

Research Article

Reported health system solutions implemented to contain COVID-19 in six West African countries: a media content analysis

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Background

When COVID-19 began to spread globally, concerns for high morbidity and mortality rates in West African countries started to grow. Nevertheless, West African countries have had lower morbidity and mortality rates than other countries in the world. Little research has been done to investigate what health system solutions these countries implemented to decrease COVID-19-related morbidity and mortality rates earlier in the pandemic.

Methods

We performed a content analysis of highly circulated news organizations in 6 West African countries (Ghana, Sierra Leone, Liberia, Nigeria, Niger, and Guinea) to identify health system solutions implemented in the early months of the pandemic. The news articles were analyzed in Dedoose, using a thematic approach based on the World Health Organization's 6 health system building blocks for pandemic and epidemic preparedness and management.

Results

We reviewed a total of 4,388 news articles, of which 1,437 excerpts focused on health system solutions. Health system solutions implemented in the selected countries varied. However, technological innovations, new national and multi-country collaborations and funding mechanisms, repurposing of existing resources and facilities, medical treatment experimentations, and enforceable regulations were all commonly used health system strategies. Nevertheless, limited local attention and resources were directed towards vaccine development.

Conclusions

The health system strategies identified in this study can be beneficial for African nations and other countries in overcoming future health emergencies.

In the early months of the COVID-19 pandemic, West African countries including Ghana, Sierra Leone, Niger, Liberia, Nigeria, and Guinea were expected to be hit hard by the virus in comparison to more developed regions such as North America and the United Kingdom.¹ Although most

West African countries had previous experience managing the Ebola epidemic, there were still concerns that the financial resources necessary to combat yet another large-scale health crisis were lacking.^{2,3} In addition, concerns were raised about the ability of these countries to provide qual-

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ity healthcare services and treatments due to weak and under-resourced health infrastructures.⁴ Countries also feared the possibility of higher COVID-19 mortality rates in this region due to existing chronic diseases such as diabetes and hypertension.⁴

As of August 2021, the region of West Africa has reported 456,958 COVID-19 cases resulting in 6,036 deaths.⁵ Incidence rates are 14 times lower than the global incidence rate, while fatality rates are 1.7 times lower than global rates.^{5,6} Statistical data also shows that since the onset of COVID-19 in December of 2019 until May of 2020, cases in Africa comprised approximately 1% of the reported global burden, which was significantly lower than that of North America, Asia, and Europe.⁷

There are various explanations for the lower spread and severity of the disease in Africa compared to other regions of the world. The relatively younger population with lower rates of chronic disease, limited testing and surveillance capacities resulting in an underestimation of true morbidity and mortality rates, milder symptoms experienced by affected individuals, and cross-reactivity against current COVID-19 strains due to prior exposure to other coronaviruses have all been cited as possible explanations.^{4,8–10} Recent evidence also proposes that the experience with previous health crises may have also played a role in reducing the number of cases and deaths.¹¹ What has received less empirical investigation in the literature is the health system solutions West African countries used to tackle the pandemic in the initial months following the onset of the pandemic.

The World Health Organization (WHO) created a health system framework consisting of 6 building blocks: (1) service delivery, which involves the usage and organization of patient-centered medical resources, equipment, prevention, and other services; (2) health workforce, in which a “well-performing” country has a responsive and productive supply of educated health workers readily available at all times; (3) information, which includes the development of health information, surveillance systems, and standardized tools and instruments, as well as the collation and publication of international health statistics; (4) medical products, vaccines, and technologies, and their procurement and utilization to protect populations from health disparities; (5) financing, which involves raising adequate funds both internally and through outside sources to ensure people have access to necessary health services and are protected from catastrophic health expenditures (CHE) or impoverishment; and (6) leadership and governance, which encompasses governments to build coalitions, work with external actors, and develop policies to assist the health system in protecting citizens.⁹

To our knowledge, the framework has not been systematically and extensively used to delve into the health system response to COVID-19 in West Africa, or elsewhere. The purpose of this study was to leverage the WHO framework to identify the different facets of health systems solutions implemented by West African countries during the early stages of the COVID-19 pandemic. The findings can be used not only to address future pandemics, but they can

also inform solutions to tackle existing health system constraints in West Africa.

METHODS

This study was an exploratory media content analysis using online media sources from news organizations that provide up-to-date information on major events, including the COVID-19 pandemic. The media analysis followed the standards for reporting qualitative research.¹² To select countries, each of the 16 West African countries were ranked by COVID-19 incidence and case-fatality ratios at the time of the study, 02 June, 2020 (*Tables S1 and S2* in the **Online Supplementary Document**). Each country was then categorized based on Ebola case history as (no Ebola, moderate Ebola, or high Ebola countries). For accessibility purposes, countries with at least two available online sources (in English or French) were selected. Maximum variation sampling was then done to select only 6 of the 16 countries with the highest range in COVID-19 and Ebola experience. The final countries selected were Ghana, Guinea, Liberia, Niger, Nigeria, and Sierra Leone. Two online news sources with the highest circulation number were selected for each country. Circulation numbers were used as a proxy for popularity and readership. News sources are listed in *Table S3* in the **Online Supplementary Document**. Although some online sources did not list ownership (private or public) or circulation numbers, these sources were still used based on the number of articles published and their popularity as listed by other sites.¹³

All news articles published from 01 January to 30 June, 2020 containing the key search terms: COVID-19; COVID; Coronavirus; Coronavirus-19; nCov-19; SARS-CoV-2; Corona; Coronavirus-2019; and pandemic were downloaded directly from each news site and imported into Dedoose Version 8.0.35.¹⁴ Articles published in French were translated to English using the Adobe translate plug-in before being uploaded into Dedoose. The accuracy of the translated articles was verified by French speaking team members. Each article was given a unique identifier, using their country of origin and a number (ex. Sierra Leone Article #13, SL-C0013).

DATA PROCESSING AND ANALYSIS

Coding was done using both deductive and inductive methods. Deductive codes were created from the WHO's frameworks on managing epidemics and health systems titled *Everybody's Business: Strengthening Health Systems to Improve Health Outcomes* and *Managing Epidemics*.^{9,15} The blueprints laid out in these documents provided a method to evaluate the effects of the pandemic on the 6 main blocks of a health system and create codes in relation to them. Additional codes were created inductively by the team. 40 articles were randomly selected to create the inductive codes, and were subsequently refined as the coding process evolved.

After a codebook was created, each team member was required to learn and thoroughly understand the codes, as

well as complete a practice coding evaluation. They had to receive a kappa score of 0.80 or above before coding further articles. Any disagreements between team members on applications of codes were discussed and resolved with the help of other coders.

Excerpts selected for inclusion were chosen based on representation of the respective health system block and comprehensiveness in relation to length and content of each excerpt.

ETHICAL CONSIDERATIONS

Ethical approval was not required for this study, for all data was obtained from news sources freely available for the public to view.

RESULTS

A total of 4,388 news articles were reviewed, and there were a total of 1,437 excerpts from news articles that reported on solutions to support health systems in the selected West African countries (Tables S4, S5 and S6 in the Online Supplementary Document).

LEADERSHIP SOLUTIONS

The analysis of 499 excerpts demonstrated the presence of strategic leadership to strengthen the health systems of selected countries during the pandemic. Leadership came from both non-governmental professionals and institutions as well as public officials. The forms of leadership identified were collaboration, establishment of regulations, and the creation of task forces. Collaboration within countries took on two forms. First, government officials collaborated with institutions, researchers, and healthcare professionals to study the virus, increase awareness, and prevent disease spread (GU-C0287F; LI-C0801E; NR-C0224F; NA-C0265E). Second, collaboration occurred between professionals without government affiliation. In Guinea, for example, news sources reported that a Scientific Council consisting of professors, doctors of different disciplines, researchers, and trainees was created to respond to the pandemic (GU-C0860F). In Nigeria, news sources mentioned that teaching hospitals collaborated with one another to expand care to more COVID-19 patients (NA-C0999E; NA-C0794E).

The establishment of regulations on the wearing of face masks and on movement was an additional tool that governments used to protect against the virus. Government agencies in all countries enforced mask mandates (GU-C0513F; GH-C0726E; LI-C0790E; NR-C0224F; NA-C0373E; SL-C0367E). In Ghana, the refusal to wear a mask was made punishable by imprisonment of four to ten years or by fines ranging from GH¢12,000 to GH¢60,000 (GH-C0726E). Other countries, such as Guinea, reportedly utilized military forces to enforce mask wearing in public spaces (GU-C0513F). According to news reports, all selected countries, with the exception of Liberia, closed national borders to contain the spread of the virus (GU-C0145F; NR-C0199F; SL-C0536E). Guinea, Niger, and Sierra Leone imposed cur-

fewes which restricted movement within the country to designated times (GU-C0145F; NR-C0199F; SL-C0536E).

Most countries relied on task forces to manage the pandemic. The role of these task forces as documented in the articles ranged from surveillance (LI-C069E; NA-C0825E; SL-C0377E), to health education on COVID-19 measures and symptoms (GH-C0538E; LI-C0521E), to communication using press releases (NA-C1110E; NA-C0206E).

SERVICE DELIVERY SOLUTIONS

The analysis of 107 excerpts showed selected countries grappled with delivering COVID-19 related services. At the core of national responses, the analysis identified three main service delivery solutions: expanding testing, isolation, and treatment capacities. Approaches to support service delivery, although predominantly led by governments, were complemented by financial contributions from businesses, local organizations, and foreign governments.

The strategy to expand testing, isolation and treatment appeared consistently across all countries. Existing infrastructure was often repurposed to meet increased health care needs and new testing, treatment, and isolation centers were constructed (GU-C0535F; GH-C0739E; NA-C0923E; SL-C0536E; GH-C0195E; NR-C0138F; SL-C0064E). For example, Guinee7 reported that Guinea expanded COVID-19 treatment to prisons by building a 300-bed care center in Conakry prisons (GU-C0998F). In Liberia, existing facilities were renovated using government funds (LI-C0750E).

Other than the human resource and facility driven solutions, transportation innovations were used in some countries to improve access to care and patient safety. Guinee-News documented that COVID-19 patients began to be *"accompanied by the police or the gendarmerie if possible in order to bring all the patients of the Covid-19 to the care structures"* which helped patients to be able to get to hospitals quicker and more safely (GU-C0344F). Other transportation innovations were reported to have occurred in Nigeria, as an emergency ambulance system was set up to aid in responses to those who needed assistance (NA-C0789E). In Ghana, the government utilized military drones to distribute medical supplies to hard-to-reach communities (GH-C0029F).

HEALTH WORKFORCE SOLUTIONS

After reviewing 74 excerpts, two common themes emerged as health workforce solutions: expanding availability and accessibility of health workforce and increasing quality and empowerment of health workforce.

In all selected West African countries, reports from newspaper articles indicated that governments made efforts to improve availability of health workers in various communities. Strategies included: (1) recruiting retired health professionals, such as in Ghana and Liberia (GH-C0063E; GH-C0062E; LI-C0639E); (2) hiring new health workers, including training medical students to support COVID-19 response, such as in Ghana, Nigeria, Guinea, and Liberia (NA-C0159E; GH-C0574E; LI-C0639E; GU-C0254F).

and (3) receiving support from foreign medical personnel from Cuba, Lebanon, and China to augment their workforce such as in Guinea, Sierra Leone, and Niger (GU-C0826F; SL-C0490E; GU-C0518F; GU-C0520F; NR-C0083F).

Besides the government's own efforts, both local organizations and foreign countries also contributed to expanding the health workforce in the selected countries. The Red Cross society in Liberia reportedly deployed their volunteers to support health workers in case detection and management (LI-C0760E). Other health workers were deployed into communities for case detection and management by various additional local organizations (LI-C0702E; GH-C0806E; SL-C0176E; GU-C0395F; NA-C0999E). In Liberia, it was even reported that some local organizations offered to provide stipends and other incentives, including PPE and medical supplies for health workers to work in their catchment communities.

"In the fight against this global pandemic, the organization is committed to supporting the County Health team in providing stipends for 6 health workers to be assigned to our catchment communities" (LI-C0698E).

Further, foreign countries like Cuba, China and Lebanon came to the aid of Guinea and Niger by augmenting their workforce with medical experts (GU-C0826F; SL-C0490E; GU-C0518F; GU-C0520F; NR-C0083F).

"National spokesperson for the COVID-19 Response Team Solomon Jamiru has confirmed that a team of eight (8) medical doctors and coordinators from Lebanon arrived on Friday 19th June to assist in the fight against coronavirus" (SL-C0490E).

Efforts were made within each country to improve the overall quality of the health workforce by motivating health personnel and enhancing their knowledge and capacity to treat patients.

Motivating health workers and enhancing the quality of care relied on a combination of financial incentives (e.g. salary increases, hazard allowances, transportation, support for families of health workers), showering commendation on health workers, and implementing training programs (e.g. virtual programs, training pamphlets, documentaries) (GH-C0041E; NA-C0925E; GU-C0700F; NA-C1076; NR-C0209F). In Nigeria, for example, Vanguard reported *"President Muhammadu Buhari approved over N20 billion as three months hazard allowance for health workers on the frontline to contain coronavirus pandemic in the country"* (NA-C0025E). In Liberia, some local organizations were reported to have provided stipends, medical supplies, PPE, and other incentives for health workers to serve their communities (LI-C0698E).

Training programs to enhance health worker case detection management were also reported on in all the selected countries (GH-C0041E; NA-C0925E; GU-C0700F; LI-C169E). Some of these training programs were virtual, while in other cases, documentaries and pamphlets on the prevention of the virus were distributed to health workers (NA-C1076E; NR-C0209F).

Newspapers in all selected West African countries except Guinea published reports of commitments made by governments and non-government organizations to empower health workers to fulfill their duties. Articles in Nigeria reported donations of medical equipment along with public commendation of health workers by government and international representatives as well as a call for the public to support their efforts (NA-C0780E). There were reports of increases in salaries and emoluments, provisions of insurance packages, transportation arrangements, hazard and risk allowances, and support for families of health workers who have been affected by COVID-19.

"President Muhammadu Buhari approved over N20 billion as three months hazard allowance for health workers on the frontline to contain coronavirus pandemic in the country" (NA-C0025E).

MEDICAL PRODUCTS, VACCINES, AND TECHNOLOGY SOLUTIONS

There were 145 excerpts that outlined the solutions implemented to improve medical products, vaccines and technology. The solutions drew on collaboration, technological innovation, and a search for new treatments. The majority of the excerpts identified in the news articles mentioned efforts to expand the availability of and access to medical products through mass production and targeted distribution. For instance, Guinea's National Agency for Economic and Social Inclusion, as part of its national phased plan, delivered medical products and hygiene supplies to districts across the country, targeting areas most affected by the virus (GU-C0506F).

Collaboration was further emphasized in the solutions countries pursued to find treatment for COVID-19. For instance, A Niamey reported on a Pan-African collaboration called the African Medical Supplies Platform, an online initiative of the African Union (AU). Through this platform, the AU sought to *"tackle shortages and security of supply, ensure price competitiveness and purchasing transparency, and [enable] governments [to] access the services of certified and quality suppliers"* (NR-C0203F).

Reports on herbal treatment for COVID-19 largely focused on the Neem Plant in Madagascar. International health entities later discredited and advocated against its use. Nevertheless, Niger and Liberia reported that clinical trials were still underway to test the efficacy and safety of this treatment (NR-C0108F; LI-C0132E). The pandemic also spurred experimentation with and mass production of both biomedical and herbal remedies to COVID-19 locally. Nigeria, for example, was reported to have been developing and testing their own alternative treatment, CVD Plus (NA-C0604E; NA-C0601E). In May 2020, news articles reported that Ghana was set to mass produce hydroxychloroquine and azithromycin, despite WHO disapproval (GH-C0400E). Similarly, Niger maintained the use of these drugs due to no alternative treatments, as indicated by A Niamey (NR-C0184).

Several news articles noted technological innovations to support health service delivery. To mention a few, in both

Nigeria and Guinea, 3D printers were utilized to produce facemasks. (NA-C0604E; GU-C0424F; GU-C0534F). The *Ghanaian Times* reported on solar-powered hand washing machines as another unique innovation used to promote the continuation of hygienic practices during COVID-19 (GH-C0156E; GH-C0552E). The *Daily Graphic* announced that research institutions in Ghana were reported to have developed new tools to test for COVID-19 and treat COVID-19 patients:

"In another development, researchers at the Kwame Nkrumah University of Science and Technology (KNUST) and Incas Diagnostics in the Ashanti Region have, in partnership with scientists from the Kumasi Centre for Collaborative Research (KCCR), developed a rapid test kit for the COVID-19. Relatedly, a number of institutions have also come up with prototype ventilators that could be used to manage COVID-19 patients." (GH-C0552E)

HEALTH INFORMATION SOLUTIONS

There were 63 excerpts from the news articles which related to solutions to improve health information among the studied West African countries, including methods of communicating about new medical products and technologies, managing misinformation, and analyzing and disseminating COVID-19 information. The articles also need to maintain confidentiality by not disclosing patient identifiers but rather sharing the name of the affected communities (LI-C052E; NA-C0863E). The dissemination of COVID-19 information was the most covered in news reports and appeared expansive and innovative in approaches and platforms. Ghana, Nigeria and Guinea used campaigns, hosted open discussions and debates, set-up coronavirus information centers, created toll-free health lines, employed and trained peer educators from local communities, and issued press releases (GU-C1104F; GU-C0911F; GU-C0783F; NA-C0092E; GH-C0472E; NA-C1110E; NA-C0206E). Government officials also shared information using websites, television programs, radio shows, and print media (GU-C0096F; GU-C0078F; SL-C0051E). Mobile communications like motorbike rallies, speakers attached to vehicles, banners, t-shirts, and stickers printed with preventive instructions were also used (GU-C0156F; GH-C0420E; SL-C0060E).

To manage misinformation, government agencies reportedly collaborated with media outlets to promote credible information centers. In Sierra Leone, the *Awoko* newspaper reported that the country joined Facebook Coronavirus Information Center to manage misinformation (SL-C0240E). Guinea and Ghana dispelled misinformation through the creation of a health line. They also were reported to have urged media personnel to maintain their credibility and not to create confusion by promoting misinformation (GU-C0783F; GH-C0472E; GU-C0202F). Another initiative was the BBC Africa COVID-19 minute bulletin, which provided valuable tips and dispel misinformation in 10 African languages (SL-C0381E).

Some countries used technological innovations to improve health information during the pandemic. For example, *Guinee7* reported that some facilities in Guinea used

tablets to record and analyze information and to improve efficiency (GU-C0735F). *Awoko* published how Sierra Leone used new digital surveillance methods and virtual case management applications to improve health service delivery (SL-C0176E).

HEALTH FINANCING SOLUTIONS

The 350 excerpts showed that health financing solutions to address COVID-19 varied by source of funding, how the funding was used, and how countries sought to reduce financial catastrophe on individuals and families. Financial support was reported to have been provided by other countries, such as China, Germany, and the United States of America (GU-C1063F; NR-C0086F; SL-C0109E). Regional funding from sources such as the United Bank for Africa Plc Group (UBA) and African Union (AU) was repeatedly mentioned (GH-C0036E; NR-C0045F; GU-C0029F). Domestic funds were documented to have been provided through multiple avenues, including government-initiated COVID-19 funds (GH-C0709E; SL-C0227E; NR-C0045F; LI-C0694E; GU-C0790; NA-C0659E), contributions from local banks (SL-C0201E) and businesses (LI-C0758E; GH-C0446E), and the redistribution of annual government budgets for health (SL-C0527E; LI-C162E; NR-C0095F).

Funds were primarily used to purchase equipment and supplies, pay for increased personnel and infrastructure costs, and to create, promote, and distribute information about COVID-19 (GU-C1017F; NA-C1107E; NA-C0007E; GH-C0648E; NR-C0084F). Very few news articles reported the allocation of funding for the development of a COVID-19 vaccine (NA-C0392E; NR-C0204F).

Social protections such as the removal of interest payments (NA-C0246E), loan forgiveness or repayment extensions (NR-C0082F; LI-C0051E), and financial aid from stimulus packages (GU-C0182F; GH-C0567E; LI-C0661E) were enacted to prevent COVID-19 related impoverishment and financial catastrophe on patients and the public.

DISCUSSION

The present study uses the six building blocks of the WHO health systems framework to highlight the solutions that West African countries used to tackle the COVID-19 pandemic in its early months. The findings demonstrate that technological innovations, new national and multi-country collaborations and funding mechanisms, use of diverse communication media, repurposing of existing resources and facilities, and strong public health regulatory enforcement were critical interventions to solve health system constraints.

Some have suggested that effective solutions to the pandemic could be achieved through global cooperation and good governance.^{4,16} Our findings of how West-African countries managed the pandemic demonstrate that effective solutions also require strong within-country collaborations and prudent use of constrained resources. In the news articles, some hospitals collaborated to maximize the number of patients receiving care at once; health institutions,

like in Ghana, partnered with the military to use drones to deliver essential supplies, and several business and local organizations donated money, material goods, and technical expertise to support the health system. These were also coupled with medical support from other countries and refurbishing existing facilities to serve as isolating centers, calling in retired health workers, and expanding the responsibilities of medical students. While this study showed that many of these collaborative efforts to contain the pandemic in early months were local, local efforts have received less attention in the literature.⁴

This study's results also show the essential role of technology in improving on the various sectors of the health system. African countries are emerging as examples in the rapid development and use of technology to manage the pandemic.¹⁷ WHO Africa reported that 12.8% of modified technologies developed across the world in response to the pandemic originated from the African continent.¹⁸ In this media analysis, news articles reported on technology to enhance medical products and health information. These findings are consistent with literature demonstrating the history of success with digital and mobile initiatives within Sub-Saharan African contexts to track infections and improve case management for communicable diseases such as HIV and TB.¹⁹

Despite these innovations, the analysis also highlights the chronic, under-investment in vaccine development in sub-Saharan Africa.²⁰ Only 2 of the 6 selected countries (Nigeria and Niger) had or promised funding for vaccine development. A possible explanation is the limited vaccine manufacturing capacity in Africa. According to WHO, fewer than 10 African manufacturers have vaccine production capacity, only one of which is in West Africa (Senegal).²¹ Additionally, Africa manufactures only 1% of all vaccines consumed on the continent. In preparation for future pandemics, there has to be a strong, concerted effort to strengthen vaccine development in West Africa.

This media analysis offers a wide understanding of the common and diverse health system-specific strategies West African countries implemented as initial responses to the pandemic, as reported by the news media.

LIMITATIONS

However, these findings must be evaluated in the context of several limitations. The media analysis included only 6 of the 17 West African countries. However, using maximum variation sampling, the selected countries varied based on COVID-19 morbidity and mortality rates. Second, news organizations have their ideologies and reporting practices and may have influenced the outcomes of the study. We also included only two news organizations per country and excluded those that did not publish in English or French, limiting the generalizability of our findings. Nevertheless, the organizations selected had widest online coverage throughout their respective countries, and over 4,000 news articles were reviewed. While the search strategy used was systematic, search engines tend to pick up popular articles. Lastly, this study only covered news articles published be-

tween January 1 and June 30, 2020. Given the evolving nature of the pandemic, it is likely our findings are only representative of the initial solutions to support the health system during the pandemic.

CONCLUSIONS

The findings of this study have two broad implications for pandemic response. First, the results demonstrate that despite resource constraints, low to middle income countries (LMICs) can innovate and create health system solutions to contain global pandemics. The strategies West African countries used are transferrable. They included strongly enforcing public health regulations, widely utilizing technological innovations, creating new financial mechanisms, promoting local and external collaborations, relying on diverse communication media, and repurposing of existing resources and facilities. WHO and similar countries can systematically harness these strategies as best practices for managing pandemics today and in the future. Second, the findings also show that resource constrained countries are likely not to invest in vaccines during a pandemic. Yet, such investments are so critical to a country's health system's long-term recovery from a pandemic like COVID-19 that has no end in sight. As the COVID-19 Delta variant stretches the health systems of some African countries, vaccine preparedness now and in the future should be a priority.

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AUTHORSHIP CONTRIBUTIONS

KSS and KS led the drafting of this manuscript, with input from EM, FTZ, PGO, JZ, and PT. KS, EM, FTZ, PGO, JZ, and PT conducted the qualitative analysis. MK and SD assisted in editing the manuscript. MK secured the funding for this study.

COMPETING INTERESTS

The authors completed the Unified Competing Interest form at <http://www.icmje.org/disclosure-of-interest/> (available upon request from the corresponding author), and declare no conflicts of interest.

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SUPPLEMENTARY MATERIALS

Online Supplementary Document

Download: <https://www.joghr.org/article/32434-reported-health-system-solutions-implemented-to-contain-covid-19-in-six-west-african-countries-a-media-content-analysis/attachment/81519.docx>
