



'Fighting a Global War Using a Local Strategy': contextualism in COVID-19 response in Africa

Chinwe Lucia Ochu ,¹ Oluwatosin Wuraola Akande ,^{1,2} Oyeronke Oyebojani,³ Olaolu Aderinola,⁴ Oladipo Ogunbode,¹ Rhoda Atteh,⁵ Tochi Okwor,¹ Emeka Oguanuo,¹ Tijesu Ojumu,¹ Chinenye Ofoegbunam,⁵ Blessing Ebhodaghe,¹ Gbenga Joseph,⁴ Priscilla Ibekwe,⁶ Chikwe Ihekweazu⁶

For numbered affiliations see end of article.

Correspondence to

Dr Oluwatosin Wuraola Akande, Prevention, Programmes and Knowledge Management, Nigeria Centre for Disease Control, Abuja, 240102, Federal Capital Territory, Nigeria; akande.wuraola@gmail.com

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ABSTRACT

With a considerably high level of poverty, high population density and relatively fragile health systems, most African countries have a predominance of factors that could contribute to the rapid spread of the COVID-19 pandemic. Despite these challenges, the continent has shown capacity in its response to the pandemic. This may be related to the continent's experience in responding to several infectious disease outbreaks such as Ebola disease, Lassa fever and cholera. Since the beginning of the COVID-19 pandemic, several local innovations have been developed and implemented. These innovations take into consideration unique circumstances in countries such as multiple government levels, belief in traditional medicine, limited access to medical supplies and others. This paper describes the various strategies developed in African countries across leadership and coordination, surveillance, laboratory capacity, case management, infection, prevention and control, risk communications, points of entry, research, logistics and supply chain, partnership, food security and education. We highlight the impact of these strategies on the response so far, and lessons that other regions across the world can learn from Africa's response to COVID-19. Finally, we recommend the urgent need for increased investment in African health and social institutions to enable the development of African-owned and led strategies in response to disease outbreaks.

INTRODUCTION

The first case of COVID-19 in Africa was reported in Egypt on 14 February 2020. As of 13 May 2020, COVID-19, which

Summary box

What is already known?

- ▶ The African continent has arguably outperformed the predicted trajectory of the COVID-19 pandemic.
- ▶ In response to the pandemic, there is a surge in innovative strategies and capacities.

What are the new findings?

- ▶ Country-developed strategies and innovations are being used across countries in Africa.
- ▶ Countries should be empowered to implement indigenous solutions tailored to unique challenges.

is caused by SARS-CoV-2, had been reported in all African countries.¹

The pandemic has caused significant strain on health systems across the globe.² With high population density, fragile communities, weak health systems and developmental challenges, many African countries have a prevalence of risk factors that could aggravate the pandemic.³

There is considerable disparity across countries in terms of demography, socio-cultural and economic attributes. Given its global focus, evidence-based recommendations from WHO are not always contextualised to the specific needs of individual countries.⁴ Therefore, countries need to adapt these recommendations to their context.

The reality of contextual differences has prompted several in-country innovations and adaptations to the pandemic response. This paper aims to describe the diverse and innovative strategies implemented in



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African countries against the pandemic, based on 12 most important thematic areas, with more focus on Nigeria, the most populous country in the continent.

LEADERSHIP AND COORDINATION

The need for high-level coordination within and across countries to counter the pandemic was recognised by African governments. At regional level, the Africa Centres for Disease Control and Prevention (Africa CDC) has been at the forefront of regional coordination efforts.⁵ The organisation has played a significant leadership role in providing guidelines and frameworks, building capacity, planning for vaccine development and access, and ensuring access to medical supplies for African countries. They have disseminated information on the SARS-CoV-2 variants in the continent, training resources for health workers, frameworks for supply chain management, outbreak briefs and communiqués on expedited regulatory authorisation process for emergency use of COVID-19 vaccines.⁶

African leaders, on their part, have coordinated response to the pandemic by showing ingenuity in the implementation of innovative public health and social measures. From the creation of national task forces, to the implementation of economic stimulus measures in form of monetary and fiscal policies, to the enactment of a recovery plan, these are all measures which were created during the pandemic.⁷ National task forces on COVID-19 consisting of experts from diverse fields, provided high-level strategic coordination of the national response and served as platforms for exchange of experiences and best practices across countries.^{8,9} In Nigeria, the Presidential Task Force (PTF) on COVID-19 and its national public health institute—Nigeria Centre for Disease Control (NCDC)—provided strong leadership and coordination of response to the pandemic. The PTF, comprising ministers (from Health, Interior, Aviation, Human Affairs, Disaster Management and Social Services, Education, Environment sectors), director-generals (from the National Emergency Management Agency, Department of State Services, NCDC) and the WHO country representative, was established on 9 March 2020, about 2 weeks after the country's index case.¹⁰ The PTF has ensured a coordinated intersectoral response with oversight leadership from the Secretary to the Government of the Federation, ensuring the highest level of political commitment to the response. Working together, the PTF and NCDC provide regular updates, with the PTF leading on policy direction and NCDC focusing on scientific and technical guidelines across the country.⁹ Furthermore, a national Emergency Operations Centre (EOC) led by NCDC was activated to coordinate COVID-19 response activities at the national and subnational levels, and facilitate timely implementation and tracking of national and state incident action plan for COVID-19.

SURVEILLANCE

To rapidly detect and monitor trends of COVID-19 cases across the continent, many African countries have adopted innovative strategies and adapted existing systems to strengthen surveillance activities. In April 2020, the WHO Regional Office for Africa hosted its first virtual hackathon which brought about innovative local solutions to improve surveillance for the pandemic from 100 leading innovators across sub-Saharan Africa.¹¹ An array of local solutions were proposed, including mobile-driven self-diagnosis applications, an X-ray-based self-screening platform, mobile-based screening and mapping tools, low-cost methods for the production of personal protective equipment (PPE), and so on. It may be too early to assess the true impact of the hackathon. Nonetheless, considering the plethora of good ideas that never get implemented, a clear monitoring and accountability framework is required to ensure that these innovations come to fruition.

In some countries like Nigeria, Benin, Ethiopia, Kenya, South Africa and Uganda, mobile location data tracking applications were deployed for contact tracing.¹² For example, an innovation hub in Kenya called the FabLab created Msafari, a mobile application which tracks passengers on public transport.¹³ Passengers enter a code and the vehicle registration number on their phone. If any passenger tests positive to the virus, all the passengers who might have had contact with the case will be traced. Similarly, Wiyaytna is a mobile application that has been downloaded over a million times in Morocco.¹⁴ This free application tells users if another user who was nearby in the last 21 days becomes positive for COVID-19.

Digitisation of surveillance supported real-time reporting and early notification of cases. In Nigeria, the Surveillance, Outbreak, Response Management and Analytical Software was scaled to all the 36 states and the Federal Capital Territory, a great leap from its prepandemic presence in only 18 states. Digital surveillance is also being implemented in over 16 other African countries including Cameroon, Congo, Ethiopia, Ghana and South Africa.^{15,16} Nigeria also adopted other innovative strategies for surveillance using community volunteers from the polio immunisation programme to serve as community liaison for disease surveillance and notification.

LABORATORY CAPACITY

Recognising its limited resources and the need to strengthen laboratory and testing capacity as part of the COVID-19 response, many African countries developed competence in this field during the response. The National Institute for Communicable Diseases in South Africa has leveraged its research and laboratory capacity from HIV and tuberculosis (TB) in the response to the pandemic.¹⁷

The Pasteur Institute of Dakar in Senegal is working on a rapid diagnostic test for COVID-19 which costs US\$10 and will give results in 10 min.¹⁸ Though the test kits were initially designed to test for dengue fever, validation trials for COVID-19 testing are ongoing.¹⁹ A rapid diagnostic test which is projected to cost about US\$1 is also being developed in Uganda.²⁰

Nigeria built significant laboratory capacity during the pandemic based on a strategic approach.²¹ When Nigeria reported its first case in late February 2020, only two laboratories in the country could test for COVID-19.²² By May 2020, twenty-five laboratories had joined the national COVID-19 laboratory network. By October 2020, there were over 70 public health laboratories in Nigeria's COVID-19 laboratory network. The activities of the COVID-19 laboratories are coordinated by the NCDC National Reference Laboratory.

Like South Africa, Nigeria reconfigured the high-throughput Cobas machine for HIV and the GeneXpert machine for TB to also test for COVID-19. While routine testing for TB and HIV could have been negatively affected, the integrated testing approach helped mitigate this. Furthermore, a mobile diagnostic van (Wellness on Wheels) for integrated COVID-19 and TB testing was successfully implemented in a state in Nigeria, leveraging on the existing TB structure and resources. The success of this intervention has prompted discussion regarding scaling this intervention to other states in the country. Nigeria published the first African SARS-CoV-2 genome sequence from the index case of the disease in Nigeria. This was a collaborative effort by NCDC, the African Centre of Excellence for the Genomics of Infectious Disease, the Nigerian Institute of Medical Research (NIMR), the Centre for Human and Zoonotic Virology and other partners.²³ Results from these sequencing are being used to monitor the mutation of the virus and community transmission.

CASE MANAGEMENT

There is currently no cure for COVID-19. As of October 2020, ninety-one clinical trials are ongoing in Africa to find a potential cure.²⁴ In the management of COVID-19 cases, Senegal has deployed the use of robot doctors, named 'Docteur Car'.¹⁹ The robot which speaks multiple languages takes vital signs before a patient is seen by a human doctor. It is also loaded with medication or food and piloted to the hospital wards, so as to reduce health workers' workload and risk of infection. Rwanda has also adopted the use of robots in caring for patients with COVID-19.²⁵

African countries have explored the use of local herbs as traditional remedies for COVID-19, although with varying levels of scientific scrutiny. While many herbal remedies are self-acclaimed and yet to undergo preclinical and clinical trials, some are in advanced stages of research and development and very few have

completed phase II clinical trials.²⁶ The novelty of the outbreak and high cost of conventional antiviral agents have spurred many African countries into a scientific spree in search of possible cost-effective local herbal remedies.²⁷ The Central Bank of Nigeria has prioritised funding for research and development on herbal products against COVID-19 in its Health Sector Research and Development Intervention Scheme.²⁸ The WHO African region continues to emphasise its support of therapies that are based on appropriate scientific evidence—clinical trials.²⁹ In collaboration with Africa CDC and the African Union Commission, the WHO Afro Region in September 2020 endorsed a clinical trial protocol for COVID-19 herbal medicines.³⁰

In Nigeria, centralised management of cases in designated isolation centres in each state was practised at the early and middle phases of the outbreak.² Understanding the living conditions in most parts of Nigeria where family members share rooms, all confirmed cases regardless of whether they were symptomatic or not were admitted in the isolation centres. As the outbreak progressed with community transmission of the virus, transition to home-based care (HBC) for asymptomatic and mild cases was made to avoid overburdening the healthcare system. NCDC developed an HBC handbook to guide patients, their relations and caregivers on safe practice of this innovative strategy.³¹ The state case management team follows up patients on HBC with home visits and teleconsultations. In case of deterioration of health conditions, patients are quickly transferred in ambulance to nearest treatment centres.

INFECTION PREVENTION AND CONTROL

Implementation of infection prevention and control (IPC) measures is critical to preventing infections among healthcare workers (HCWs). In 2019, NCDC launched an innovative 'Turn Nigeria Orange' project aimed at improving IPC capacities of tertiary health facilities in the country to minimise HCW infections while managing infectious diseases. The 'PALS' (Participatory Approach in Learning Systems) project was also introduced. This is an innovative way of training HCWs (change agents) and engaging them in identifying and implementing critical IPC projects in their health facilities using a participatory approach. These change agents and their trainers played very critical roles on IPC response to COVID-19 in Nigeria. An IPC network for support and mentorship was activated. This network provided virtual support to health workers across the country. A day after the first COVID-19 case in Nigeria was reported, a checklist was deployed across health facilities to assess their IPC readiness. The NCDC IPC unit also created an online course that features standard precautions, appropriate use of PPEs and other essential aspects of infection control for HCWs.³²

Guinea, Liberia, Mali, Sierra Leone and Uganda make use of the artificial intelligence-powered mHero for proactive real-time communication and coordination of the healthcare ecosystem.^{33 34} It leverages on existing health information systems (iHRIS health workforce information systems software, District Health Information Software 2), OpenMRS and popular communication platforms (RapidPro, Facebook Messenger, WhatsApp) to train HCWs and facilitate two-way communication between front-line HCWs and health officials. mHero can send and receive text messages, voice messages, pictures and videos. There is also the option to switch to a call centre where a live operator can help address pressing issues. A similar initiative is also being employed in Ethiopia.³⁵

RISK COMMUNICATION

Risk communication is part of the critical response to the pandemic in Africa. The need to contextualise risk communication made some African countries to adopt local strategies to reach all groups in their communities. In Ivory Coast, drones are being used to raise public awareness on COVID-19 by broadcasting messages in French and local languages in rural areas.¹⁶ In Senegal, an incident-reporting digital platform, SunuCity, was created to enable a two-way communication between local authorities and the citizens.³⁶ The medium allows the public to report incidents such as suspected cases of the disease in their communities; local authorities also communicate with the people using this platform. In Nigeria, NCDC developed an interactive voice response and an online self-assessment tool to help Nigerians assess their COVID-19 risk factors. Through this, a triage system was created to ensure that callers with urgent needs could speak to a call centre agent immediately, while others seeking information could receive this through prerecorded messages.

Building on lessons from previous outbreak responses in Nigeria, NCDC leveraged on its event-based surveillance system to review epidemic intelligence from diverse media sources in real time. This, in addition to biweekly opinion polling, enabled understanding of public perception of the virus and the government's response, as well as informed messaging priorities. NCDC championed the #TakeResponsibility campaign using social and mainstream media to foster behavioural change among Nigerians. This includes the introduction of an automated chatbot on WhatsApp messaging service to disseminate COVID-19 messages. The campaign was decentralised at subnational levels, enabling local authorities to adapt national messages, infographic and multimedia materials to suit their context. NCDC also launched the #MaskUpNaija campaign to commemorate World Mask Week and increase the use of masks among Nigerians. The hashtag gained over 752 000 impressions on Twitter and over 7720 186 impressions on Facebook within its first week of use.

There has been widespread misinformation and myths regarding the pandemic in Nigeria such as the virus being a hoax.^{37 38} Addressing misinformation, various strategies were adopted which include collaboration with non-government, non-partisan fact-checking organisations and public health associations to debunk rumours and misinformation. Video documentaries and human interest stories were also disseminated, including stories from HCWs, patients and survivors. Cartoons and opinion pieces targeted towards different segments of the population were designed and distributed via social and traditional media. Innovative community engagement strategies such as coproduction of risk communication strategies, audio diagnosis of jingles (playing jingles to community groups and receiving feedbacks), use of trusted voices, community volunteers and town criers all facilitated risk communication in Nigeria.³⁹

Other African countries faced similar myths and misinformation challenges. To combat these challenges, a South African private firm created a pro bono WhatsApp bot that disseminates timely and accurate information to the public in multiple languages.⁴⁰ Similarly, Alerte Santé Sénégal, a mobile app made in Senegal, provides fact-checked information and statistics on the pandemic.⁴¹ In Guinea-Bissau, a website which is managed by a vast community of experts (journalists, doctors, economists) is dedicated to fact checking and providing verified information to combat misinformation and myths.⁴² An online platform in Cameroon disseminates verified information on COVID-19 in many African languages.⁴³

POINTS OF ENTRY

Importation of COVID-19 cases was an important means by which the virus spread across different countries.⁴⁴ This prompted many countries in Africa to stop and subsequently regulate international travels. In March 2020, Ghana imposed a travel ban on flights from countries with more than 200 cases, when the country had only six cases of the disease.⁴⁵ Besides, those who travelled into the country were placed on a mandatory 14-day quarantine. Similar measures were implemented in Burundi, Ethiopia, Gabon, Kenya, Morocco, South Africa, among others.^{46 47}

Nigeria started its phased travel restrictions by imposing a ban on incoming flights from 13 countries that had reported up to 1000 cases, including a temporary suspension of the visa-on-arrival policy on 18 March. This eventually culminated into a shutdown of the air, land and sea borders.^{48 49}

The pandemic brought about a multisectoral collaboration between NCDC, Port Health Services of the Federal Ministry of Health, Nigerian Civil Aviation Authority, Federal Airports Authority of Nigeria and the Office of the National Security Adviser. A traveller's kit which contained guidelines on the country's self-isolation and quarantine process, face masks, a

digital thermometer, and sanitisers was designed.⁵⁰ All returnees were made to take mandatory COVID-19 tests before arrival, self-quarantine for 7 days before conducting a repeat test. In preparation for resumption of regular passenger international flights in Nigeria, an automated calling system with capacity for a thousand calls daily was developed by eHealth Africa to follow-up returnees for symptoms.⁵¹

The University of Namibia's School of Veterinary Medicine started an initiative to train sniffer dogs to identify COVID-19 in humans.⁵² On completion of the training, the dogs are to be deployed to ports of entry in Namibia. The East African Community (EAC) designed a mobile application—Regional Electronic Cargo and Driver Tracking System (RECDTS).⁵³ RECDTS issues EAC COVID-19 digital certificates to truck drivers. This initiative minimises the need for multiple COVID-19 tests and congestion at the border crossing points in East Africa.

RESEARCH

Despite being home to 12% of the world's population, less than 1% of global research is generated from Africa.⁵⁴ The need for tailored responses to the pandemic further underlines the value of the generation and dissemination of scientific evidence in Africa. Digital platforms such as AfricArXiv and the African Academy of Sciences are research online communities dedicated to increasing the visibility of research outputs and collaboration in Africa.^{55 56} AfricArXiv, in particular, encourages the dissemination of research findings in African languages.

In response to the pandemic, the Nigeria COVID-19 Research Coalition consisting of academics, public health professionals, social scientists, policymakers, manufacturers, private sector and COVID-19 survivors was established to coordinate COVID-19 research activities across the country. The coalition developed and is implementing a COVID-19 research agenda for Nigeria in line with WHO's Research Roadmap for COVID-19. In addition, the National COVID-19 EOC in Nigeria has a research pillar that conducts operational research to guide the EOC response activities.⁵⁴ Findings from research activities are shared directly with NCDC and the PTF, and also published in peer-reviewed scientific journals. Other research organisations such as the South African Medical Research Council, Kenya Medical Research Institute, the KZN COVID-19 Research Consortium and the Uganda Research Unit are making significant contributions to research in other countries in Africa.^{57–60}

LOGISTICS AND SUPPLY CHAIN

The pandemic exposed the inequity in distribution of critical medical equipment globally.⁶¹ During the outbreak, many countries prioritised their domestic needs over exports and countries overly reliant on importation suffered a shortage of medical supplies.⁶²

Before the pandemic, many African countries were dependent on international supply chains for these medical products, leading to an acute shortage of vital medical supplies in many African countries when transport routes were closed.⁶¹ This stimulated a boost in local manufacturing capacity in these countries.

Tertiary institutions in Zimbabwe became major producers of these PPEs in Zimbabwe with Chinhoyi University of Technology alone producing more than 2000 masks daily.⁶³ In Kenya, one firm developed the capacity to produce 400 000 masks daily during the pandemic.⁶⁴ A university in Uganda also started producing self-sanitising reusable masks during the pandemic.⁶⁵

In March, the United Nations Development Programme crowdsourced 12 3D printing experts across Tanzania to help in designing, fabricating and distributing PPE for front-line health workers. This initiative led to the development of intubation boxes, face shields and ventilator parts.¹⁶ A 3D printing company in Kenya, Ultra Red Technologies, started the production of 500 face shields daily; they also produced printing parts for locally made ventilators.⁶⁶ The National Agency for Science and Engineering Infrastructure pioneered ventilator production in Nigeria.⁶⁷ The institution also produced mobile sprayers for the disinfection of homes and cities. Similar initiatives are being done in other African countries, including Ghana, Kenya, Morocco and South Africa.^{15 68 69}

Technology was used for real-time monitoring of the supply chain. In Djibouti, real-time COVID-19 dashboards were created by the government to receive requests for medical supplies and equipment from all health facilities in the country.⁷⁰

In Nigeria, institutions such as National Institute of Pharmaceutical Research and Development; NIMR; Defence Industries Corporation of Nigeria; engineering departments of universities; National Biotechnology Development Agency and other agencies of the Federal Ministry of Science and Technology; Federal Ministry of Industry, Trade and Investment; National Youth Service Corps; and the private sector piloted the local manufacturing of ventilators, PPEs, hand sanitisers, handwashing devices, disinfectant spray channels, COVID-19 extraction kits, among many others. The challenge though was in the scaling of these products to commercial quantities. The PTF on COVID-19 set up a Sustainable Production Working Group to coordinate and support these local innovations.

PARTNERSHIP

In response to the pandemic, African countries have recognised the importance of public-private partnerships to maximise their resources. This has shown the capability of the continent to build its health

security in collaboration with indigenous partners. A Solidarity Response Fund was created in South Africa to receive funds from companies/foundations and individuals.⁷¹ As of October 2020, about 3.12 billion rands (US\$19 billion) had been raised. The fund is used to support campaigns and communication measures, supply testing kits and PPEs, support research and help vulnerable communities through food access.

The Coalition against COVID-19 (CACOVID) is a private sector task force set up in Nigeria to combat the pandemic. CACOVID has supported the Nigerian government by providing and equipping health facilities across all geopolitical zones in Nigeria including testing, isolation and treatment centres.⁷²

FOOD SECURITY

For every three Africans, one lives below the global poverty line.⁷³ Majority of Africans are employed in the informal sector, and the implementation of lockdowns without adequate social protection interventions could lead to catastrophic results.⁷⁴ Many African countries adapted lockdown strategies to their realities.

The Government of Botswana implemented an economic response plan that compels the government to buy food locally, redistribute excess vegetable supplies to rural communities and institute milk collection centres in public areas.⁷⁴ Ghana and Rwanda disinfected and decongested food markets, in addition to providing food and non-food items to vulnerable populations.^{74 75}

A group in Nigeria, Diet234.com, created an online food bank called 'Communeating'.⁷⁶ Through social media and technology, Nigerians could sponsor a food bag by making a poster, tagging friends and accumulating funds. The food bags are complemented with COVID-19 safety guidelines, and guidance on the preparation of nutritious low-budget meals from locally available food items.

EDUCATION

The Kids Education Engagement Program in Liberia launched a book to teach children about COVID-19 in a fun and simple form.⁷⁷ The organisation is also distributing anti-COVID-19 kits to children in the country. Each pack contains a small-sized FM radio preloaded with songs, jingles and stories, a crayon pack, hand sanitiser, locally made soap, mask and a toothbrush.

During the lockdowns, many schools resorted to the use of online platforms to ensure educational continuity for students. However, 44% of people without internet access live in Africa.⁷⁸ To ensure internet access in remote communities in Kenya, Alphabet developed high-altitude balloons to supply internet to these areas without internet coverage. This enabled the continuation of education and also

the connection of remote health facilities to referral facilities.⁷⁹ In addition, a less tech approach using radio and television broadcasts was adopted for those who could not access the internet (an initiative of the Ministry of Education and the Kenya Broadcasting Company). The Edu TV Kenya channel operated by the Kenya Institute for Curriculum Development also has its own educational channels, and has more than 9400 subscribers on YouTube.⁸⁰

CONCLUSION

Given the prevalence of poverty, weak health systems, significant disease burden, conflicts and high population density in many African countries, the continent faces a challenging uphill struggle against the COVID-19 pandemic.³ Before the COVID-19 outbreak in Africa, predictions on the trajectory of the pandemic in the continent were gloomy, given its limited resources and the preponderance of risk factors for the rapid spread of the disease.⁶² Despite its relatively fragile health systems, the continent has outperformed these expectations. This pandemic has reiterated the need for African countries to increase their focus on preventive strategies in limiting disease burden. There has been a surge of indigenous innovations contextualised to its realities. African nations must deliberately work on sustainability for these innovations so they remain valuable even after the pandemic. Communities should be empowered to develop and implement responses suited to address their challenges in their way, as they understand their communities best. The pandemic presents an opportunity for African countries to develop indigenous digital solutions for health, strengthen governmental and non-governmental collaborations and build health system capacity for sustained health security.

Author affiliations

¹Prevention, Programmes and Knowledge Management, Nigeria Centre for Disease Control, Abuja, Federal Capital Territory, Nigeria

²Epidemiology and Community Health, University of Ilorin Teaching Hospital, Ilorin, Kwara, Nigeria

³Vaccine Research and Development, Coalition for Epidemic Preparedness Innovations, London, UK

⁴Health Emergency Preparedness and Response, Nigeria Centre for Disease Control, Abuja, Federal Capital Territory, Nigeria

⁵Surveillance and Epidemiology, Nigeria Centre for Disease Control, Abuja, Federal Capital Territory, Nigeria

⁶Office of the Director General, Nigeria Centre for Disease Control, Abuja, Federal Capital Territory, Nigeria

Twitter Chinwe Lucia Ochu @chinwe_Ochu and Tochi Okwor @tokwor7

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ORCID iDs

Chinwe Lucia Ochu <http://orcid.org/0000-0002-0630-7332>
Oluwatosin Wuraola Akande <http://orcid.org/0000-0001-6906-895X>

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