

## Scoping Review

# Scoping Review and Expert Reflections: Coronavirus Disease 2019 - Preparedness and Response in Selected Countries of East Africa, West Africa, and Southeast Asia

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## ABSTRACT

### Background

The coronavirus disease 2019 (COVID-19) outbreak, started in the Hubei province of China in December 2019. On January 31, the World Health Organization (WHO) declared COVID-19 a worldwide pandemic. We wondered what countries in Africa and South-East Asia had done to prevent infectious disease, specifically, COVID-19, from impacting the population of specific countries in that region, and what disease control measures were successful. Expert reflections on findings could guide continued successful public health approaches in managing this complex infectious disease pandemic.

### Methods

Using a scoping review, published papers, or program descriptions for specific geographic regions (i.e., Africa or Southeast Asia) were searched using specified key terms. Three targeted countries classified by World Bank as lower-middle-income in the two WHO selected regions [Africa (Sudan and Nigeria); Southeast Asia (India)] were reviewed with respect to COVID-19 preparedness and response. Findings were organized, highlighting key points that seem particularly useful for regional learning. The evidence from each region was summarized in the aggregate to determine some common, noteworthy themes. COVID-19 epidemiologic data for these regions were also reviewed.

### Results

Our findings indicate experience from prior infectious disease outbreak seems to have prepared the selected countries in their preparedness for COVID-19 outbreak on various levels. Incidence of COVID-19 increased across the selected countries. WHO recommended basic public health strategies to reduce disease transmission was initiated by the selected countries at different levels. However, feasibility and lockdown practices raise public health concerns and questions across the target regions reviewed.

### Conclusion

This scoping review and expert reflections uncovers important preparedness and responses to the COVID-19 pandemic in the selected WHO regions. Further exploration and possible public health strategic plans may be needed.

### Keywords

COVID-19 Pandemic; Health system; Preparedness and response; Sub-Saharan Africa; Southeast Asia; Developing countries.

## INTRODUCTION

As we reported in our earlier publication,<sup>1</sup> the coronavirus disease 2019 (COVID-19) pandemic shows how disease out-

breaks can connect people in different regions of the world in a significant way. The interconnectedness of people and disease is a hallmark of the concept and practice of global health.<sup>2,3</sup> It has long been recognized that public health professionals can assist popula-

tions in responding to complex public health emergencies.<sup>4</sup> In fact, Burkle reminds us: “The emergence of complex global public health crises such as climate change and extremes, biodiversity loss, emergencies of scarcity, rapid unsustainable urbanization, migrant and refugee surges, domestic and international terrorism, cyber-security, the civilianization of war and conflict, and the global rise of resistant antibiotics has resulted in an unprecedented rise in direct and indirect mortality and morbidity”.<sup>5</sup> The global response to the COVID-19 pandemic may be seen as illustrating the characteristics of a complex global public health crisis.

However, an increase in the number of cases within a few weeks raised public health concerns.<sup>6</sup> The existence of diseases caused by coronaviruses are not, however, new. Severe acute respiratory syndrome coronavirus (SARS-CoV) virus epidemic of 2003 was thought to be an animal virus from an uncertain animal reservoir and transmitted to other animals (possibly originating from bats). Interestingly, the first infected humans were traced to the Guangdong province of southern China in 2002 leading to an epidemic of SARS, a resultant transmission to 26 countries resulted in more than 8000 cases in 2003.<sup>7</sup>

COVID-19 is, already, a pandemic and complex, public health emergency. With the alarming transmission rates of the current COVID-19 infectious disease which has claimed many lives, we want to help our public health peers in Africa and South-East Asia prepare for COVID-19 using good, public health science and thinking to reduce morbidity and mortality. We were curious as to what countries in Africa and Southeast Asia have done to prevent infectious disease (specifically, COVID-19), from affecting the population of specific countries in that region. We also wanted to know what disease control measures they embarked on were successful.

## METHODS

To address our interests, we crafted two questions: First, between March 2015 and March 2020 what actions have been taken to prepare for the impact of infectious diseases in countries in either Africa or Southeast Asia? Second, between the dates of March 2015 to March 2020, what actions have these same nations taken to successfully stop or control the infectious disease? These questions were best answered using a scoping review approach whose purpose is “to provide an overview of available research evidence” on a broad question/broad questions of interest.<sup>8</sup> We looked for good quality published papers or program descriptions for specific geographic regions (i.e., Africa or Southeast Asia), and searched the published literature using these terms: “COVID-19”, “Corona”, “Pandemic”; “Preparedness”, “country preparedness”, “health system preparedness”; “country response”, “health system response”; “COVID-19”, “Africa”, “Sub-Sahara”, “developing countries”; “COVID-19”, “Southeast Asia”, “developing countries”. Then, we organized our findings by the two questions, highlighting key points that seem particularly useful for regional learning. The evidence from each region was summarized in the aggregate to determine some common, noteworthy themes. COVID-19 epidemiologic data and administrative data for selected countries were also reviewed. The World Health Organization (WHO) regions of Eastern Africa (Sudan); Western Africa (Nigeria) and South-East Asia (India) were included.

## RESULTS

The COVID-19 epidemiologic data along with administrative data provided a profile of the available information pertinent to public

**Table 1a.** Comparison Table of WHO Countries, selected, as of 23 April 2020 and 31 May 2020

Countries	Sudan, 23-APR	Sudan, 31-MAY	Nigeria, 23-APR	Nigeria, 31-MAY	India, 23-APR	India, 31-MAY
COVID-19 (2020)*						
Confirmed Cases	162	4,800	541	9,855	21,393	182,143
New Cases	22	279	0	553	1,409	8,380
Deaths	13	262	19	273	681	5,164
New Deaths	0	29	0	12	41	193
<b>General Statistics (2020)<sup>^</sup></b>						
Total Population (2016)	39,579,000		185,990,000		1,324,171,000	
Gross National Income per capita (PPP international \$, 2013)	2,370		5,360		5,350	
Total Expenditures on health per capita (Intl \$, 2014)	282		217		267	
Total expenditure on health as % GDP	8.4		3.7		4.7	
<b>Health workforce per 10,000 population (2019)**</b>						
Density of physician	4.1		3.8		7.8	
Density of nurse	8.3		14.5		21.1	
Density of pharmacist	2.1		0.5		1.9	
<b>World Bank income group (2014)<sup>^^</sup></b>						
Classification	Lower-middle		Lower-middle		Lower-middle	

Source: \*WHO COVID-19 Situation Report-94, 23 April 2020; Situation Report-132, 31 May 2020; ^WHO Country Profile page, as of 22 April 2020; \*\*WHO World Health Statistics 2019, Annex 2, Annex B-4; ^^WHO Global Atlas of Medical Devices-2014

health efforts for COVID-19 pandemic prevention preparedness and disease control (Tables 1a and 1b).

**Table 1b.** Comparison Table of WHO Countries, Selected, as of 31 May 2020 and 15 June 2020

COVID-19 (2020)*	Sudan, 23-APR	Sudan, 31-MAY	Nigeria, 23-APR	Nigeria, 31-MAY	India, 23-APR	India, 31-MAY
Confirmed Cases	4,800	7 220	9,855	16 085	182,143	332 424
New Cases	279	213	553	904	8,380	11,502
Deaths	262	459	273	420	5,164	9,520
New Deaths	29	12	12	21	193	325

Source:WHO-Situation Report-132 and 147

Table 1a displays a comparison between the three selected countries with respect to COVID-19 cases (2020), General Statistics (2020), Health workforce (2019), World Bank income group (2014). Regarding COVID-19, the number of confirmed cases and deaths in the three countries, and the differences between April 23<sup>rd</sup>, 2020, and May 31<sup>st</sup>, 2020, are displayed. From the data provided, it can be noted that the three selected countries: Sudan, Nigeria, and India are all classified by the World Bank in the “lower middle income” group. Note the gross national income per capita for each country. The comparison data between these countries seem to justify the joint consideration of these three lower-income countries. Table 1b displays the comparison between the three selected countries from the updated WHO Situation Reports.

**Preparedness for COVID-19 Outbreak in East Africa (focus: Sudan)**

Epidemics of infectious diseases including epidemics caused by the coronavirus family constitute a risk worldwide including the African continent.<sup>9</sup> In Africa, the most devastating ones are Ebola, viral haemorrhagic fevers, cholera, SARS, MERS, malaria, measles, and many others.<sup>10</sup> Recognizing the threat to health and public system, the International Health Regulation (IHR) 2005, calls for a list of actions; some to be carried out by WHO and international community and the others to be carried out by countries and regions.<sup>11</sup> To reduce the health and socio economic impact of these epidemics countries need to work together and to be prepared. Each country basically to have strategic and contingency plans, trained rapid response teams, functioning surveillance systems and buffer stock of essential commodities to initiate action before asking for help. Sudan and countries in Eastern Africa are at particular risk to these epidemics considering the challenges facing the economic, public, and health system and unrest.<sup>12</sup>

During the period 2016-2018; the WHO and countries jointly assessed the IHR core capacities of countries to meet the health security requirements; an exercise which was done in all countries including Sudan and Ethiopia.<sup>13,14</sup> An international team of experts worked together with their national peers (joint external evaluation (JEE)) through discussions and site visits using the WHO/IHR-JEE tool. They also jointly developed a report with recommendations and priority actions for each country.

**Response to COVID-19 Outbreak in East Africa (focus: Sudan)**

In response to COVID-19, the “Resolve to Save Lives”- an initiative of vital strategies<sup>15</sup>-provides country-level information on epidemic preparedness using data from WHO/JEE missions. The “ReadyScore” tool created by “Resolve to Save Lives” determine whether a country prepared to detect, contain and prevent epidemics and classified countries into 3 categories: Better prepared (score 80% or higher), have work to do (score 40-79%) and not ready (39% or lower).

Sudan and countries in Eastern Africa (Ethiopia, Eritrea, Djibouti, Somalia, South Sudan, Kenya, Uganda, and Tanzania) overall ReadyScore ranged between 29% to 57%. No country scored 80% or higher “better prepared”. Djibouti (31%), Somalia (29%), and South Sudan (30%) are classified as “Not ready” and the rest of countries as having “Work to do” to detect, contain and prevent epidemics. Countries are doing better in the national laboratory systems, real-time surveillance and risk communication, and scoring generally between 40-79% with few exceptions. The picture changes a lot and countries under study were found better prepared with the exception of Somalia and South Sudan.<sup>16</sup> In fact, Africa is better prepared than ever before.<sup>17</sup> This may be attributed to the JEE report as the team identified for each country what to do and the process was also enhanced by the Ebola epidemic in Western Africa.

Sudan and countries in East Africa have taken preparedness and response actions to detect and contain COVID-19 following WHO guidelines.<sup>18</sup> Measures directed towards strengthening surveillance, prevention of introduction at point-of-entry, testing of suspected cases. All countries adopted home isolation for suspected cases but some countries have public isolation centres where people coming from certain countries isolated for 14-days. Severe confirmed cases admitted to specialized treatment centres, the number of these centres varies between countries but generally, there is one advanced centre at the capital city. Non-severe cases asked to stay at home with a daily phone calls from the 24-hour call desk. The call centre also counters rumours and misinformation about the disease. Countries also adopted partial or complete lockdown with mass public awareness campaigns.<sup>19,20</sup> All countries enhance infection prevention and control practices at health facilities and communities.

**Preparedness for COVID-19 Outbreak in West Africa (focus: Nigeria)**

As discussed earlier, the initial surge of the alarming COVID-19 cases seen in Asia, Europe, and the United States seemed to have spared most African countries including the western African regions. However, an increase in the number of cases within a few weeks raised public health concerns.<sup>6</sup> Prior Ebola outbreaks in regions of West African between 2014 and 2019, for which Nigeria was notable for swift action had demonstrated the importance of adequate preparedness in handling infectious disease outbreaks<sup>21</sup> With vulnerable health systems in most West African countries, were they prepared enough to maintain successful, sustainable ap-

proaches for this new public health challenge.<sup>22</sup> To determine a country's capacity to detect and respond to cases with two using preparedness and vulnerability indicators, Nigeria and Ghana were among the countries deemed of moderate risk for having the variable capacity and high vulnerability.<sup>23</sup>

Nigeria was one of the first countries to recognize the risk and start planning the response for COVID-19. A multi-sectoral National Coronavirus Preparedness Group was established by Nigeria Centre for Disease Control (NCDC) on January 7, 2020, one week after China first reported the cases and three weeks before WHO declared the disease to be of international concern. Within one month, three laboratories with diagnostic capacity for COVID-19 was established. The first confirmed COVID-19 case in Nigeria was recorded in February, 2020. A multi-sectoral emergency operations center (EOC) led by NCDC was activated on the 28<sup>th</sup> of February at Level 3, the highest level of response to public health emergencies. Lagos and Ogun State Ministries of Health activated State-level EOC. The Executive Governors and Honorable Commissioners in both States had held a press briefing. Two NCDC Rapid Response Teams were deployed to Lagos and Ogun State to support response activities on 28<sup>th</sup> February. The ongoing risk communications campaign was set in place across the country.<sup>24-26</sup>

Other countries in the region equally set up plans to address the pandemic. Without an early surge of COVID-19 cases in West African countries, they potentially had enough time to adequately prepare before the dreaded pandemic broke out in their region. Notably, Senegal partnered with the United Kingdom to develop an affordable point of care COVID-19 testing.<sup>27</sup> Ongoing research, publications, media, and community awareness efforts continued in most countries in the West African region.<sup>21,22,24,27</sup> Would the public health measures in place be sufficient when the COVID-19 outbreak hits the region?

#### Response to COVID-19 Outbreak in West Africa (focus: Nigeria)

The first recorded COVID-19 death in West Africa was in Burkina Faso on Wednesday, March 18, 2020, the 2<sup>nd</sup> and third were both recorded on Friday 20<sup>th</sup> March 2020 in Gabon and the Democratic Republic of Congo. Nigeria recorded her first death on the 21<sup>st</sup> March 2020,<sup>26</sup> although her first identified case was on February, 27<sup>th</sup> 2020.<sup>25</sup> Abdalla & Galea (2020) recommend that different countries in Africa chart their own paths in responding to the COVID-19 pandemic through testing, contact tracing, and isolation, as well context-specific guidelines around physical distancing based on stratified risk aimed at protecting those at high risk.<sup>28</sup>

In response to the arrival of COVID-19 to the West African region, countries embraced public health measures to identify and contain the disease including public awareness, testing, provision of personal protective equipment to healthcare workers, and the use of mandatory lockdown in many regions. Conflicting media and oral reports question the efficiency of the measures in place.

As of May 7, 2020, Nigeria has recorded 3526 confirmed cases, 601 discharges, and 107 deaths from 34 states and the Federal Capital Territory. On the 7<sup>th</sup> of May 2020, 381 new confirmed cases and 4 deaths were recorded. The 381 new cases from 18 states-Lagos (183), Kano (55), Jigawa (44), Zamfara (19), Borno (9), Bauchi (19), Katsina (11), Kwara (8), Kaduna (7), Gombe (6), Ogun (5), Sokoto (4), Oyo (3), Rivers (3), Niger (2), Akwa Ibom (1), Enugu (1), Plateau (1). No new state reported a case in the last 24-hours. Of note, many states in the country are not represented in the list.<sup>25</sup> As noted, a similar lower prevalence of confirmed cases are reported in other West African countries. As of May 2<sup>nd</sup>, 2020, the following represents the number of confirmed cases of COVID-19 in West African countries starting with the highest prevalence to the lowest: [Nigeria (3,145), Ghana (3,091), Cameroon (2,264), Guinea (1,856), Guinea (1,856), Ivory Coast (1,516), Senegal (1,433), Burkina Faso (729), Mali (631), Sierra Leone (225), Liberia (178), Zambia (146), Togo (128)].<sup>29</sup>

With respect to testing resources, researchers in Senegal have been commended for initiated a \$1 COVID-19 rapid testing responsible for testing more people upon entry to healthcare facilities. Such a noteworthy endeavor could be emulated by other West African countries. As in other African countries, in West Africa, mandatory lockdowns, curfews, closure of some public offices, and markets are employed as efforts to reinforce physical distancing with the goal of limiting COVID-19 transmission. However, mandatory lockdowns have posed economic and psychosocial challenges threatening the survival of persons, particularly for those who depend on daily employment for living sustenance and deemed unjustifiable by some in the context of low identified COVID-19 cases or lack of symptomatology. Barriers to successful lockdown efforts are linked to health-care systems with limited financial resources, infrastructures less resilient to the consequences of lockdown and curfew measures, as well as cultural, geographical, and relationship differences between governments and residents.<sup>28</sup> Critical questions arise if universal lockdown is an equitable practice in areas of unidentified COVID-19 cases, particularly if daily survival sustenance is not provided by the government in low-income areas. Of note, new cases of COVID-19 continued to increase in all states in Nigeria as presented in Table 3 below. However, lower identified cases remain considerably low in most Southern States of the country.

#### Preparedness for COVID-19 Outbreak in South East Asia (focus: India)

The Southeast Asia region is more vulnerable due to climate change and emerging diseases. Most of these countries had prior experience of tackling disasters in the recent past. India, in particular, had battled cyclone Fani and Nipah virus and had significantly reduced the deaths during these emergencies.<sup>30</sup> In September 2019, all the countries had signed the 'Delhi Declaration' to scale up preparedness to respond to health emergencies.<sup>31</sup> The four key initiatives include (1) to identify risks by mapping and assessing vulnerabilities for evidence-based planning; (2) invest in people and systems for risk management;<sup>32</sup> (3) implement plans; and (4) interlink sectors and networks to engage and involve all, beyond the health sector, who can and have a role in responding to public health emergen-

cies. These countries had conducted regular simulation exercises and annual self-assessment to strengthen their response and contingency plan.<sup>32</sup>

The eleven countries of South-East Asia were more susceptible to the COVID-19 infection because of their proximity to China. As on 4<sup>th</sup> March 2020, five of the eleven countries had reported COVID cases Thailand (43), India (28), Indonesia (2) and Sri Lanka and Nepal one each and only nine countries in the region were equipped with laboratory testing facilities for COVID. However, over next two months; as on 15<sup>th</sup> May 2020, the number of cases and deaths (#) recorded in these countries were: India 81,970 (2649), Bangladesh 20,065 (298), Indonesia 16,496 (1076) and Thailand 3025 (56), Maldives 1020 (4), Sri Lanka 925 (9), Nepal 258 (0), Myanmar 181 (6), Timor-liste 24 (0), Bhutan 20 (0), Democratic People's Republic of Korea 0 (0). In India, the National Taskforce was formed which included experts from across the country and belonging to various disciplines in collaboration with the Indian Council of Medical Research (ICMR). The task force works closely with the Ministry of Health and Family Welfare, Government of India and provides technical inputs to the Government to contain the spread of the disease in the country.

**Response to COVID-19 Outbreak in Southeast Asia (with focus on India)**

The WHO provided technical inputs in all these countries during

the COVID pandemic. In India, the first COVID death was reported in Gulbarga district, Karnataka on 13<sup>th</sup> March 2020. The Ministry of Health and family welfare, Government of India assess the situation after obtaining the reports from the 33 states across the country and then issues necessary actions and guidelines for further implementation by the states.<sup>33</sup> All the states are closely monitored by the centre. The country adopted '5' P for disaster management. (1) Proof of concept with a social environment where the curfew was in place in the whole country for a period 40-days (b) proactive approach to ban international flights and have screened more than 1.5 million passengers (c) The impact of COVID is not just physical health but it caused huge stress among people due to which there were some cases of even prominent people committing suicide or died of a heart attack. The Prime Minister of India, Shri Narendra Modi announced an initiative called #9PMfor9Minutes Challenge on April 5<sup>th</sup> to turn off lights and lit lamps for 9 minutes at 9 pm as a mark of unity (d) Partnerships: the country dwelled upon interaction with stakeholders of state governments, exchanging knowledge and empowering state governments. They also have supplied Hydroxychloroquine tablets and personal protective equipment kits to other countries (e) Preparation and collaboration: The country had devised and implemented various strategies to contain the spread and avoid the spike in the sudden increase of cases. The health facilities were further equipped with ventilators, personal protective equipment (PPE), and established isolation wards, COVID care centres, and

**Table 2.** Synthesis Table from Scoping Reviews, Preparations, and Responses to Infectious Disease Outbreak (including COVID-19), from March 2015 to March 2020

	Preparation for Infectious Disease Outbreak	Response to Infectious Disease Outbreak
Eastern Africa (Sudan)	<ul style="list-style-type: none"> <li>Sudan and countries in Eastern Africa are at particular risk to these epidemics considering the challenges facing the economic, public and health system and unrest</li> <li>Experience from the Ebola period 2016-2018 helped with preparation: The World Health Organization and countries jointly assessed the IHR core capacities to meet the health security requirements. Sudan and Ethiopia participated in the exercise</li> <li>Embraced the WHO/ Joint External Evaluation- JEE tool: jointly developed by the international team of experts with recommendations and priority actions</li> <li>Overall ReadyScore ranged between 29 to 57% in East African countries and improving; "Resolve to Save Lives"-</li> </ul>	<ul style="list-style-type: none"> <li>Sudan and countries in East Africa adopted preparedness and response actions to detect and contain COVID-19 following WHO guidelines.</li> <li>National Call centres implemented.</li> <li>Adoption of home isolation for suspected cases, public isolation centres where people coming from certain countries isolated for 14 days. Severe confirmed cases admitted to specialized treatment centres.</li> <li>Despite the adoption of public health recommended measures, cases of COVID-19 are increasing raising the need for measures relevant to the context of Africa</li> <li>Partial or complete lockdown is ongoing with relatively high commitment from the people. The possibility of extending is concerning due to the impact on individuals' income and the overall economy.</li> </ul>
Western Africa (Nigeria)	<ul style="list-style-type: none"> <li>An initial surge of the alarming COVID-19 cases seen in Asia, Europe, and the United States seemed to have spared most African countries including the western African regions.</li> <li>Nigeria was one of the first countries to recognize the risk and start planning the response for COVID-19. A multi-sectoral National Coronavirus Preparedness Group was established by Nigeria CDC (NCDC) on January 7, 2020, one week after China first reported the cases and three weeks before WHO declared the disease to be of international concern.</li> <li>Prior Ebola outbreaks in regions of West African between 2014 and 2019, for which Nigeria was notable for swift action had demonstrated the importance of adequate preparedness</li> </ul>	<ul style="list-style-type: none"> <li>Within one month, three laboratories with diagnostic capacity for COVID-19 were established in Nigeria.</li> <li>Senegal Commended for \$1 COVID-19 testing through collaborative research with the United Kingdom</li> <li>WHO recommended Public health preventive/containment measures publicized through community awareness, testing, and provision of personal protective equipment to healthcare workers</li> <li>Use of mandatory lockdown in many regions including regions with low confirmed cases and/or deaths in Nigeria (approx. 200million. Most the southeast States with minimal cases and no deaths.</li> <li>Conflicting media and oral reports question efficiency of mandatory lockdown with its attendant psychosocial/economic strains challenging day to day survival, particularly among persons living in poverty in areas of low COVID-19 cases</li> </ul>
South-East Asia (India)	<ul style="list-style-type: none"> <li>Prior experiences tackling disasters helped most southeast Asian countries prepare for the epidemic. India, in particular, had battled cyclone Fani and Nipah virus and had significantly reduced the deaths during these emergencies.</li> <li>Signed 2019 'Delhi Declaration' to scale up preparedness to respond to health emergencies helped with preparedness with four key initiatives and simulation exercises</li> <li>In India, a multidisciplinary National Taskforce collaborated with the Indian Council of Medical Research (ICMR). The task force works closely with the Ministry of Health and Family Welfare, Government of India to provide technical inputs to help reduce disease spread</li> </ul>	<ul style="list-style-type: none"> <li>The WHO SEARO countries have witnessed the increase in the number of cases despite the appropriate public health measures</li> <li>India, in particular, is leveraging on mobile applications that track patients and prophylaxis for health care workers</li> <li>It is a challenge to control the spread of disease as the countries are gearing up to ease the lockdown fearing the slump in the economy.</li> <li>Intense measures to build the public health system and changing the mindset and behavior of the population to effectively implement the protective measures remain the key strategy for control of COVID-19.</li> </ul>

COVID hospitals to manage a huge influx of patients in the future. The government also launched the ‘AarogyaSetu’ app that helps in curbing the spread of infection by tracking the movement of infected persons and alerting their presence to nearby persons.<sup>34</sup> It also provides updates on the recent developments in the travel advisory, updates on containment areas, and guidelines.

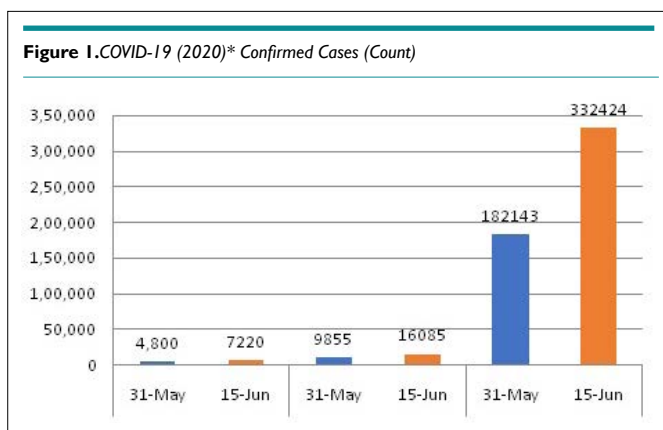
## DISCUSSION

Following our earlier piece,<sup>1</sup> this scoping review is written because the COVID-19 pandemic shows us that disease outbreaks connect the people of the world in a significant way. Our broad interests motivated two questions regarding preparedness and responses by the three selected countries in two WHO regions: Africa: Sudan (East) and Nigeria (West), and Southeast Asia: India. Comparable data between these countries presented in Table 1 seem to justify the selection of these low middle-income countries. Table 2 displays the summary synthesis from the scoping review, preparations, and responses of the selected countries during the specified period.

A narrative or descriptive account of available information on the public health efforts at COVID-19 pandemic prevention preparedness and responses for disease control in the three countries have been presented. A synthesis table from scoping reviews, preparations, and successful response to infectious disease outbreak (including COVID-19) in these regions are highlighted in Table 3.

## CONCLUSION

Infectious disease continues to have a severe impact on developing nations. In the face of the COVID-19 pandemic, countries in Africa and South-East Asia have taken steps to both prepare for the spread of the pandemic and respond to the virus impacting the population (Figure 1) (see “dashboard”).



## Dashboard

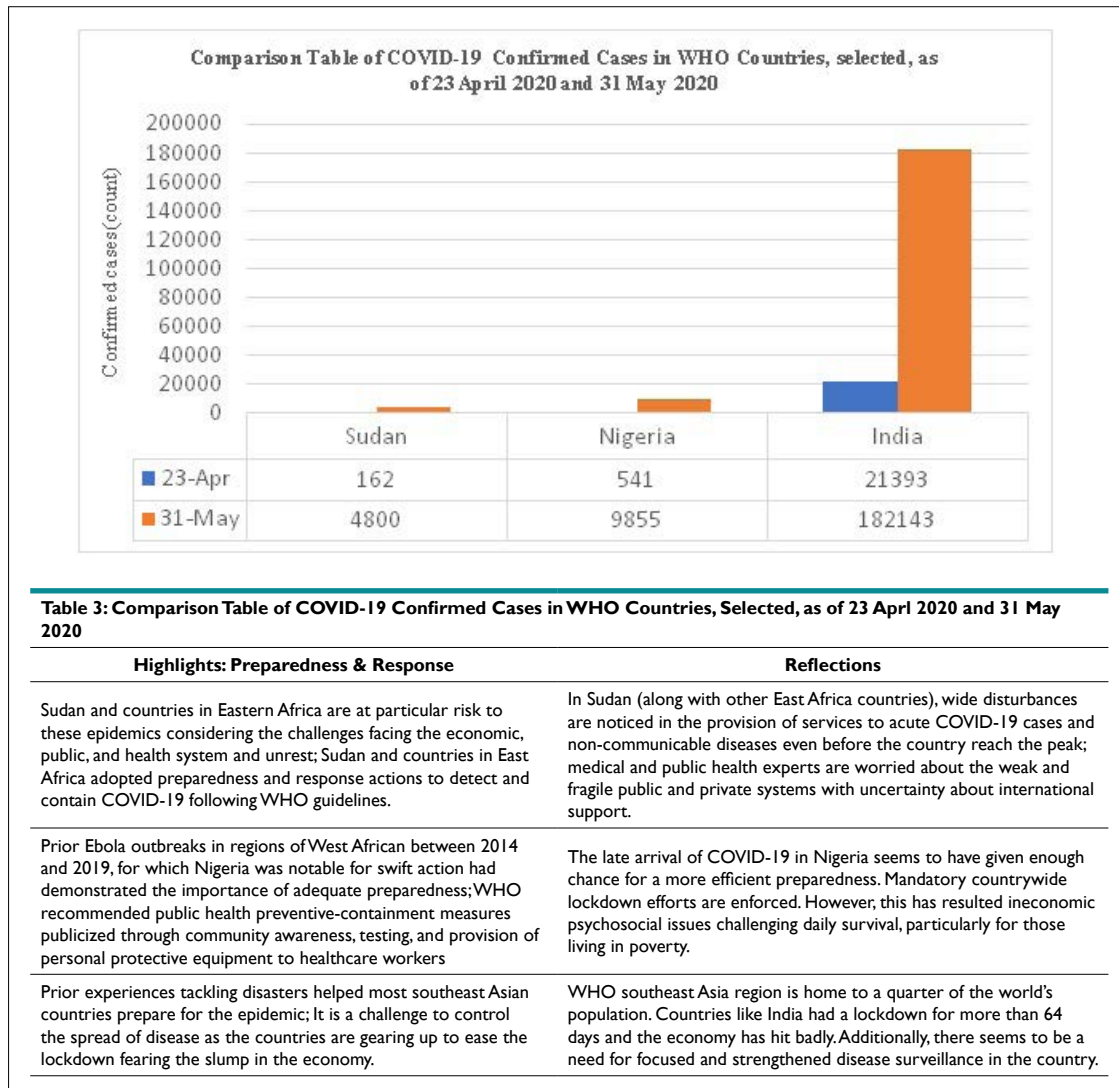
In the face of the number of confirmed COVID-19 cases, how have Sudan, Nigeria, and India prepared and responded to the virus to protect their populations?

In addition to country-specific public health strategies to reduce COVID-19 transmission and its associated morbidity/mortality, it is interesting to note the similarities and differences noted among these countries. Upon reflection, the period of communicability of the disease suggest the need to help populations understand the seriousness of the treatment of this virus and, in the short-term, the need to conduct the activities of daily living differently than in the past. Overall, COVID-19 is a complex pandemic posing significant public health and economic challenges worldwide including the countries discussed in this paper. The similarities noted among Sudan, Nigeria, and India with respect to preparedness for the COVID-19 pandemic show that each country has established infectious disease preparedness protocols based on prior experiences with disease outbreaks. Countries in Africa including Sudan and Nigeria seem to have been spared of the initial COVID-19 surges seen in other parts of the world. In spite of reports of instituting WHO-recommended measures to reduce disease spread, consistent increasing trends in the number of COVID-19 confirmed cases and deaths were noted across Sudan, Nigeria, and India.

Differences noted in the preparedness and responses to the COVID pandemic between the three countries of interest are largely due to administrative and technological differences. For example, India’s use of an “app” to track cases was not noted in Sudan or Nigeria. Of interest is the low number of identified COVID-19 cases in Nigeria with a population of about 200 million. The low number of identified cases in the many Nigerian States in the South-Eastern regions. Possible explanations could be linked to inequitable testing resources, individual defense mechanisms/group attributes against COVID-19.

Perhaps the issue of disease containment through enforcing mandatory lockdowns even in regions with very few identified COVID-19 cases have raised the most controversial concerns. This is particularly noted in the low-income African regions where the adverse effects of such lockdowns result in economic and psychosocial issues challenging daily survival of those living in poverty. Such observation seems to validate concerns and questions posed by Abdalla Galea (2020) regarding the workability of lockdowns in African countries with respect to handling coronavirus.<sup>28</sup>

Adhering to WHO recommended public health strategies for prevention, case identification, quarantine, and treatment remains paramount. Of great interest, in addition to promoting the necessary public health measures to identify and treat COVID-19, is the need to address the urgent and overwhelming psychosocial strain, economic challenges, and unmet daily needs associated with lockdowns, particularly in low-income regions of Sudan, Nigeria and India. Timely data collection, analysis, and dissemination to public health decision-makers are, also, critical actions in favor of disease prevention and control efforts. The results of our scoping review has implications for clinical practice, policy making and planning public health strategies. In addition to clinical issues of morbidity and mortality associated with the COVID-19 pandemic in these regions, concerns regarding equity, economic, and psychosocial consequences COVID-19 seem to have serious implications from a public health standpoint.



**Table 3: Comparison Table of COVID-19 Confirmed Cases in WHO Countries, Selected, as of 23 April 2020 and 31 May 2020**

Highlights: Preparedness & Response	Reflections
Sudan and countries in Eastern Africa are at particular risk to these epidemics considering the challenges facing the economic, public, and health system and unrest; Sudan and countries in East Africa adopted preparedness and response actions to detect and contain COVID-19 following WHO guidelines.	In Sudan (along with other East Africa countries), wide disturbances are noticed in the provision of services to acute COVID-19 cases and non-communicable diseases even before the country reach the peak; medical and public health experts are worried about the weak and fragile public and private systems with uncertainty about international support.
Prior Ebola outbreaks in regions of West African between 2014 and 2019, for which Nigeria was notable for swift action had demonstrated the importance of adequate preparedness; WHO recommended public health preventive-containment measures publicized through community awareness, testing, and provision of personal protective equipment to healthcare workers	The late arrival of COVID-19 in Nigeria seems to have given enough chance for a more efficient preparedness. Mandatory countrywide lockdown efforts are enforced. However, this has resulted in economic psychosocial issues challenging daily survival, particularly for those living in poverty.
Prior experiences tackling disasters helped most southeast Asian countries prepare for the epidemic; It is a challenge to control the spread of disease as the countries are gearing up to ease the lockdown fearing the slump in the economy.	WHO southeast Asia region is home to a quarter of the world's population. Countries like India had a lockdown for more than 64 days and the economy has hit badly. Additionally, there seems to be a need for focused and strengthened disease surveillance in the country.

**CONFLICTS OF INTEREST**

The authors declare that they have no conflicts of interest.

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