of local communities and people.71 People from the lower economic class in these communities need extraction addition in risk communication. These people are more likely to be affected by the negative consequences of the pandemic rather than the positive effect from taking prevention measures.69

In a study by Abdelhafiz et al among Egyptian adults, it was reported that knowledge about the COVID-19 disease was lower among the elderly, rural dwellers, and people of low socio-economic status.72 The government should liaise with traditional, religious and community leaders to pass on information to citizens in a way they will understand, for example through town criers and volunteers. The government should be aware that simply demanding uninfected persons to remain at home will not be effective until the reason for such action is understood.

To this effect, the Slum and Rural Health Initiative, a Nigeria-based NGO, developed infographics in over 70 languages, and these focused on educating people living in underserved settings.73 Similar initiatives would enhance the passage of health information to people, and foster good health practices without high costs, such as regular hand washing, early reporting of symptoms and social distancing.

Inadequate access to basic healthcare facilities and shortage in medical personnel in African countries present another challenge in the fight against COVID-19.65 There is shortage of ICUs which are essential in treating infected individuals with the available ones concentrated in specialist or tertiary hospitals.74 To make the situation worse, LMICs depend on other nations for medical supplies including testing kits. As part of the WHO COVID-19 monitoring and evaluation framework, only about 15% of African countries had a self-assessment reporting, substantially below the low limit of 60%.75

As used in China, incorporating mobile testing units to boost test capacity would be a practical measure in Africa. For example, South Africa’s National Health Laboratory Service in April 2020 announced increases in mobile testing units to 6776 and over 5 million people were tested in 5 months, the highest number in Africa.77 Also, sufficient funds should be allocated to research78 and training of health professionals for effective handling of epidemics.79

Furthermore, like in China, Italy and the U.S., public health surveillance in Africa can be strengthened by partnering with information and communications technology companies. With such collaboration, African countries can develop their own database to support effective monitoring of an epidemic, and policy making for future pandemics.

4. Conclusion

China’s success in controlling the COVID-19 outbreak was multi-faceted, including high levels of preparedness, decisive anti-epidemic actions; initial and continuous resort to strict measures, diversion of resources to health care, large amount of research, and strong commitments of the government, and active participation of all Chinese people.

Governments in African countries can learn from China to enhance emergency responses to pandemics, to be more proactive and committed in the planning and implementation of long-term strategies for future pandemics. Moreover, there should be promotion of hygiene and public participation as a regular practice in all communities in Africa. Liaising with medically sophisticated countries will facilitate the exchange of real-time information ensuring that gaps existing between the advanced countries and LMIC like Africa are bridged. African countries should also develop their own capacities to make their own anti-epidemic materials such as PPE, and testing kits.

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Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.
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