COVID-19 Pandemic Response Capacity Status of West Africa

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Abstract

Introduction: From the onset of COVID–19 pandemic in late December 2019, countries have stepped up their pandemic preparedness and response activities in accordance with WHO recommendations. Informed by the recent lessons learned from the West Africa Ebola Virus Disease outbreak, and subsequent investments made in public health emergency preparedness and response, it expected that West Africa is more capable of pandemic response than before. We assessed the COVID–19 pandemic response capacity status of West Africa states, and the support and leadership provided by the West Africa Health Organisation. **Methods:** Between February 27 and March 15, 2020, we conducted a mixed method study of the response capacity status and preparedness activities among all the 15 West African states. We used the 9–item WHO national capacity review tool for novel corona virus (nCOV) to perform two types of assessments: a quantitative assessment of the status of states' response capacity; and a qualitative assessment of pandemic preparedness activities. Our data sources were: expert interviews, COVID–19 country situation reports, COVID–19 pandemic preparedness training reports, and minutes of inter-governmental meetings. We calculated and tabulated counts and proportions to depict the response capacity standings on assessable requirements for each of the 9–items for states. We also performed a descriptive thematic analysis on the strengths and weaknesses of preparedness activities at state and regional levels. **Results:** Overall, 87% (13/15) of member states had the capacity test for COVID–19 by PCR. All (100%) of the 15 states had functional incident management systems; rapid response teams; and at least two of the three tiers of field epidemiology workforce. There existed good cross-border collaborations among member states, active participation of health ministers of member states in regional coordination meetings and decision making. Member states described health workforce for response as inadequate. None of the member states had stockpiles of COVID–19 test kits, laboratory supplies, and personal protective equipment. **Conclusion:** The West Africa sub region is able to investigate and confirm COVID–19. Member states are taking appropriate pandemic preparedness measures in all response pillars. Governments of member states are supportive of the coordination and technical direction of WAHO and WHO, but not as much with adequate funding for national and regional response.

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Introduction

The coronavirus disease 2019 (COVID–19), was first described as a novel respiratory disease among a cluster of pneumonia cases with unknown aetiology that was reported on December 31, 2019 by the Wuhan Municipal Health Commission, Hubei province, China [1]. The causative agent was subsequently characterized by genomic sequence analysis and named by the World Health Organization (WHO) as severe acute respiratory syndrome coronavirus 2 (SARS–CoV–2) [2,3]. On January 30, 2020, WHO declared the COVID–19 epidemic a Public Health Emergency of International Concern? As a continent, Africa recorded its first case in Egypt on February 14, 2020 [4]. Given the trend of spread, the WHO urged Africa and the rest of the yet unaffected countries and territories to prepare to respond to a very likely COVID–19 outbreak [5]. Within 24 hours of this last caution, on February 25, 2020, Algeria became the first country of the African Region Office of WHO to report a case of COVID–19 [6]. On February 27, 2020, Nigeria confirmed the first case in West Africa [7]. With the confirmation of cases in 114 countries across all continents, the WHO declared COVID–19 outbreak as a pandemic on March 11, 2020 [8].

Africa is particularly at risk of imported cases because China is Africa´s leading commercial partner; and hence, there are large travel volumes through which COVID–19 could reach the continent [9]. Several measures have already been implemented to prevent and control possible case importations from China and other affected countries. However, the ability to limit and control local transmission after importation depends on the implementation of strict measures of prevention, detection, and control [10]. These measures include enhanced surveillance, active case search for rapid identification of suspected cases, testing, case isolation, and contact tracing. The effective operationalization of these vast set of technical interventions depends on each state´s public health and laboratory infrastructure; human resource capacity, good in-country leadership in crisis situation, and effective regional coordination.

The West African context is unique in terms of readiness for a pandemic because the region is still recovering from 2014-2016 Ebola Virus Disease (EVD) outbreak. Also, the increasing burden of communicable diseases resulting from the ongoing epidemiologic transition presents a further strain on health system resilience of the region even in the absence of disease outbreaks [11]. In the current context, health systems have limited capacity for managing routine critical care services; and the ability to manage severe forms of COVID–19 will increase the demand for well–equipped intensive care units with adequate bed capacities to receive all cases who need such services [12,13]. A recent global analysis of countries with the highest numbers of intensive care beds per capita does not include any country from Africa [14]. In Liberia for example, there are no intensive care units (ICU) with ventilators [14]. Per WHO recommendations, a country´s response capacity for COVID–19 depends on its testing capacity, the effectiveness of surveillance and risk assessment strategies, an effective incident management system for coordination, and a reliable logistic and supply chain management system [15].

These challenges notwithstanding, it is also expected that the recent lessons learned from the West Africa Ebola Virus Disease outbreak, and subsequent investments made in public health emergency preparedness and response should make West African states and the region as a whole, more capable of pandemic response than before [16,17]. In keeping with its mandate, Regional Center for Surveillance and Disease Control (RCSDC) of the West African Health Organisation (WAHO) of the Economic Community of West African States (ECOWAS) with support from partners, stepped up regional coordination efforts and pandemic preparedness trainings for member states from January 2020 in anticipation of the worst-case scenario. These activities included pandemic response capacity assessments of member states, inter-governmental planning and coordination meetings, capacity building workshops, and simulation exercises. We assessed the COVID–19 pandemic response capacity status of West African states, and the support and leadership provided by WAHO.

Methods

Study design

We conducted a mixed method study to assess the status of COVID–19 pandemic response capacity, the preparedness efforts of West African states, and the support from WAHO and partners. We performed a quantitative assessment of the response capacity based on the 9-item WHO national capacity review tool for novel corona virus (nCOV); and a qualitative assessment of national and regional pandemic preparedness activities based on thematic areas of pandemic preparedness and response outlined in the

same review tool [15]. The assessment was carried out from February 27 to March 15, 2020.

Data sources and sampling

We obtained both primary and secondary data. We obtained the primary data from expert interviews, and the secondary data from records review. For expert interviews, we purposively selected two respondents from each of the 15 West African states. The respondents were individuals in charge of emergency response operations in their respective countries and had been manning the emergency response pillar of their National Public Health Institutes (NPHIs) or equivalent institutions. The records we reviewed were: COVID–19 situation reports of member states, reports of training workshops organised by ECOWAS/RCSDC, and minutes of inter-governmental meetings convened by WAHO. The workshop training reports contained submissions from both RCSDC facilitators and country participants. The minutes of the intergovernmental meetings contained submissions from state representatives, WAHO leadership, and partners.

Data collection and study variables

We collected data on response capacity from emergency response pillar leads of member states using a structured in-depth interview guide based on all items on the WHO national capacity review tool for novel corona virus (nCOV) [15]. Based on the thematic areas of pandemic preparedness outlined in the review tool, we obtained data on the availability or lack, of the types of response capacities, and scored as such for each state. We conducted in-depth interviews to probe further on the reasons for availability or lack of COVID–19 response capacities for each state, the measures being considered to overcome response gaps, and the application of requisite technical guidelines and standard operating procedures (SOPs) on public health emergency preparedness and response. To assess the COVID–19 preparedness efforts within and among member states, we reviewed and extracted data from COVID–19 country situation reports that were submitted by member states to WAHO. From these, we extracted the types of preparedness and response activities that were completed, ongoing, or not started. In addition, to assess the technical and political efforts of the sub region, we reviewed and extracted data from the reports on COVID–19 preparedness training workshops that were organised by ECOWAS/RCSDC, and the minutes of inter-governmental meetings on COVID–19 preparedness that were convened by WAHO.

The variable categories by which we obtained data for the analysis included: the capacity of the national laboratory systems to test; the capacity of surveillance, risk assessment, and rapid response teams to investigate suspected cases of COVID–19; the availability and functional capacity to detect cases through case investigation; the capacity conduct to contact tracing and case management [15]. Also, we assessed the leadership, coordination and support services of ECOWAS/RCSDC and WAHO; the completed and ongoing activities on six complementary emergency response pillars viz. incident command and coordination, risk communication, point of entries (POEs), case management, infection prevention and control (IPC), and logistics and supply management [15].

Data analysis

We performed a quantitative analysis on the pandemic response capacity status of each member state. We calculated and tabulated counts and proportions to depict the response capacity standings on sub-requirements for each of the 9-items for states and the sub region for which definite data was available at the time of study. We presented findings on other sub-requirements as explanatory text based on data obtained from in-depth interviews.

We performed a descriptive thematic analysis on the data obtained from in-depth interviews and those extracted from records review to describe the preparedness activities, coordination, and partner support in keeping with the thematic areas of WHO recommended activities for pandemic preparedness [15]. From all the results obtained, we described the strengths and weaknesses of national and regional initiatives, planned strategies, and ongoing preparedness activities of the West Africa sub region.

Ethical considerations

We did not apply for formal ethics review. We considered this study as part of the pandemic response measures where time was of the essence and for which reason, applying for formal ethical approval would delay assessment and defeat its very purpose as an

emergency undertaking. We had the necessary support from all state institutions to conduct the study in the superior interest of regional public health. We obtained verbal consent from study participants. Even though most data were analysed and reported at the aggregate level, we obtained additional expressed verbal consent from respondents to include quotes from their responses where necessary for the completeness of reporting the findings. The West African Health Organisation granted consent for publication in keeping with its mandate provided in article III, paragraph 2c (objectives and functions) of the protocol on the establishment of the West African Health Organisation: "to serve as a forum for collecting and disseminating technical, epidemiological, research, training and other types of relevant health information among Member States".

Results

Overview of National Response Activities

From early January 2020, West African states started acting on recommendations from WAHO and WHO on COVID–19 readiness activities for prevention and early containment in the event of spread to the region. To ensure early case detection and laboratory confirmation, ECOWAS states stepped up surveillance activities at all points of entries, conducted laboratory readiness assessment, and trained personnel on safe sample collection, management, and testing for SARS–CoV–2. Also, the countries held incident command and coordination meetings, and started risk communication and community engagement. They also took steps to address human resource capacity and logistics gaps in all pillars of the COVID–19 response. An overview of individual state and regional standings on pandemic response capacities that were assessable is summarized on **Table 1**, **Table 2a**, & **Table 2b**.

Command and Coordination

There were established multi-sectoral response mechanisms for epidemics coordinated by national public health institutes/divisions/agencies as the case may be in each member state. With the exception of Niger, the remaining 14 (93%) of member states had national preparedness and response plans for public health emergencies that could manage respiratory diseases. These plans were being adapted to include specific requirements COVID–19 response. Additionally, four countries namely: Burkina Faso, Ghana, Liberia, and Mali had linked these plans for managing infectious disease to include securing the legal basis for quarantine and restriction of movement. Legislative processes were underway in Ghana to give the president additional powers to institute interventions as may be warranted for the control of the pandemic.

With the exception of Cabo Verde and The Gambia, each of the remaining 13 (87%) member states had a functional Public Health Emergency Operation Centre (EOC) managed by their respective Incident Management Systems (IMS). Whereas an EOC did not exist at all in Cabo Verde, The Gambia had the physical structure and installations, but it was not functional due to unavailability of information and communication technology (ICT) personnel to operate the installed gadgets.

In the wake of the COVID–19 outbreak, NPHIs of all member states held planning meetings involving the leaders from the human, animal, and environmental health departments to create a common understanding of their institutional and collective roles in preparing to respond to a possible COVID–19 outbreak. The political leadership of health ministries of member states had also held multidisciplinary coordination meetings at the national and subnational levels with representations from other ministries and international partners notably the US CDC and WHO. Following recommendations from these meetings, governments from some member countries had dedicated funds to support the emergency response preparedness activities. For example, the government of Ghana had approved the Ghana cedi equivalent of 100 million US dollars as an initial financial support for preparedness and response activities. Aside direct financial commitment, governments of other member states had demonstrated a serious national approach to the oncoming crisis as related by some national response focal persons:

"The situation is being monitored at the very highest level of the State ... because government meetings were held on the preparation for COVID–19" (MoH, Burkina Faso).

"We have activated a health crisis management committee. It is within this committee that decisions are made. This committee is chaired by the minister of health. Above this committee, the government has set up an inter-ministerial committee including the ministries of health, foreign affairs, animal resources, and ministry of the living environment. This

inter-ministerial committee supervises all the response operations carried out." (MoH, Benin).

In non-outbreak times, three (3) member states viz. Cabo Verde, Liberia, and Togo had no dedicated financial support for surveillance, preparedness and response to emerging diseases. Gambia had no officially designated quarantine facility and health authorities have advised suspected case to do self-quarantine at home.

National Laboratory Systems

Of the 15 member states, 13 (87%) had the in-country laboratory capacity to test for COVID -19 Table 1. The remaining two which did not yet have the capacity as of March 06, 2020 were Liberia and Cabo Verde. These two countries had engaged infectious substance certified shippers for shipping their specimens abroad for testing in other member countries - Ghana testing for Liberia, and Senegal testing for Cabo Verde. In the meantime, Liberia and Cabo Verde were preparing their laboratory infrastructure, training laboratory personnel, and procuring essential logistics and supplies to start in-country testing. Some member states had multiple laboratories with the capacity to test. For example, Mali had four (4) of such laboratories viz. Laboratoire Union des Centres de Recherche Collective (UCRC), Laboratoire Institut National de Santé Publique (INSP), Laboratoire Virologie et maladies émergentes, and Laboratoire Centre d'Infectiologie Charles Mérieux (CICM) (laboratoire mobile). Guinée (Conakry) had three (3) viz. Institut National de Sante Publique (INSP), Institut Pasteur de Guinée (IPGui), and Centre de Recherche Médecine, Science, Santé et Société (CEREMES). Ghana had two viz. the Advance Laboratories of Noguchi Memorial Institute for Medical Research (NMIMR), and the Kumasi Centre for Collaborative Research (KCCR) both of which were already testing for cases. All the 13 member states with in-country laboratory capacity had each conducted laboratory readiness assessment for COVID–19 testing. Also, all member states had documented incident action plans in which they outlined plans for boosting surge capacity through training laboratory personnel, case investigators, contact tracers, increasing number of testing centres, and stockpiling critical supplies in anticipation of the spread of outbreak. Ghana had a drone delivery system for critical medical supplies, blood, and blood products across the country and was ready to adapt this system for the rapid transport of COVID–19 samples and other critical supplies should the need arise.

Surveillance and Risk Assessment

For a start, all member states had activated their national and subnational health systems (public and private) to inform healthcare workers (HCWs) and laboratories on prevailing case and contact definitions, and reporting protocols. COVID–19 protocols were already being enforced at airports and sea ports, but not particularly vigorous at land borders as at March 06, 2020. With the exceptions of Burkina Faso, Cabo Verde, and Liberia, the remaining 12 (80%) of member states had pre-existing respiratory disease surveillance systems for influenza-like illnesses (ILI) on which they leveraged to establish their respective COVID–19 surveillance systems. As at March 06 2020, all member states had started trainings for HCWs for various roles in COVID–19 detection, contact tracing, data management, case management, and risk communication and community engagement. With exception of Ghana and Mali, all the remaining 13 (87%) member states had already included the private sector HCWs in their COVID–19 trainings. In Ghana and Nigeria, the Surveillance, Outbreak Response Management and Analysis System (SORMAS) which had already been deployed by the Helmholtz Centre for Infection Research (HZI) of Germany in collaboration with German Development Co-operation (GIZ) and ECOWAS/RCSDC had been updated with a COVID–19 module and being scaled up to cover at least 400 districts of over 85 million population. The Ghana Health Service and ECOWAS/RCSDC were supporting the scale up of this updated version of SORMAS to enhance real time case-base reporting and outbreak response management and assist with accurate mapping of cases and contacts (transmission chains) for efficient deployment of field workers and the positioning of needed response logistics and supplies.

Readiness of Rapid Response Teams

All 15 member states had functional Public Health Rapid Response Teams (RRTs). Except for Niger and Cabo Verde, the 13 (87%) other member states had started training their RRTs on contact tracing and conducted simulation exercises on COVID–19 outbreak response using adopted WHO protocols and tools. Following the trainings, member states developed country-specific tools for COVID–19case investigation,

contact tracing, case management, and risk communication. The RRTs of all member states were multidisciplinary and included: epidemiologists, surveillance officers, public health practitioners, physicians, nurses, paramedics, veterinary doctors, biomedical scientists and technicians, environmental health officers, risk communicators, psychologist, and health administrators.

Risk Communication

The ministries of health of member states were the lead state institutions for risk communication and community engagement on COVID–19. They coordinated communications across ministries and partners, and also across the different levels of subnational health administrations. All member states had trained professionals in risk communication who may be called upon to design and implement risk communication strategies and messages during crisis such as epidemics Table 2a. Similarly, they all had a coordination mechanism that involved relevant actors in risk communication. The list of partners, their contact details, roles and responsibilities were well spelt out in their respective national incident action plans. These communication response systems were able to quickly detect and respond to rumours, misinformation, myths, and frequently asked questions through monitoring of the various traditional and social media networks, hotlines, and reports of community workers. The most significant gap was the lack of a risk communication and community engagement (RCCE) plan. Only five (33%) of the 15 states viz. Benin, Ghana, Liberia, Mali, and Togo had RCCE plans. The representatives from other member states expressed the desire to adopt the RCCE plans from these sister states.

Points of Entries (PoEs)

Except Burkina Faso, Niger, and Cabo Verde, the remaining 12 (80%) of the member states had country-specific PoE public health emergency contingency plan, which can be used for potential COVID–19 events Table 2a. Nonetheless, all member states had oriented and trained staff working at PoEs on the appropriate methods for managing ill passenger(s) detected before boarding, on board conveyances such as planes, boats, and ships, and on arrival at PoEs. There was ongoing stockpiling of personal protective equipment (PPEs) at PoEs for screening all travelers. One common anticipated challenge of member states was that there may not be adequate rigor of screening at the diplomatic sections of the airports due to longstanding difficulties in getting politicians and other diplomats to strictly comply with safety protocols.

Except Burkina Faso and Cabo Verde, each of the remaining 13 (87%) of the member states had identified appropriate places at their PoEs for rapid health assessment and holding places for suspected COVID–19 cases. All member states had started screenings at airports as at March 01, 2020; and at seaports of the 12 (80%) member states that are not landlocked. With the exception of Carbo Verde, the remaining 14 (93%) of the member states had put in place mechanisms for transporting potential COVID–19 infected travelers safely to designated hospitals, including the identification of adequate ambulance services. All member states had some form of ground services for environmental cleaning and disinfection at PoE using a cleaning and disinfection protocol for potential COVID–19 events; but admitted that their systems needed more supervision to ensure satisfactory compliance.

Case Management

Six (40%) of the member states viz. Benin, Burkina Faso, Ghana, Ivory Coast, Mali, and Nigeria had medical teams trained on case management of severe acute respiratory infections (SARIs) Table 2b. These states had conducted some refresher orientation and reassessment of the availability and functionality of case management facilities and equipment. In the case of The Gambia, a one-day orientation training on case management of severe respiratory infections was planned for 40 general clinicians with support from WHO in the third week of March 2020. The remaining countries had similar plans of training but these were still at early stages of consideration. However, for all member states, there were ongoing country level efforts to make provisions for additional mechanical ventilation, N95 masks, surgical masks, gloves, and coveralls in addition to the pre-existing levels to cater for possible increase in the number of patients that would require intensive care. Eleven (73%) of member states had designated health facilities responsible for managing COVID–19 cases; the four exceptions were Burkina Faso, Cabo Verde, Niger, and Togo. None of the 15 member states had life and disability insurance for their frontline health workers at risk of acquiring COVID–19 and possible disability or death. However, Ghana was said to be considering this initiative as a part

of a number of motivational packages announced by the president for frontline workers who would be responding to the pandemic. All the 15 member states are at various levels of developing country-specific plans for patient placement and transportation based on patients´ COVID–19 clinical status. As at March 10, 2020, Sierra Leone had quarantined 94 suspected cases with epidemiological link to China - 67 of whom had completed 14 days monitoring.

Infection Prevention and Control

To minimize cross-infections, all member states had identified isolation for the management of COVID–19 patients. Health personnel who will be managing these cases were receiving refresher trainings in the appropriate use of personal protective equipment (PPEs), general best practices of standard precautions, and transmission-based infection prevention and control. Though all member states had protocols for environmental cleaning and disinfection, none of them was confident they had adequate numbers of trained personnel to correctly apply these protocols in events of environmental contamination with SARS-CoV-2. Also, none of the member states had a documented plan for the management of COVID–19 medical waste. Only three countries viz. Guinea, Liberia, and Sierra Leone were confident about the availability of trained safe burial teams with satisfactory community support to perform safe and dignified burials should this become necessary.

Logistics, procurement, supply management

Each of the 15 member states had a logistics & supply management focal person assigned to the COVID–19 response . These focal persons were part of the multidisciplinary national rapid response teams and were able to link with all pillars for supply forecasting. Each member state had a stock management system to ensure continual availability of appropriate logistics and their seamless distribution for COVID–19 response. All member states described their stock levels of COVID–19 supplies as scanty, and their transport and distribution systems as weak and incapable of supporting the demands of a potential pandemic of the scales witnessed in already affected countries in Asia and Europe.

Pandemic Preparedness Initiatives of ECOWAS Regional Centres for Surveillance and Disease Control (RCSDC) of WAHO

The pandemic preparedness initiatives of the ECOWAS Regional Centres for Surveillance and Disease Control (RCSDC) came in two broad categories namely: regional planning and coordination; and regional capacity strengthening and logistics support.

Regional Planning and Coordination - ECOWAS Intergovernmental Meeting

On the 14 February 2020, an emergency meeting of ECOWAS health ministers was held in Abuja. The overall objective of this high-level meeting was to harmonize regional strategies for preparedness for the prevention, early detection and control of a potential COVID–19 outbreak within the ECOWAS region. The ministers discussed both regional and country level preparedness in all response pillars with particular emphasis on: enhanced surveillance, case investigation, laboratory testing, contact tracing, risk communication and community engagement, case management, and infection prevention and control. Following engaging deliberations, the health ministers agreed that all response pillars needed both country level and regional support. They unanimously resolved specifically to:

-Strengthen coordination, communication, and collaboration among member states in preparedness for COVID–19, particularly in the area of cross-border collaboration;

-Enhance surveillance and enforce safety protocols for COVID–19, particularly at points of entry (air, land, and sea);

-Step up risk communication and community engagement to ensure that the public receives accurate, appropriate, and timely information regarding the pandemic;

-Urgently strengthen critical national capacities for diagnosing and managing cases;

-Develop a costed strategic regional preparedness plan based on member states´ priorities, to be funded by governments, with support from partners and the private sector;

-Promote multi-sectoral national efforts using the one-health approach to maximize effectiveness of response;

-Implement robust measures to ensure availability of critical medical supplies, including laboratory supplies, and personal protective equipment in the region; and;

-Work closely with the relevant authorities of national governments and the Chinese government to protect and monitor the health situation of ECOWAS citizens resident in China.

Regional Capacity Strengthening and Logistics Support

A regional laboratory training workshop was organized on February 27- 28, 2020. It provided hands-on training for biomedical scientists of member states on how to perform RT-PCR detection of SARS-CoV-2. They were also trained on the operationalization of test algorithms, biosafety and biosecurity (BSL-3) practice, and sample referral systems within, and among member states. The ECOWAS RCSDC supported member states in capacity building and logistics for screening and laboratory testing of all persons passing through all points of entries including land borders.

From March 05 to 06, the ECOWAS RCSDC in collaboration with the Africa CDC, organized a simulation exercise on COVID–19 for a total of 50 members of the ECOWAS Regional Rapid Response Team (ERRRT) with representations from all 15 member states. The team reviewed the principles of pandemic response with focus on the epidemiology of COVID–19. Based on the known epidemiology of COVID–19, the team discussed specific response strategies and revised preparedness and response cycle of the ERRRT´s standard operating procedures (SOPs) for COVID–19 response. Using role play, the team practiced community engagement, and the design and dissemination of risk communication messages to the general public, healthcare workers, and vulnerable populations such as women and children. The logistics support from the ECOWAS RCSDC to member states included: pieces of IPC supplies, screening equipment at PoEs, and test kits for SARS-CoV-2.

Discussion

In early 2020, all West African states were on high alert for the spread of COVID–19 to the region. The levels of their individual existing response capacities as well as their levels of readiness varied among them. Overall, the main strengths of member states and the region for that matter included: in country capacity to test, strong political support, the existence of incident management systems (IMS) and rapid response teams (RRTs), the availability of three tiers of skilled field epidemiology workforce, the availability of experienced public health practitioners able to adopt existing and new preparedness and response protocols to country-specific contexts, and their readiness to collaborate on cross-border surveillance and response. These strengths represent modest gains in health system resilience of the ECOWAS region as envisaged by WAHO and development partners following some investments in region [18-20].

On the other hand, the weaknesses of member states in their preparedness to respond to COVID-19 bordered more on varying levels of insufficiencies in the numbers of skilled human resource, and stocks of logistics and supplies - rather than a total lack. On human resources, there were inadequate numbers of: qualified biomedical scientists/technicians, field epidemiologists, risk communicators, and trained COVID-19 case management teams. For logistics and supplies, there were no stockpiles of sample collection supplies, diagnostic test kits, reagents, and personal protective equipment. On operational readiness, EOCs were not optimally functional, and the conduct of surveillance and contact tracing were largely paper-based. These weaknesses are testimony the concerns of global health stakeholders about the readiness of Sub-Sahara Africa to respond to a potential COVID-19 outbreak [21,22]. These weaknesses are also a reflection of longstanding poor financing of health systems aptly described by Otu and colleagues as "an epidemic of weak public financing" in their paper "Tackling COVID-19: Can the African continent play the long game?" because most African countries still spent below their former Abuja agreement of 15% public revenue on health - thereby hindering the establishment of resilient health systems capable of adequately responding to epidemics [23,24]. Another potential consequence of underfinancing health systems for a fast-spreading pandemic as COVID-19 is that the weaker health systems in the region will get overwhelmed very early in the response, and efforts get focused on hot spots and the critically ill to the detriment of a systematic enhanced testing and contact tracing to break transmission chains [25].

Though Cabo Verde and Liberia did not yet have the in-country capacity to test for COVID-19, through the strong collaborations orchestrated by WAHO, memoranda of understandings were in place for

member countries to support one another more seamlessly than would otherwise be. In this particular case of testing, Ghana tested for Liberia, and Senegal tested for Cabo Verde. In the meantime, Liberia and Cabo Verde were working assiduously to adopt their laboratories and train their biomedical scientists to kick-start in-country testing. In general, for all member states, more testing centres needed to be added and positioned strategically across each country to minimize potential delays in testing of samples that would arise from delays in transportation over long distances. Given the high infectivity rates of the severe acute respiratory syndrome corona virus 2 (SARS-CoV-2), delays in testing that would arise from inadequate numbers of testing centres and low testing surge capacity will be detrimental to early detection, isolation of cases, and initiation of contact tracing. Fortunately, the leadership of the Incident Management Systems of member states were aware of this potential setback and were each strategizing to forestall it with technical and logistic support from the WHO, WAHO, and international partners. Ghana already used a drone system to transport emergency medicines, blood, and other medical supplies across the country. This existing capacity positioned Ghana well to facilitate the speedy transport of COVID-19 samples to the two existing testing centres located in the southern and middle belts of the country. For a start, following a hands-on training of biomedical scientist on RT-PCR diagnostic testing methods for SARS-CoV-2, WAHO supplied test kits to participants as they return to their countries. Essentially, should encourage them to increase their index of suspicion for COVID-19 cases and start testing cases that met the suspected case definition.

Aside delays in testing, the availability of trained contact tracers in adequate numbers will be key to early contact identification, listing, and follow up monitoring. Trainings on COVID-19 contact tracing were taking place at national levels and expected to cascade to subnational levels in due course to augment the numbers and create a surge capacity in anticipation for the worst. Member states such as Liberia, Guinea, Sierra Leone, and Nigeria that had experienced the recent Ebola Virus Disease (EVD) outbreak were probably in a better position to build their surge capacity more quickly compared to their sister states. However, owing to the much-decentralized public health systems in all member states, community health workers and community-based surveillance volunteers have had longstanding experiences in following up cases of priority infectious disease such as poliomyelitis, tuberculosis, Lassa fever, and non-communicable diseases such as child malnutrition. Thus, there were existing systems that could easily be augmented with appropriate training and retooling for COVID-19 contact tracing.

Since its establishment in 1987, WAHO has always acknowledged the dire need to develop a skilled workforce in all aspects of disease surveillance, prevention, and control so as to improve the efficiency of containment of outbreaks at source, and in the worst-case scenarios, rally all resources within the region to affected member states to support response and prevent spill overs across borders. In particular, WAHO with support from the World Bank, US CDC, and other international partners supported the role out of field epidemiology and laboratory training programmes (FELTPs) across the region in all three tiers viz. frontline, intermediate, and advance [26,27]. This cadre of workforce receive on-the-job field epidemiology competency training with particular focus on surveillance system design and evaluation, outbreak response, and data management as recommended by the WHO and US CDC for bridging a critical skill gap in public health emergency response [27-28]. The particular strategic relevance of this skilled cadre of workforce has been aptly described by Mutabaruka and colleagues in their paper: "The West Africa Field Epidemiology and Laboratory Training Program, a strategy to improve disease surveillance and epidemic control in West Africa" [27]. As they were in the West Africa Ebola Virus Disease outbreak - especially in Liberia and Nigeria, these FETP graduates and residents will once again be a great asset to the ECOWAS region in supporting an effective COVID-19 pandemic response through skillful case investigation, contact tracing, and outbreak data management [30-32].

In the face of shortages in the numbers of skilled public health workforce, and coming to terms with the reality that population growth and the rise in burden of emerging and re-emerging infectious diseases will always outpace the rates of increase in workforce to population ratio, adopting innovations such as the use of digital tools for surveillance and outbreak response is the way forward to consolidating the gains made so far in promoting the ECOWAS regional health security in particular, and global health security in general. During the West Africa EVD outbreak, the ECOWAS Regional Centres for Surveillance and Disease Control (RCSDC) seized the opportunity to collaborate with the Helmholtz Centre for Infection Research (HZI) of Germany with financial support from the German

International Co-operation (GIZ) to develop and deploy the mobile eHealth tool called SORMAS (Surveillance, Outbreak Response Management and Analysis System) which facilitated early case detection, contact tracing, and real-time data analysis that helped to efficiently contain the outbreak in Nigeria [33]. SORMAS was initially deployed in 22 federal states (448 local government areas) in Nigeria; and 2 regions (35 districts) in Ghana [34]. In the wake of COVID-19 threat, trainings were underway for total nationwide deployments of SORMAS in Ghana and Nigeria, while plans of piloting the tool in other West African countries were taking shape [35]. It is envisioned that the launch of the "Support to the Regional Centre for Surveillance and Disease Control in the ECOWAS zone" project which integrates the European Union´s contribution to the already running GIZ-funded regional pandemic prevention project in the ECOWAS zone (RPPP), will facilitate the speedy deployment of SORMAS in some more West African states [36].

The results of our survey revealed that there is a lag in development of COVID-19 risk communication plan compared to other response pillars. As at March 06, 2020, only Benin, Ghana, Liberia, Mali, and Togo confirmed the readiness of their country-specific risk communication plans. For outbreaks of diseases such as COVID-19 where definitive medical interventions do not exist, risk communication and social mobilization are priceless interventions in identifying local risk factors so as to minimize exposure, reduce infection rates, and stem the spread of the outbreak [37]. Among other tasks, social mobilization will involve community engagement in the design and dissemination of vigorous health?information campaigns to raise awareness and educate people about the measures needed to protect individuals, families, and communities [38]. Lessons documented, and hopefully learned from responding to past infectious disease outbreaks such as the West Africa EVD are that outbreaks are better contained when: communities are effectively engaged in a bottom-up approach; the local context and risk perceptions inform the design of risk communication messages; and communities are actively involved in the control and prevention activities so as to increase the acceptance and sustainability of preventive and mitigation behaviours even after the outbreaks [39-41]. Getting the community and all stakeholders to participate actively in the outbreak response therefore calls for attention in identifying culturally appropriate and socioeconomically feasible risk reduction strategies and activities [42]. As a threat to this "whole society approach", West African states have raised concerns about poor cooperation from politicians and diplomats who tend to expect waivers in the application of the safety protocols at points of entry in general, and airports in particular. The overwhelming evidence so far is that, COVID-19 - just like other infectious diseases, does not respect diplomatic immunity. Hence, the Incident Management Systems (IMS) of member states are encouraged to draw the attention of law enforcement agencies to tighten this lose end that posed a risk of importing COVID-19 to their countries. Risk communication on the global level also needs to be uniform and concerted. For example, the ongoing controversies and widespread media debates on the place of face masks in reducing spread of COVID-19 is a low point in our risk communication efforts and likely reduce public confidence in expert recommendations, and detract from compliance with other related control measures [43].

The simulation exercise that was organised by the ECOWAS RCSDC provided a unique opportunity for partners and representatives of all member states to discuss strategies for improving coordination, communication and collaboration for a collective regional response to COVID-19 in West Africa. Representatives of member states were expected to replicate these simulation exercises and update their respective country-specific SOPs to align with the regional SOPs so as to facilitate smooth region wide coordination. In addition, all these preparedness trainings conducted by the ECCOWAS RCSDC created the opportunity for lead response officers from member states to network and to support one another in less bureaucratic ways towards the ultimate goal of an effective regional response.

West Africa´s response to the COVID-19 pandemic would serve as a litmus test on whether or not the lessons documented from the EVD outbreak have been learnt and hence served their purpose of better preparing the ECOWAS region for effective epidemic response [41,44,45]. It is also expected that, the efficiency and quality of the response would vindicate the amount of investment put into all the pillars of pandemic preparedness and response infrastructure and capacity building for the ECOWAS region in the last decade by governments of member states on the one hand, and the many international partners on the other. In addition to the good will and legislative support from governments of member states, a significant financial support to the preparedness activities will prove crucial in the effectiveness of the response. The government of

Ghana had already declared 100 million USD as an initial support to preparedness; part of which will go into insuring frontline healthcare workers against the risk of infection, COVID-19 related complications and death [46,47]. Failure to invest in the protection of frontline health workers carries the high risk of depleting it, causing fear and panic among the remaining workforce, weakening the response, protracting pandemic and its associated health and socioeconomic costs [48,49].

In line with the unanimous resolutions made at the high level inter-ministerial meeting in Abuja on how to prepare the region for the pandemic, WAHO was actively engaging governments of member states to honour their commitments of support for the preparedness efforts in order to avert the potential human and economic losses that were unfolding in the Asia and Europe [50]. That said, the ECOWAS region recognizes that its efforts at building a formidable front is a useful as the overall global response efforts which in the words of Ebrahim et al., must take an "All hands on deck" and "a synchronized whole-of-world approach"[25]. Thus, a concerted response in all forms is required of all governments, global health organisations, private actors in the health industry, individuals, and the general public - for none is safe if one is not [21,46].

Study Limitations

Due to delays in obtaining data from all member states within the data collection period, the most updated state of response activities of all member states may not reflect in this paper at the time of submission for publication. Some sub-requirements of each of the 9 broad capacity areas for which definite data was not available at the time of study posed a limitation on a complete assessment of capacity status of states. However, this limitation was mitigated to some extent by explanatory data from in-depth interviews that have been presented in text under thematic areas. The insufficiencies in workforce, logistics, and supplies could not be quantified due to non-available of data on these within the study period.

Conclusion

West African states have made good efforts in all emergency response pillars to prepare for the COVID-19 pandemic. Governments of member states have attached seriousness to the preparedness activities but are unlikely to be capable of providing all the required funding without external support from international partners. The training of field epidemiologists through the FELTPs, and the deployment of SORMAS for real time routine surveillance and pandemic response by WAHO and partners will prove useful in the pandemic response and should be scaled up. The responsiveness of member states to the technical support and regional coordination strategies of WAHO for the COVID-19 preparedness activities is commendable. Overall, the regional coordination and resource pooling among member states spearheaded by WAHO has shown early promise of mounting an effective regional COVID-19 response.

What is known about this topic

- The coronavirus disease 2019 (COVID-19), was first described as a novel respiratory disease among a cluster of pneumonia cases with unknown aetiology
- The causative agent was characterized by genomic sequence analysis and named by the World Health Organization (WHO) as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)
- As a sub region, West Africa recorded its first case in Nigeria on February 27, 2020.

What this study adds

- Governments of member states have attached seriousness to the preparedness activities but are unlikely to be capable of providing all the required funding without external support from international partners
- The responsiveness of member states to the technical support and regional coordination strategies of WAHO for the COVID-19 preparedness activities is commendable
- Overall, the regional coordination and resource pooling among member states spearheaded by WAHO has shown early promise of mounting an effective regional COVID-19 response

Competing interests

The Authors declare no competing interests.

Authors' contributions

VKL and BBK contributed equally to this paper. Conceptualization: VKL. Study design: VKL, BBK, DAB, EK, AO, EJ, FAB, SKA, IS, DTS, EMO. Data collection: BBK, AO, VKL, SKA. Data analysis: BBK, DAB, EK AO, VKL, EMO, DTS. Drafting of initial draft of manuscript: BBK, VKL, AO, DAB. Internal review of manuscript: EK, EMO, IS, DAB, SKA, EJ, FAB, VKL, DTS, BBK. All authors read and approved of the final version of the manuscript.

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Tables

Table 1: Capacities of West African States to Detect COVID-19 per WHO National Capacity Assessment Tool, March 2020

Table 2a: Capacities of West African States to Respond to COVID-19 per WHO National Capacity Assessment Tool, March 2020

Table 2b: Capacities of West African States to respond COVID-19 per WHO National Capacity Assessment Tool, March 2020

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Table 1: Capacities of West African States to Detect COVID-19 per WHO National Capacity Assessment Tool, March 2020

State	National Laboratory Systems			Surveillance and Risk Assessment						Rapid Response Team		
	Capacity to test for COVID-19*	Completed laboratory readiness assessment	Completed incident action plan with surge in laboratory capacity	Activation of national and subnational epidemic response teams	Enforcement of COVID-19 protocols at airports and sea ports	Enforcement of COVID-19 protocols at land borders and ground crossings	Existing and functional surveillance systems for influenza-like illnesses (ILIs)	Inclusion of private sector HCWs in COVID-19 response trainings	Use of real-time surveillance and outbreak managements tools	Existence of functional Public Health Rapid Response Teams (RRTs)	Multidisciplinary composition of RRTs based on the One Health approach	Ongoing simulation exercises on COVID-19 response for RRTs
Benin	✓	✓	✓	✓	✓	✗	✓	✓	✗	✓	✓	✓
Burkina Faso	✓	✓	✓	✓	✓	✗	✗	✓	✗	✓	✓	✗
Cabo Verde	✗	✗	✓	✓	✓	✗	✗	✓	✗	✓	✓	✓
Gambia	✓	✓	✓	✓	✓	✗	✓	✓	✗	✓	✓	✓
Ghana	✓	✓	✓	✓	✓	✗	✓	✗	✓	✓	✓	✓
Guinea	✓	✓	✓	✓	✓	✗	✓	✓	✗	✓	✓	✓
Guinea-Bissau	✓	✓	✓	✓	✓	✗	✓	✓	✗	✓	✓	✓
Ivory Coast	✓	✓	✓	✓	✓	✗	✓	✓	✗	✓	✓	✓
Liberia	✗	✗	✓	✓	✓	✗	✗	✓	✗	✓	✓	✓
Mali	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✓	✓
Niger	✓	✓	✓	✓	✓	✗	✓	✓	✗	✓	✓	✗
Nigeria	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓
Senegal	✓	✓	✓	✓	✓	✗	✓	✓	✗	✓	✓	✓
Sierra Leone	✓	✓	✓	✓	✓	✗	✓	✓	✗	✓	✓	✓

Togo	✓	✓	✓	✓	✓	✗	✓	✓	✗	✓	✓	✓
Regional: Member States (n=15) with capacity n (%)	**13 (87)**	**13 (87)**	**15 (100)**	**15 (100)**	**15 (100)**	**0 (0)**	**12 (80)**	**13 (87)**	**2 (13)**	**15 (100)**	**15 (100)**	**13 (87)**

Sub-requirements of each of 9 broad capacity areas for which definite data was not available at the time of study are not included on the summary table.

** The availability of at least one laboratory in the country that can perform a PCR test for COVID-19.*

Table 2a: Capacities of West African States to Respond to COVID-19 per WHO National Capacity Assessment Tool, March 2020

State	Command and Coordination						Risk Assessment			Point of Entry				
	Operational national action plan for public health emergencies	Availability of dedicated national funding for surveillance and outbreak response	Established coordinated multisectoral response team	Secured legal basis for quarantine and restriction of movement should it become necessary	Availability of functional emergency operating centers (EOC)	Availability of at least one designated quarantine facility	Available risk communication professionals capable of design and dissemination of appropriate messages to the general and various subpopulations	Existence of some coordination and communication response mechanisms that scan social and traditional media and response to rumours, misinformation, myths, etc.	Availability of documented risk communication and community engagement (RCCE) plan	Existence of country-specific point of entry (PoE) public health emergency contingency plan adoptable for COVID-19 response	Conducted of training staff of air and sea PoEs on COVID-19 protocol	Identified appropriate places for rapid health assessment of passengers and holding places for suspected COVID-19 cases	Existence of mechanisms for identification of ambulances and safely transporting suspected COVID-19 cases from PoEs to designated hospitals	Availability of ground services for environmental cleaning and disinfection of per COVID-19 disinfection protocol
Benin	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Burkina Faso	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓	✗	✓	✓
Cabo Verde	✓	✗	✓	✗	✗	✓	✓	✓	✗	✗	✓	✗	✗	✓
Gambia	✓	✓	✓	✗	✗	✗	✓	✓	✗	✓	✓	✓	✓	✓
Ghana	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Guinea	✓	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓
Guinea-Bissau	✓	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓
Ivory Coast	✓	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓
Liberia	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mali	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Niger	✗	✓	✓	✗	✓	✓	✓	✓	✗	✗	✓	✓	✓	✓
Nigeria	✓	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓
Senegal	✓	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓
Sierra Leone	✓	✓	✓	✗	✓	✓	✓	✓	✗	✓	✓	✓	✓	✓
Togo	✓	✗	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Regional: Member States (n=15) with capacity n (%)	**14 (93)**	**12 (80)**	**15 (100)**	**4 (27)**	**13 (87)**	**14 (93)**	**15 (100)**	**15 (100)**	**5 (33)**	**12 (80)**	**15 (100)**	**13 (87)**	**14 (93)**	**15 (100)**
Sub-requirements of each of 9 broad capacity areas for which definite data was not available at the time of study are not included on the summary table.														

Table 2b: Capacities of West African States to respond COVID-19 per WHO National Capacity Assessment Tool, March 2020										
State	**Case Management**			**Infection Prevention and Control**			**Logistics, Procurement, and Supply Management**			
	Availability of trained medical teams for managing severe acute respiratory infections (SARIs)	Availability of designated health facilities for managing COVID -19 cases	Completed country-specific plan for COVID-19 patient placement and transportation based on clinical status	Identification of isolation centers for management COVID-19 cases	Documented plan for managing COVID-19 medical waste	Availability of trained safe burial teams with community acceptance and support to conduct safe and dignified burials for COVID -19 deaths	Availability of logistics and supply management focal person for COVID -19 within the multidisciplinary response team	An existing stock management system	Availability of adequate stock levels of COVID -19 supplies capable of supporting an outbreak of the scale in already affected countries	Existence of adequate logistics transportation and distribution capable of supporting an outbreak of the scale in already affected countries
Benin	✓	✓	✗	✓	✗	✗	✓	✓	✗	✗
Burkina Faso	✓	✗	✗	✓	✗	✗	✓	✓	✗	✗
Cabo Verde	✗	✗	✗	✓	✗	✗	✓	✓	✗	✗
Gambia	✗	✓	✗	✓	✗	✗	✓	✓	✗	✗
Ghana	✓	✓	✗	✓	✗	✗	✓	✓	✗	✗
Guinea	✗	✓	✗	✓	✗	✓	✓	✓	✗	✗
Guinea-Bissau	✗	✓	✗	✓	✗	✗	✓	✓	✗	✗
Ivory Coast	✓	✓	✗	✓	✗	✗	✓	✓	✗	✗
Liberia	✗	✓	✗	✓	✗	✓	✓	✓	✗	✗
Mali	✓	✓	✗	✓	✗	✗	✓	✓	✗	✗
Niger	✗	✗	✗	✓	✗	✗	✓	✓	✗	✗
Nigeria	✓	✓	✗	✓	✗	✗	✓	✓	✗	✗
Senegal	✗	✓	✗	✓	✗	✗	✓	✓	✗	✗
Sierra Leone	✗	✓	✗	✓	✗	✓	✓	✓	✗	✗

Togo	✗	✗	✗	✓	✗	✗	✓	✓	✗	✗
Regional: Member States (n=15) with capacity n (%)	**6 (40)**	**11 (73)**	**0 (0)**	**15 (100)**	**0 (0)**	**3 (20)**	**15 (100)**	**15 (100)**	**0 (0)**	**0 (0)**
Sub-requirements of each of 9 broad capacity areas for which definite data was not available at the time of study are not included on the summary table.										