Data Management And Effectiveness Of E-Governance In Nigeria – Post Covid-19 Pandemic

Obike, Christopher Agaodi & Ugwu, Christian C.

Department of Public Administration and Local Government
University of Nigeria, Nsukka, Nigeria

ABSTRACT
The completeness and accuracy of data in the Nigerian health care system is a challenge. Studies have shown that the data quality, and by extension data integrity, has been suboptimal and thus poses a barrier to strengthening service delivery. This article showcases how the design process sparked the concept for an intervention to improve the integrity of public health data being collected in Nigeria. In collaboration with the Nigerian Institute of Medical Research (NIMR) and Lifebank, the Co-creation Hub team conducted formative research with the coronavirus disease (COVID-19) test center managers at NIMR. The insights informed the development of the features for an outbreak management system. These features were refined through an iterative process of development and continuous feedback from the end users. NIMR reported an improvement in its data collection process and data integrity. Using documentary sources, the study found out that by using e-governance techniques   it was observed that the integration of this intervention into the current health information system ensures an improvement in the accuracy and validity of health care data being collected and stored.
Keywords: Health Management Information System, Nigeria; SARS-CoV-2; Covid-19; Data Management and E-government

1.0 INTRODUCTION
The completeness and accuracy of data in the Nigerian health care system is a challenge. Studies have shown that the data quality, and by extension data integrity, has been suboptimal and thus poses a barrier to strengthening service delivery.

 February 27, 2022, is exactly two years since the index case of the dreaded Coronavirus disease of 2019 (COVID-19), was confirmed in Nigeria. But two years after that incident, preliminary results of the seroprevalence study conducted nationwide by the Nigeria Centre for Disease Control (NCDC), shows that over 50 per cent of Nigerians have been exposed to the virus, and have antibodies for COVID-19.
In other words, over 50 per cent of Nigerians have survived the virus, and have not been tested for COVID-19{Munanya, 2022}.
Also, most medical experts, who spoke to The Guardian, were unanimous that challenges persist in the health sector despite the billions of naira sunk into the healthcare delivery system in the last two years.
Even though opinions are, however, divided regarding lessons learnt in the course of managing the deadly virus, health professionals maintain that the country remains, perhaps better prepared now than she was on February 27, 2020, but without a guarantee that she is ready for future pandemics.
According to them, challenges facing the sector, including inadequate training, shortage of intensive care equipment and facilities' ability, keeping the required number of health workers in acceptable work climate etc., persist. They, therefore, urged the Federal Government to address key issues of human resources, financing, data management/research for evidence, local production of pharmaceutics and vaccines, as well as partnerships for health.
Today, large amounts of data are created and transferred from person to person on a daily basis through social media platforms, websites, etc, people seeking to connect with each other, send pictures, videos, graphics and so on.

However, up until the eruption of the COVID-19 pandemic, tech companies in Nigeria were not adept to this form of data due to deficiencies in collection and management.

Despite being in such a situation, tech companies are beginning to adapt and familiarize themselves with Big Data Analytics. For example, South African tech companies are in the early stages of employing big data solutions to ease governmental monitoring and surveillance for the purpose of ensuring security. This snowballs into the use of the technology to combat Coronavirus.

These firms are also offering modelling services to biomedical researchers interested in fighting the Coronavirus by using artificial intelligence and machine learning (both tools of Big Data Analytics) to probe pharmalogical and genomic data bases to retrieve knowledge on the virus. The results of this is the graphical expressions of the virus seen in adverts and campaigns during this pandemic.

More interestingly, tech and telecom corporations are increasingly using big data to monitor human movement during lockdown and social distancing measures. This creates a forecast on communities prone to high rates of infections. While these are implemented, there is a need to ensure privacy concerns and guidelines are followed. These are satisfied with collaborative governments who support this initiative. This is where the concept of Electronic governance is significant.

This article showcases how the design process sparked the concept for an intervention to improve the integrity of public health data being collected in Nigeria. In collaboration with the Nigerian Institute of Medical Research (NIMR) and Lifebank, the Co-Creation Hub team conducted formative research with the coronavirus disease (COVID-19) test center managers at NIMR. The insights informed the development of the features for an outbreak management system. These features were refined through an iterative process of development and continuous feedback from the end users.

NIMR reported an improvement in its data collection process and data integrity. Studies by Bosun Tijani, Tomi Jaiyeola and Zahra Kassam {2020} among others reported that (1) almost all data collection by the test center was now automated, thereby minimizing the proportion of inaccurate and repeat entry in comparison to data collected in other parts of the same center; (2) the auto-validation feature of the system ensured that all required fields of a patient's information were completed and verified, thereby ensuring 100% data completeness; and (3) the validation and verification feature ensured that patients' contact information was validated.

The integration of this intervention into the current health information system ensures an improvement in the accuracy and validity of health care data being collected and stored the researchers concluded.

Through the Global Partnership, the data hub was expanded with additional data embedded, including mobility data from Flowminder and Qatar Computing Research Institute. The hub was a user-friendly one-stop shop for COVID-19, used by the Government, the Presidential Task Force on Covid-19, the Nigeria Centre for Disease Control, and anyone else who wanted to understand Nigeria's dynamic situation.

The NBS brought into the hub additional critical information, including locations of health care facilities, cases by region, and locations of infection epicenters, drawn from diverse sources including Nigeria Centre for Disease Control, Our World in Data, and the MRC Centre for Global Infectious Disease Analysis at Imperial College. The essence of this paper is to explore the relevance of data in health studies especially in a pandemic like COVID-19.

Conceptualizing Data Management

Data management involves the collection, keeping, and using of data securely, efficiently, and cost-effectively. It is the ability for generated data to be readily available in the right format, at the right time, and at the right place.

It also involves control of the information in conformity with ethical standards. This ensures that the information is used specifically for the purpose it was generated, and not disclosed to unauthorised persons, corporate bodies or international community as the case may be.

Without effective data management, institutions would not be able to access the information they need to implement their strategies efficiently.

Data management ensures integrity of data. This means the accuracy and validity of data over its lifecycle within a digital environment. Maintaining data integrity and reducing the presence of bad data within organisations' systems should be the core focus of an effective e-governance" (Zylotech, 2021).

Data management is the process of ingesting, storing, organizing and maintaining the data created and collected by an organization. Effective data management is a crucial piece of deploying the IT systems that run business applications and provide analytical information to help drive operational decision-making and strategic planning by corporate executives, business managers and other end users (Craig Stedman, Jack Vaughan, 2021).

They went on to posit that data management process includes a combination of different functions that collectively aim to make sure that the data in corporate systems is accurate, available and accessible. Most of the required work is done by IT and data management teams, but business users typically also participate in some parts of the process to ensure that the data meets their needs and to get them on board with policies governing its use.

This comprehensive guide to data management further explains what it is and provides insight on the individual disciplines it includes, best practices for managing data, challenges that organizations face and the business benefits of a successful data management strategy. You'll also find an overview of data management tools and techniques. Click through the hyperlinks on the page to read about data management trends and get expert advice on managing corporate data.

Data management is an administrative process that includes acquiring, validating, storing, protecting, and processing required data to ensure the accessibility, reliability, and timeliness of the data for its users. Organizations and enterprises are making use of Big Data more than ever before to inform business decisions and gain deep insights into customer behavior, trends, and opportunities for creating extraordinary customer experiences (Molly Galetto March 31, 2016, March 31, 2016 Thought Leadership).

Data management in the context of the coronavirus pandemic, refers to the statistics of those infected by the disease, total fatalities, and recoveries. It also include logistics information, facilities (structures, equipment), location of facilities, treatment drugs, vaccines, number of personnel (frontline workers available) names and addresses of quarantined people, travellers from abroad during the period of the disease, people travelling outside the country, the demography of the people affected in each case, their ages, male or female., where they reside, etc.

These data are vital for policy formulation and decision making by some Government functionaries. It also facilitates planning response to the pandemic, as well as evaluating the effectiveness or otherwise of the response efforts.

Reliable information from governments also helps people make informed decisions about their daily routines, build public trust as well as enables public authorities to act decisively to flatten the coronavirus curve.

E-Governance:

E-governance is the application of Information and Communications Technology (ICT) to the performance of functions of governance. It includes the generation, storage, analysis, control, process, and communication of the data. It could involve the use of Electronic Document and Records Management System (EDRMS) to carry out government functions. The process involves digitisation of records and making such records easily accessible remotely thereby creating a digital economy.

The systems are specifically designed to manage the integrity of, and provide desktop and remote access to information enabling collaborative and integrated work flow. An EDRMS combines document management and records management functionality.

The aim of e-governance includes creation of a digital economy. This entails making government services available online through various platforms. This also includes opening of self-service websites to become self-service tools, and training and retraining of personnel to perform front line jobs. This enhances the quality of service delivery and job satisfaction in the public sector.

According to Eme, et.al, 2007 and Shilubane,   2001), e-governance is simply the use of information and communications technologies to carry out public services, which includes the use of the internet to provide services in a much more convenient, customer oriented and cost effective manner.

In the case of COVID-19, it involves the use of ICT to drive the Government's response to the pandemic. It was aimed at ensuring that COVID-19 related data were held in the right domain and would be made available in good time to appropriate authorities to aid decision making. This is because it is essential for Government to provide vital, accurate, useful, and up-to-date information for informed decisions to be made.

ICT would make access to the data through transmission via portals, social media platforms, internet, intranet, wireless networks, cell phones, Ipad, computers, etc. Such information aids logistics planning, provides details about the number and capacities of isolation centres, distribution of medication, personnel requirements, among others.

Research Design

Research design means outlining the name of equipment and other materials the research intends using, applying same to successfully execute the practical aspect of the research study. A research design is the basic plan which guides the collection and analysis phases of a research project. It is the framework which specifies the type of information to be collected and source of data collection procedure.

This study adopted a descriptive desktop method. It is important to determine the method and procedure adopted in this research report since it gives the reader the background information on how to evaluate the findings and conclusion.

The data for this research work were collected from secondary sources. In   secondary sources of data collection were based on the information from printed materials such as textbooks, Newspapers, Magazines, government publication, journals and internet materials. The NBS brought into the data hub additional critical information, including locations of health care facilities, cases by region, and locations of infection epicenters, drawn from diverse sources including Nigeria Centre for Disease Control, Our World in Data, and the MRC Centre for Global Infectious Disease Analysis at Imperial College. The technique of content analysis was used to analyze the data to transform them into information from these sources.

HISTORY OF THE PANDEMIC AND DATA MANAGEMENT TECNIQUES IN NIGERIA

The Coronarvirus (COVID19)   pandemic outbreak began in Wunjan Province in China in 2019 and was thought to be a local health challenge (epidemic) by the world. Unfortunately, the disease took the world by storm as the level of the infections topped 20 million people world-wide.

The Federal Ministry of Health has confirmed a coronavirus disease (COVID-19) case in Lagos State, Nigeria. The case, which was confirmed on the 27th of February 2020, is the first case to be reported in Nigeria since the beginning of the outbreak in China in January 2020.

The case is an Italian citizen who works in Nigeria and returned from Milan, Italy to Lagos, Nigeria on the 25th of February 2020. He was confirmed by the Virology Laboratory of the Lagos University Teaching Hospital, part of the Laboratory Network of the Nigeria Centre for Disease Control. The patient is clinically stable, with no serious symptoms, and is being managed at the Infectious Disease Hospital in Yaba, Lagos.

The disease spread to other parts of the country, which necessitated Federal Government's intervention through the setting up of the Presidential Task Force (PTF) as a response team to articulate, coordinate and drive Federal Government's response to the disease.

The Government of Nigeria, through the Federal Ministry of Health has been strengthening measures to ensure an outbreak in Nigeria is controlled and contained quickly. The multi-sectoral Coronavirus Preparedness Group led by the Nigeria Centre for Disease Control (NCDC) has immediately activated its national Emergency Operations Centre and will work closely with Lagos State Health authorities to respond to this case and implement firm control measures.

Health authorities assured all Nigerians that have we have been beefing up our preparedness capabilities since the first confirmation of cases in China, and we will use all the resources made available by the government to respond to this case.

To add currency to the fight, they all started working to identify all the contacts of the patient, since he entered Nigeria. They did this in order to remind the populace that most people who become infected may experience only mild illness and recover easily, but it can be more severe in others, particularly the elderly and persons with other underlying chronic illnesses. All Nigerians should take care of their health and maintain hand and respiratory hygiene to protect themselves and others, including their own families, following the precautions below:

1. Regularly and thoroughly wash your hands with soap and water, and use alcohol-based hand sanitiser.
2. Maintain at least 1 & half metres (5 feet) distance between yourself and anyone who is coughing or sneezing.
3. Persons with persistent cough or sneezing should stay home or keep a social distance, but not mix in crowd.
4. Make sure you and people around you, follow good respiratory hygiene, meaning cover your mouth and nose with a tissue or into your sleeve at the bent elbow or tissue when you cough or sneeze. Then dispose of the used tissue immediately.
5. Stay home if you feel unwell with symptoms like fever, cough and difficulty in breathing. Please call NCDC toll free number which is available day and night, for guidance- 0800-970000-10. Do not engage in self-medication
6. Stay informed on the latest developments about COVID-19 through official channels on TV and Radio, including the Lagos State Ministry of Health, NCDC and Federal Ministry of Health.

Dr Osagie Ehanire, the health minister warned citizens not abuse social media and indulge in spreading misinformation that causes fear and panic. The Federal Ministry of Health according to him, through Nigeria Centre for Disease Control, will continue to provide updates and will initiate all measures required to prevent the spread of any outbreak in Nigeria.

The president had on March 9 constituted the Presidential Task Force (PTF) on COVID-19 chaired by the Secretary to the Government of the Federation (SGF), Boss Mustapha, with membership from various sectors.

Since then, the PTF has coordinated a multi-stakeholder response to the pandemic while providing technical and material support to states to manage the outbreak.

The PTF also serves as an advisory body to the president on specific decisions such as imposing and lifting lockdowns. It provided daily feedback to Nigerians on the work being done to contain the pandemic through media briefings.

Sani Aliyu was appointed as the national coordinator of the PTF.

Apart from the local and international support Nigeria received, one response many Nigerians paid attention to was the philanthropic donations by big companies, organisations and individual Nigerians.

The PTF comprised the Secretary to Government of Federation as the Chairman, the Minister of Health, the Director General of Nigerian Centre for Disease Control (NCDC), the Minister of Education, among other members.

The tasks of the team include developing response templates and enforcing approved presidential directives to the against the disease. The worked collaboratively with the NCDC in gathering data on infected people, those successfully treated and discharged, as well as number of deaths resulting from the disease.

The management design of the pandemic as reported and documented by Bosun Tijani, Tomi Jaiyeola, and Zahra Kassam (2020) inspired the deployment of an automated data collection and management system based on the one used for NimCure for TB management. Through the engagement of all the relevant stakeholders during multiple rounds of iteration, this simple solution evolved into a practical digitized data management system that promotes data integrity and helps test centers more efficiently manage data.

Unique value proposition: By automating and streamlining data collection, the outbreak management system makes it easier and faster to manage data. The system retrieves information on demography, symptoms, pre-existing conditions, recent contact, and travel history to identify and triage high-risk cases that require testing. Some of the system's key features are described here.

1. **Case reporting form:** People who think that they might have the virus and want to get tested can communicate their symptoms and request to be tested by completing an online digital form. Prospective patients submit the form to allow necessary information to be gathered faster and recorded more accurately.
2. **Triaging/eligibility indication:** The system automates the screening and triaging process based on the Nigerian Center for Disease Control case criteria to ensure that test centers' capacity and resources are directed first toward cases with the highest risk level.
3. **Phone number verification:** This feature runs every phone number submitted on the platform through a nationwide database to confirm existence and validity.
4. **Address validation:** Using Google maps application programming interface, the system can validate every address provided to confirm that they indeed exist on the map.
5. **Access control:** The classification of users with specific privileges helps maintain data protection by ensuring data can only be accessed and modified by appropriate and qualified users.
6. **Privacy:** A unique identification code ensures the privacy of patients' data.
7. **Contact tracing data**: The system collects a list of persons that each case may have been in recent contact with in the past to understand how the individual contracted the virus as well as who they may have been in contact with since the possible contracting point. These data are collected to support contact tracing for positive patients.

Duplicate entry restriction: Repeat or duplicate entries are detected and restricted based on name, phone number, email, and date of birth. This helps to ensure that all submissions are unique to a specific individual and that patients cannot make multiple submissions (Tijani, Jaiyeola, and Kassam,2021,p.230-231)

By automating and streamlining data collection, the outbreak management system makes it easier and faster to manage data.

Other features that were included during iteration were: test invitations, appointment scheduling, and result reporting.

When COVID-19 hit, there were global fears over what would happen in Africa's most populous nation. More than 200 million people live in Nigeria, with several informal settlements constituting hotspots, so concerns were high that the already overburdened health care system would not withstand a rapid spread of the virus. There were also fears that low public trust in health care systems and widespread misinformation about the virus would add to the challenges of effectively controlling COVID-19.

Having data, evidence, and easy access to information was vital for this West African nation during the pandemic, and the Government wanted to draw information together to make it easier to use and understand.

The Global Partnership, UNECA, and their partners worked with the National Bureau of Statistics in Nigeria (NBS) to create a comprehensive data hub to show where cases of COVID-19 were occurring and what support might be needed.

The Global Partnership identified the GRID3 Consortium (the nonprofit Flowminder, the location-based data services company Fraym, Esri, and the United Nations Population Fund), Qatar Computing Research Institute, Surgo Foundation, as solutions providers that would enable the NBS to update its existing COVID-19 tracker into a more robust COVID-19 data hub.

The PTF has responsibility for logistics planning, coordination of international aids for COVID-19, liaison with State Governments for a coordinated approach to the fight against the disease. As at 11th July 2021, Nigeria had reported a total of 168,552 cases, 2,124 deaths, and 164,439 recoveries.

E-GOVERNANCE APPLICATION IN A POST-COVID-19 ERA
Without a vaccine, in early 2020 the first line of defense against the pandemic was good data. Governments needed to see where the virus was spreading and where the vulnerable populations were concentrated, and to monitor the stocks of medicines and personal protective equipment available.

An early priority for Governments across Africa was to develop ways to bring together available data and make it easy to visualize for hard-pressed government decision-makers trying to protect public health, food security, and the economy. The Global Partnership and UNECA mobilized partnerships to share data across government and between the public and private sectors, and to make data easier to access and understand.

The Global Partnership facilitated the development and strengthening of COVID-19 data hubs in seven countries. Countries were able to develop data dashboards featuring visual, analyzed data of confirmed cases, recoveries, deaths, and other indicators that could inform COVID-19 actions from Governments, businesses, and communities. These data hubs were able to provide immediate insights into the virus's spread as well as the social and economic impacts. They also provided a foundation to add other metrics to be used for other needs, including future pandemics, health interventions, or climate change adaptation.

In many cases, government officials needed to rapidly acquire new skills to enable them to take advantage of new data sources and develop insights. The Global Partnership facilitated capacity-building partnerships to support immediate pandemic insights across 14 countries: Burkina Faso, Central African Republic, Ghana, Madagascar, Mauritius, Namibia, Nigeria, Senegal, Sierra Leone, Somalia, Somaliland, South Sudan, Togo, and Zambia. The study focuses on Nigeria.

For e-governance to be effective in the post-COVID-19 era, the following should be put in place:

(i) Remote Working
Some government functions that could be performed remotely should be encouraged to be done remotely from home or wherever through the use of ICT equipment such as laptops, desktops, tablets, mobile phones, etc. It is important to state here that government has to provide the necessary equipment as well as internet access for its workers in the remote office.

This would enable workers work from home and submit finished or draft jobs to the appropriate supervisors. Supervisors' feedback would also be sent to the worker seamlessly, and vice versa, till a job is completed.

(ii) Zoom Platforms
Effective data management could facilitate electronic meetings and training between and among government functionaries. This would reduce physical contact among persons and thus reduce the chances of contracting of coronavirus disease.

Video conferencing, cloud phone, webinars have blossomed during the pandemic. The platforms provide alternative to physical meetings which was considered as one the places coronavirus is contracted. Sustained use of the platforms would help in the social distancing protocol, and thus contribute to the effectiveness of e-governance.

(iii) Online Services by Government Functionaries
Data management and e-governance would enhance accessibility of government services without having to go to their offices physically. Nigerian Immigration Service (NIS) has operationalised this initiative already. Applications for Nigerian international passport could only be done online with effect from 1st June 2021. This development would curtail congregation of passport applicants in NIS offices, thereby reducing the chances of spread of COVID-19 and other communicable diseases.

It is essential then to create a technologically literate workforce, as well as citizens for effective online services delivery.

(iv) Data/Information Sharing among Government Functionaries
Effective data management would enhance data sharing among government functionaries. It is no doubt that a lot of COVID-19 related data have continually been generated from February 2020 when Nigeria recorded its first coronavirus case till date. The data are domiciled with the Nigerian Centre for Disease Control (NCDC). The data are essential to other government functionaries like the Nigerian Immigration Service (NIS), Nigerian Population Commission (NPC), among others.

E-governance would facilitate exchange of data/information and reduce inefficiency in governance. Leveraging accurate data is essential for inter-agency relationships.

As data are generated through various sources, there would be the need to have a centralised data reservoir, which could be accessible by authorised persons and organisations. Such readily available data would facilitate and enhance efficiency and effectiveness in service delivery by relevant institutions and organisations throughout the country.

It is cost-effective to centralise data from multiple sources and made accessible to the appropriate users. However, the central data are to be constantly updated and remain in sync. This would ensure the validity and accuracy of the data held in the system. Irrespective of the data governance strategy adopted, it is imperative to maintain consistency in standards, quality and accuracy.

The Government should formulate data policies that would ensure integrity of data and its use. Once an effective data policy is in place, Government agencies and institutions will begin to achieve better strategic outcomes through more informed decision making (Zylotech, 2021). However, this is premised on data integrity and ability of the institutions to leverage the resources.

(v) Internet Access

For data management to be effective post COVID-19, internet access has to be made available, stable and cheaper. Faster, cheaper and wider coverage of internet connectivity would enhance online transactions which is vital for a digital economy.

Widespread adoption of e-governance will not only impact citizen-to-government relationships positively, it will also positively impact how government prosecutes many of its functions (Omode, 2020, 40). This implies that the vast areas in Nigeria should be covered for residents in remote areas to be able to access internet services.

At the moment, many remote areas in Nigeria are still without electricity, and they lack the financial capacity buy generators to power their homes. This would be an impediment to the e-governance initiative. The imperative of electricity in the e-governance project is discussed further in (vi) below.

Government should, as a matter of urgency, address the power needs of the rural areas, to make the data management and e-governance project effective.

(vi) Electricity Supply

Power supply is essential to make for effective data management post COVID-19. Absence of it would mar the initiative and may lead to system failure. Electricity is critical to drive the system and its availability would facilitate storage and retrieval of data.

Nigeria currently generates about 3000 to 4000 megawatts of electricity, which is a far cry to what is required to provide power for a population of over 200,000,000. This is abysmal and is responsible for the blackout and epileptic power supply in the country experienced daily.

Nigeria therefore, needs huge investment in the power sector, to scale up the capacity in order to support data generation, storage and retrieval. Without this, the envisaged digital economy would be a mirage, and would tantamount to failure of e-governance project as the digital environment would become highly complex.

(vi) More Investment in ICT Infrastructure

In order to ensure the effectiveness of e-governance post COVID-19, there should be massive and sustained investment in ICT infrastructure in Nigeria. The ICT world is ever evolving, and for any system to be able to cope with the dynamics of technological advancements, it has to be constantly updated with the latest versions of system applications. It requires a lot of money to keep up to speed with developments in the ICT world.

There should also be investment in capacity building to equip the backdoor and frontline operators of the systems with the required skills, to make the e-governance project a reality. The citizens should also be enlightened and exposed to ICT through programmes sponsored by Government and non-governmental organisations. ICT centre could be established in the Local Government Areas, and training facilities and trainers provided to train the locals on the use of ICT and also to take advantage of the various opportunities present the industry.

CONCLUSION

This paper carefully revealed how advent of Covid-19 exposed deficiency in different sectors of our existence as a nation. It focused on the health sector arguably because it is considered as the most affected sector. From the discourse, it is evident that there was hardly a sector that did not feel the impact of this pandemic.

The data management and effectiveness of service delivery post COVID-19 is dependent on several factors including the ones highlighted above. The effectiveness is measured by the ability to access data/information in good time to satisfy a given need. Its effectiveness in the post-COVID-19 is essential as Government, organisations and individuals would depend on it to aid effective decision making. Digital economy is anchored on an effective data management system and broad ICT penetration.

It is recommended that the points enumerated above be applied to ensure effectiveness of data management in post-COVID-19 Nigeria. This would lead to automated services delivery nationwide. It would also revolutionise the functions of government and ensures transparency and accountability in service delivery.

The NBS has worked to build capacity within agencies as well as data culture awareness, which has been especially necessary in the nation's battle to contain COVID-19.

Working across the Government and getting as much data as possible, made available for anyone to see, was necessary to build trust about the seriousness of the pandemic. The NBS wanted to make sure whenever someone looked for information about cases, they would see the same numbers. These require inter agency collaboration in the health sector.

The poor data situation is redeemable in the light of the recommendations of this paper and the suggestions from other scholars; that all Nigerians must consider data collection as a necessity and be com-mitted to creating a reliable database in the country

REFERENCES

CcHub and NIMR launch NimCure—a digital tool to promote adherence to treatment by TB patients. Co-creation Hub website. October 9, 2018. Accessed September 27, 2021. https://cchubnigeria.com/cchub-and-nimr-launch-nimcure-a-digital-tool-to-promote-adherence-to-treatment-by-tb-patients/

Crone, D{2020}. Insights from Africa's Covid-19 Response: the Nigeria CDC., London: Tony Blair Institute.

Dan-Nwafor, C Ochu, L. C, Kelly, E, Oladejo, J, Ilori, E & Umeokonkwo, C. et.al{2020}, Nigeria's public health response to the COVID-19 pandemic: January to May 2020, www.jogh.org December, Vol. 10 No. 2 doi: 10.7189/jogh.10.020399

Eme, O.I. (2007), "E-Government in Nigeria: Benefits, Problems and future challenges. *Nigeria Journal of PALG.* Vol XIII No.1 of May, Pp: 127-133.

FederalRepublicofNigeria{2018},https://ncdc.gov.ng/themes/common/files/establishment/fdaa94605dcb8 7478f9b12002ff7eeb7.pdf

Galetto, M.{2016},What is Data Management?, Thought Leadership, March 31, 2016, https://www.ngdata.com › Thought Leadership.

Nigeria Centre for Disease Control. COVID-19 Outbreak in Nigeria Situation Report S/N 54. Abuja; 2020. [Internet]. 2020 [cited 2020 Apr 23]. Available from: https://ncdc.gov.ng/diseases/sitreps/?cat=14&name=An%20update%20of%20COVID-19%20outbreak%20in%20Nigeria.

Olugbenga, O. et al. {2021}, Exposure to known COVID-19 infection risk factors among healthcare workers responding to COVID-19 outbreak in Lagos State, Nigeria-2020. Journal of Interventional Epidemiology and Public Health. 2021;4(2):8. [doi: 10.11604/JIEPH.supp.2021.4.2.1131]

Available online at: https://www.afenet-journal.net/content/series/4/2/8/full

Omode, T. (2020) "E-Governance In Action" http://www.egov.unu.edu.events

Tijani B, Jaiyeola T, Oladejo B, Kassam Z. Improving data integrity in public health: a case study of an outbreak management system in Nigeria. *Glob Health Sci Pract*. 2021;9(Suppl. 2):S226-S233. https://doi.org/10.9745/GHSP-D-21-00240

WHO. WHO, Director-General's opening remarks at the media briefing on COVID-19. WHO. 2020. Accessed March 4 2020.

WHO. Coronavirus disease (COVID-19) Situation Report; Reports - 205. WHO. 2020. Accessed August 19 2021.

WHO Africa. Situation reports on COVID-19 outbreak - Sitrep 25. WHO Africa. 2020. Accessed 19 August 2021.

Zycotech Solutions Private Limited *https:www.zaubacorp.com*