

Contemporary Issues in Managing COVID -19 Outbreak in Nigeria and Implications for Future Outbreaks

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ABSTRACT

Severe Acute Respiratory Syndrome – novel Coronavirus 2 (SARS-nCoV-2), was first reported in Wuhan, China, in December, 2019. Since the outbreak, the virus has caused more than Six million, One hundred and forty thousand, nine hundred and thirty-four infections and over Three hundred and seventy- three thousand, five hundred forty-eight deaths globally. The first COVID -19 disease in Nigeria was reported in February, 2020 and as at the time of writing this report, Nigeria has reported about Ten thousand, five hundred and seventy-eight cases of COVID 19 with Two hundred and ninety-nine mortalities. Many critical issues have been limiting Nigeria from curtailing numerous disease outbreaks of public health significance including COVID -19, but few of these issues have been published. While responsible government agencies and international partners have been committed to limiting the spread of COVID 19 with its associated mortality and morbidity, we present in this report some social, economic, operational and institutional related issues affecting effective management of COVID -19 outbreak in Nigeria; and propose solutions for managing future outbreaks.

Key Words: COVID-19, SARS-n-CoV2, Outbreak, Emerging and reemerging infections

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INTRODUCTION

Severe Acute Respiratory Syndrome – novel Coronavirus 2 (SARS-nCoV-2) was first reported in Wuhan, China, in December, 2019. The World Health Organization (WHO) renamed it Coronavirus Disease -19 (COVID-19) [1]. The virus has spread across countries thereby enabling the WHO to declare it a pandemic [1]. As at the time of writing this report, the virus has caused more than Six million, One hundred and forty thousand, nine hundred and thirty-four infections and over Three hundred and seventy-three thousand, five hundred forty-eight deaths across the globe. The pandemic has posed serious threats to food security, socioeconomic stability, public health and fragile health systems especially in developing countries [1]. Report has shown that it takes a very short turnaround time (TAT) for the virus to be transmitted from one individual to another; thereby making the coronavirus very infectious [2]. This implies that individuals who are infected, but do not manifest obvious symptoms of the disease could easily infect others [2].

As a risk management process to limit the spread of COVID 19 with its associated mortality, United States, United Kingdom, Spain, Italy, India and many other countries have adopted diverse stringent measures including lockdown.[3]. In Nigeria, aside the lockdown witnessed in some states, restrictions on local and international flights have been effected. Schools at all levels shut and inter and intra states movement limited [3]. All these were implemented with a view to limiting the spread of the virus and its associated mortality.

Nigeria has witnessed at various times different emerging and reemerging infectious diseases [4]. Prior to the emergence of deadly viral infections such as Ebola and

SARS-nCoV-2, Nigeria has witnessed several other infectious disease outbreaks- yellow fever outbreak in 1986 and 1987 which affected 9,800 and 1,249 individuals respectively [4]. A large meningitis outbreak was witnessed in 1996 resulting in 109,580 cases and 11,717 deaths [4, 5]. Cholera outbreak was witnessed in 2001 and 2004 respectively [5]. Aside the usual annual outbreak of Lassa fever, other viral infectious diseases which have emerged in Nigeria were Ebola outbreak in 2014 and COVID -19 in 2020 [5,6]. During the Ebola outbreak in 2014, Nigeria was able to curtail the spread of the disease through a well-coordinated public health strategic response [6].

The first COVID -19 disease in Nigeria was reported in February, 2020. As at the time of writing this report, Nigeria has reported about Ten thousand, five hundred and seventy eight cases of COVID 19 with Two hundred and ninety nine mortalities [7]. Majority of the infections were either imported or from individuals who have had contacts with those previously infected [7].

In an effort to manage, provide information regarding the coronavirus infection and ensure that COVID -19 outbreak is curtailed, the Nigeria Center for Disease Control (NCDC), an agency under the Federal Ministry of Health has been at the epicenter of coordinating all activities including surveillance, contact tracing and testing. Other local and international partners including the USCDC Nigeria have also been playing several crucial roles all targeted towards limiting the impact of the disease within the country. In spite of these efforts targeted towards ensuring that the health and economic consequences associated with COVID -19 are limited, several issues seem to be limiting the war against the disease.

Diagnostic Capacity:

One of the most crucial strategies for effective control of COVID 19 pandemic is prompt testing and identification of populations at risk. Laboratory testing is very key to prompt diagnosis, identification of causative agents and unravelling of virus genomic constituents. Prompt diagnosis assists in initiating appropriate treatment and management strategies with a view to improving prognosis.

Nigeria has a population of over 200 million spread across its six geopolitical zones. With this huge population, laboratory testing is very crucial for quick identification of the populations at risk. This helps in initiating appropriate treatment and implementing suitable treatment options. Although, the laboratory diagnostic capacity needed for prompt identification of cases has been perceived to be low, but the NCDC has been making consistent efforts to increase the number of laboratories across the country [7]. Following observation on the daily increase of COVID -19 infections, the NCDC scaled up the laboratories to seven with the addition of two more laboratories [7]. Currently, the Agency is committed to expand diagnostic laboratories to other geopolitical zones of the country [7].

Real time Polymerase Chain Reaction (rtPCR) is the current gold standard for diagnosing SARS CoV 2 infection. Due to the total testing processes (TTP) involved with the use of PCR, the turnaround time (TAT) for completing an analysis could be high. However, in situation where pre-analytical or analytical errors are encountered in the testing process, the TAT could be higher. Nonetheless, high throughput PCR systems which could complete testing within shorter TAT are available, but are more expensive. If the current daily increase in the number of positive cases reported continues to increase, there might be challenges in

testing individuals who might be at risk. Quality in medical laboratory operation has always been premised on generating fit-for-purpose, accurate, reliable and reproducible result within an allowable TAT.

Use of Rapid Diagnostic Test Kits (RDTs):

The Real Time PCR currently employed to diagnose individuals with COVID -19 is based on detecting viral RNA particles (viral antigen). However, in order to overcome the increased TAT associated with PCR technique, the need for use of Rapid Diagnostic Test Kits (RDT) for COVID -19 testing becomes very imperative. Currently, RDTs which could detect viral antigen and antibody within the shortest TAT have been developed. While this may allow for more rapid, easy and faster testing of the population, such RDTs should be validated prior to use. This ensures that RDTs with good predictive value, sensitivity and specificity are deployed for testing. Use of unvalidated RDTs poses as a great danger to curtailing the spread of coronavirus. Nonetheless, in Nigeria where everyone including non-health professionals uses RDT for testing without going through licensed healthcare professionals, there could either be over diagnosis or under diagnosis of those who are either infected or not infected with the virus. This can be due to individual's poor skill and training to handle and interpret result emanating result from the testing techniques. In order to avoid such situations adherence to regulatory provisions in the use of COVID-19 RDTs where available is advised.

Laboratory Networks:

Diagnostic Laboratory Networks in Nigeria seem to be poorly coordinated. Many laboratories exist in isolation and with

limited capacities to handle different sample volumes. Movement of samples for testing from one location to another due to poor road network could be very challenging. In order for result (s) emanating from any sample to be credible, such sample should be collected, handled and transported using approved standard procedures. In countries with excellent laboratory networks, it is easier to transport samples from one location to another without any serious limitations. However, in Nigeria where there are poor road networks, incessant delays or cancellation of local flights, lack of adequate training of operators handling and transporting biological samples could pose as big challenges when moving samples across testing laboratories. This could become exaggerated when community outbreak of COVID 19 becomes more prevalent especially among populations living either in hard to reach (HTR) or far to reach (FTR) locations. Use of mobile laboratories is therefore recommended and could be very helpful in limiting these challenges and addressing the pandemic in such locations.

Contact tracing

Successful tracing of all individuals who have come in contact with infected individual could also be a big issue. Since the outbreak COVID-19 in Nigeria, NCDC, as at the time of writing this article has reported that they were contact tracing over 6000 individuals [7]. In many locations within the country, street and house numbering are either obsolete or non-existent. Many individuals who are returning into the country might also have dropped wrong contact details. This poses great challenge to Epidemiologists who are involved in contact tracing thereby hindering successful identification, testing and isolation of infected individuals. As a measure to limiting the challenges associated

with contact tracing, use of approved technology could be deployed. The social stigma currently perceived with the infection, might also not allow infected individuals to publicly declare their status. This could exaggerate community transmission of the virus.

Preparedness of Health Institutions:

The World Health Organization (WHO) has ranked Nigeria as number 143 out of 195 WHO member countries with the worst health systems [8]. While concerted efforts have been made to improve on the identified gaps, more resources are still needed to achieve the desired goal [8]. Inadequate preparedness of healthcare institutions puts them in an emergency situation when outbreaks occur. Prior to the outbreak of COVID-19, many public health institutions in Nigeria seem unprepared. Based on GBD report 2016 [8], huge investment is needed to improve on the country's health systems. With limited resources and a mono-economy currently affected by the economic impact of COVID 19 pandemic, it becomes increasingly difficult to harness resources to prepare the healthcare institutions to manage the pandemic.

Preparedness of healthcare institutions to manage any outbreak of public health significance is a measure of several factors – adequate space for isolation of infected patients, capacity for clinical staff to manage the infection, training on biosafety issues, institutional diagnostic capacity, availability of personal protective equipments (PPEs), motivation of the healthcare workers and many more. While everyone acknowledges that COVID 19 is a novel disease, the disease has overwhelmed countries with the strongest health systems [9]. Considering its high rate of infection with associated mortality, no country can be adjudged to have been fully

prepared for the pandemic. However, in order to avoid poor preparedness of healthcare institutions to outbreaks in resource limited country like Nigeria, adequate resources should be committed to constantly improve on the available health systems. This will position the healthcare intuitions to respond adequately to disease outbreak.

Medical Supply and Logistics

Nigeria is a country which depends largely on imported products including medical supplies. Countries with increased burden of the disease have had challenges with medical supplies [9]. Excessive demands on medical supplies have put increased pressure on companies manufacturing different kinds of medical products required to curtail COVID 19 pandemic.

Supply of medical and laboratory items in most hospitals within the country have been plagued with limited funds and bureaucracies leading often to out-of-stock syndromes with its attendant effects on organizational operations and productivity. Restrictions currently placed on both international and local flights and human mobility could distort the supply of healthcare items needed to fight the COVID 19 outbreak. Pressures mounted on manufacturers of different medical products required to manage patients with COVID -19 from different countries could increase the period required to deliver ordered medical products to specific countries. Premised on these, the need for government to begin to empower, strengthen and encourage local manufactures becomes very imperative.

Other laboratory testing issues:

Individuals who have been diagnosed positive and are managed for COVID- 19 require constant testing and retesting of their

blood chemistry to help determine prognostic markers for the disease. Lippi and Plebani [10] reported that all COVID 19 patients require constant laboratory testing in order to ensure adequate staging, prognosis, therapeutic monitoring and epidemiological surveillance. Findings have shown that patients suffering from COVID -19 had decreased level of total white blood cells, increased levels of C reactive protein (CRP), lactate dehydrogenase (LDH), erythrocyte sedimentation rate (ESR) and D-dimer; with decreased level of serum albumin [10]. On the other hand, increased values of LDH, aspartate aminotransferase (AST), alanine aminotransferase (ALT), total bilirubin, creatinine, cardiac troponins, D-dimer, prothrombin time (PT), procalcitonin, CRP and decreased values of serum albumin have been reported to be useful for prognostic assessment of individuals managed for COVID-19. [10,11, 12]. Furthermore, a novel biomarker called monocyte volume distribution width (MDW) have been reported to be useful for identifying COVID-19 individuals with poor clinical conditions [11,12].

From the forgoing, the role of robust medical laboratory services in diagnosing, treating, managing and determining prognostic outcomes become very critical. The critical question is how many hospital based laboratories have capacity to estimate these parameters? While some healthcare diagnostic laboratories currently receiving COVID 19 patients do have some capacity to measure these parameters with good precision, not all secondary and tertiary hospital laboratories are adequately equipped to perform these prognostic parameters needed for effective management of COVID 19 patients. Strengthening capacities of diagnostic laboratories to enable them play their diagnostic, treatment and prognostic

roles required to effectively manage any epidemic remains very critical.

Implications for future outbreak and Recommendations

Many emerging and reemerging infectious diseases of public health significance often emerge and reemerge unannounced. This implies that adequate preparation for handling such infectious pathogens with huge potential on global health security is key to curtailing their impacts. No nation is immune to disease outbreak. With free human mobility across nations, diseases could easily be transmitted across countries. Based on the contemporary issues discussed above, we believe that if adequate efforts are made to close some of these identified gaps, handling infectious diseases of public health significance within the country could be achieved. As implications for future disease outbreak within this environment, we recommend the following:

Improving laboratory diagnostic capacity is very key to handling outbreaks. As discussed in this paper, there are serious and urgent needs to improve on laboratory diagnostic capacity for handling infectious diseases across the nation. One critical stage needed for handling any disease of public health significance and curtailing further spread is prompt identification of the causative agent through quality laboratory diagnosis. Since it might be difficult to predict or forecast the number of individuals who might be infected during any disease outbreak, there is need for the Federal government through the Federal ministry of Health to domicile a public health laboratory (PHL) in each state of the federation. This will allow for easy movement and testing of samples collected from individuals living within the state.

The health system of Nigeria runs the primary, secondary and tertiary structure. Designated primary healthcare centers should be selected and equipped for capacity to diagnose diseases during outbreaks. While the Federal government may not be able to do this alone, collaborative engagement and support from all international partners playing essential roles within the healthcare sector may be needed to achieve this.

Furthermore, different States within the country should upgrade the department of epidemiology domiciled in their respective ministries of Health (SMoH) to a full-fledged State Center for Disease Control (SCDC). The SCDC should be equipped with full capacity to detect, diagnose and manage disease outbreaks at the state level. These centers will also be working in collaboration with NCDC thereby limiting the spread of diseases at the community level.

While acknowledging the importance of RDTs as an acceptable point of care (POC) testing device, users should be aware of possible errors inherent in such testing device. To this end, all stakeholders should ensure that they are properly validated prior to deploying for public use. With various emerging and reemerging infectious disease challenging the country, there is need for the government to partner with biotechnology companies either within or outside the country to help research and develop RDTs for quick detection of infectious diseases.

There is an urgent need to improve laboratory networks within the country. In any outbreak of disease (s) of public health significance, movement of samples for testing becomes very critical. Appropriate initiation of treatment is premised on testing output. Delay in testing could result in avoidable mortalities. Laboratories with different or same capacities can be identified and linked together using technology. In HTR and FTR locations, provision of mobile laboratories

for quick testing and identification of causative agent (s) should be considered. These mobile laboratories could also be deployed to rural communities where social amenities such as electricity may be lacking. The impact of proper contact tracing in identifying exposed individuals cannot be overemphasized. To achieve this, government may empower the appropriate agency to enable them revisit house numbering and street identification using modern technology. Inability to identify individuals who are exposed, poses serious danger to efforts being made to curtail the spread of any disease outbreak.

As previously mentioned, adequate preparation is fundamental to winning wars against diseases of public health importance. Major secondary and tertiary hospitals across different geopolitical zones of the country should be prepared and equipped in readiness for any disease outbreak. Health care budgets including those made for diagnostic resources should not be cut. Building and equipping efficient laboratories with capacity to handle any disease outbreak and other services should not be an afterthought, but a well-planned activity since either outbreaks, epidemics or pandemics gives no prior notice to anyone before emerging. Laboratory emergency plans should be established and implemented when the need arises. Proper planning of medical supplies should be determined; and arrangement should be put in place for contingency supply of medical items. Available human resources and industries should be encouraged to enable them use available local resources to provide home grown solutions. Continuous capacity building to expand the number of trained professionals and improve the quality of testing is also key if the war against infectious diseases should be successful.

Conclusion: Emerging and reemerging infectious diseases break out unannounced.

Adequate preparation across all levels of healthcare within the country is very critical for winning wars against these infections and for curtailing global health security. Government should ensure that proactive measure are instituted long before any disease outbreak. Health institutions should be equipped with all items needed for tackling disease outbreak. The need to build robust infectious disease hospitals across the country should also be considered.

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REFERENCES

1. WHO Director-General. WHO Director-General's opening remarks at the media briefing on COVID-19: 11 March 2020. Geneva: World Health Organization; 2020. Available at: <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-atthe-media-briefing-on-covid-19---11-march-2020>. Accessed 30th April,2020
2. Rothe C, Schunk M, Sothmann P, Bretzel G, Froeschl G, Wallrauch C, et al. Transmission of 2019-nCoV Infection from an Asymptomatic Contact in Germany. *N Engl J Med.* 2020; 382(10):970-971.
3. World Health Organisation (WHO). Coronavirus disease 2019 (COVID-19) situation Report-60. Accessed 26th April, 2020
4. Mohammed I, Nasidi A, Alkali AS, et al. A severe epidemic of meningococcal meningitis in Nigeria

- Trans R Soc Trop Med Hyg 2000;94:265–70
5. WHO. Nigeria. 2018 <http://www.who.int/csr/don/archive/country/nga/en/> . Accessed 30th March 2020.
 6. WHO. Meningococcal disease – Nigeria. 2017 <http://www.who.int/csr/don/24-march-2017-meningococcal-disease-Nigeria/en/> . Accessed 28th March, 2020.
 7. Nigeria Center for Disease Control. Update on COVID -19 Pandemic. Available at <https://covid19.ncdc.gov.ng/>. Accessed on 26th March, 2020 .
 8. GBD 2016 Healthcare Assess and Quality Collaborators. Measuring performance the health care Access and Quality Index for 195 countries and territories and selected subnational locations: a systematic analysis from Global Burden of Disease Study 2016. Lancet. 2018 Jun 2; 391(10136):2236-2271.
 9. Kickbusch I, Leung GM, Bhutta ZA, Matsoso MP, Ihekweazu C, Abbasi K. Covid-19: how a virus is turning the world upside down. BMJ. 2020; 369:m1336. Published 2020 Apr 3. doi:10.1136/bmj.m1336.
 10. Lippi Giuseppe and Plebani. Mario The critical role of laboratory medicine during coronavirus disease 2019 (COVID-19) and other viral outbreaks. Clin Chem Lab Med 2020; aop. <https://doi.org/10.1515/cclm-2020-0240>
 11. Lippi G, Plebani M. Laboratory abnormalities in patients with COVID-2019 infection. Clin Chem Lab Med 2020; aop. <https://doi.org/10.1515/cclm-2020-0240>.
 12. Han H, Yang L, Liu R, Liu F, Wu KL, Li J, et al. Prominent changes in blood coagulation of patients with SARS-CoV-2-infection. Clin Chem Lab Med 2020; aop. <https://doi.org/10.1515/cclm-2020-0240>.