

# The COVID-19 response in Nigeria: Adequate protection of a fragile healthcare delivery system

Adeola T. Kola-Mustapha<sup>1\*</sup>, Uloma Ubani-Ukoma<sup>2</sup>, Margaret O. Ilomuanya<sup>2</sup>, Petra O. Nnamani<sup>3</sup>

<sup>1</sup>Department of Pharmaceutics and Industrial Pharmacy, Faculty of Pharmaceutical Sciences  
University of Ilorin, PMB 1515 Ilorin, Nigeria

<sup>2</sup>Department of Pharmaceutics and Pharmaceutical Technology, Faculty of Pharmacy, University of Lagos, Nigeria.

<sup>3</sup>Public Health & Environmental Sustainability (PHES) Research Group, Department of Pharmaceutics, University of Nigeria Nsukka 410001

## ARTICLE INFO

### Article history:

Received 17 Jan 2021  
Revised 24 Feb 2021  
Accepted 6 Mar 2021  
Online 31 Mar 2021  
Published -

### Keywords:

COVID-19 outbreak  
Nigeria  
Laboratory diagnosis  
Epicurve  
Nigeria Centre for Disease Control

### \* Corresponding Author:

atkmusty@yahoo.com;  
kola-mustapha.at@unilorin.edu.ng  
<https://orcid.org/0000-0001-8281-470X>  
+234-8033475485

## ABSTRACT

**Background:** The COVID-19 pandemic has impacted the healthcare system in Nigeria. The response of the government has been one that places the health and well-being of the people at its highest priority. This was evidenced by the instituted lockdown of the country soon after the first cases emerged. Specific information on appropriate hygiene, safety, and security was provided through the Nigeria Centre for Disease Control (NCDC) and several health-based organizations. This provided a clear direction on what actions the citizens should take when they start to feel ill especially if they showed the classic symptoms of the disease. The purpose of this study is to review the impact of COVID-19 on the fragile healthcare system in Nigeria and proffer recommendations.

**Methods:** A review of the COVID-19 response in Nigeria was hinged on highlighting the impact of the pandemic on the fragile healthcare system.

**Results:** Recommendations and outlook were suggested to mitigate the impact of the pandemic on the fragile healthcare system in Nigeria.

**Conclusion:** Reviewing and implementing new human resource policies in response to these changing circumstances and regulations is continually required. Continuous monitoring of the COVID-19 situation and understanding what guidance is being offered will be essential to the crisis management leadership team (task force) dedicated to leading the effort in Nigeria.

## 1. Introduction

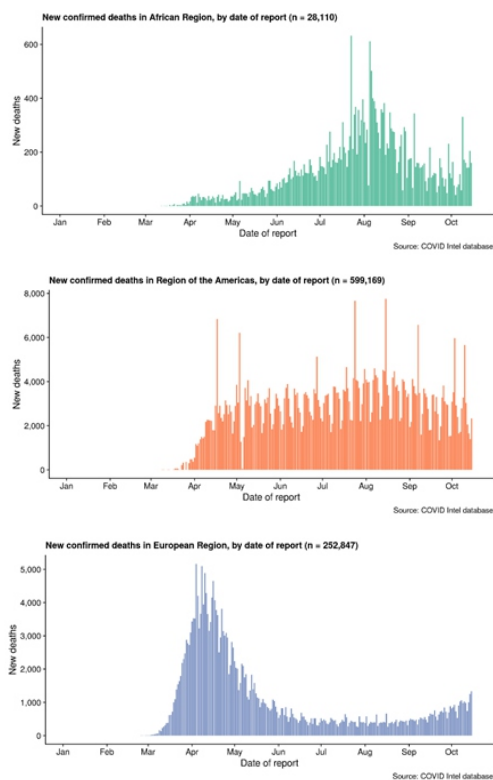
As regards the global COVID-19 response, the existing healthcare systems, geographical patterns, political engagements, state of the economy, and societal layout greatly influenced the response of countries all over the world. The high transmission rate of the SARS-Cov-2 virus had therefore triggered each country, to devise strategies to mitigate the impact of the COVID-19 pandemic. The responses gave different degrees of results as the peculiarities of the pandemic era unfolded. However, it is obvious that the current health care system in Nigeria, like in other countries in Africa and by extension globally cannot handle a pandemic of this magnitude effectively<sup>1</sup>.

Nigeria as a developing country, the most populous country amongst the 55 countries in Africa, was not left out of this loop, as the strategies adapted initially, aligned largely to global guidelines set for the COVID-19 fight. The reality is that the application of global guidelines had to be modified to suit the

peculiar Nigerian situation, far different from the developed countries. Prevention measures enforced included emphasizing physical distancing, closure of land and air borders, the imposition of lockdown and curfew, restriction on interstate travels, closure of schools, religious houses, hotels, and entertainment centers, restriction on the number of people at gatherings, restriction on the number of operating hours for essential services such as banks, only senior-level public servants were allowed at work and the wearing of face masks in public<sup>1</sup>. The initial total lockdown was eased largely due to the negative huge impact on the economy. Many Nigerians are daily earners who depend on daily wages as rewards for work done.

The peculiarities of the Nigerian terrain span the poverty level, low budget allocation to the health sector, the fragility of the health care system prior to the incidence of corona virus outbreak, limited access to healthcare, high infectious disease burden such as malaria, tuberculosis, HIV and Lassa fever, high population clusters, protracting conflicts and insecurity in

some states and other societal determinants. These obvious deficiencies had triggered the fear that the country would be overburdened by the pandemic when compared with developed countries who had advanced health systems. Against the initial expectations and predictions of the COVID-19 transmission level and its attendant impact on African countries, indeed these countries have reported a lower level of cases in comparison with the rest of the world. The World Health Organization sounded an alarm that if the virus was not curtailed, it could lead to 190,000 deaths in the African continent. As of 15th October 2020, the number of confirmed cases was 60,984 with 52,194 discharged and 1116 confirmed deaths in Nigeria<sup>2</sup>. While in the African continent as of 16th October 2020, 28,110 deaths were recorded as against 599,169 deaths recorded in the Americas region and 252,847 deaths in the European region (Figure 1)<sup>3</sup>. The reason for this is far from being established, but factors such as the high youth population, experience with tackling community infections such as Ebola and Lassa fever, the culture that ensures the elderly live with families instead of care homes which could lead to increased spread, low population density in rural areas, tropical climate conditions of the continent and fast adoption of lockdown measures are being speculated<sup>4,6</sup>. However, since the testing rates are quite low, some infected cases may have been missed as well as some COVID-19 deaths are unrecorded<sup>4</sup>. Even though it is being agreed that the death rate is not as bad as was projected initially. Figure 1 shows the new number of confirmed COVID-19 deaths from mid-March to mid-October 2020 in the regions of Africa, America, and Europe. In this manuscript, we present the impact of COVID-19 on the Nigerian healthcare system.



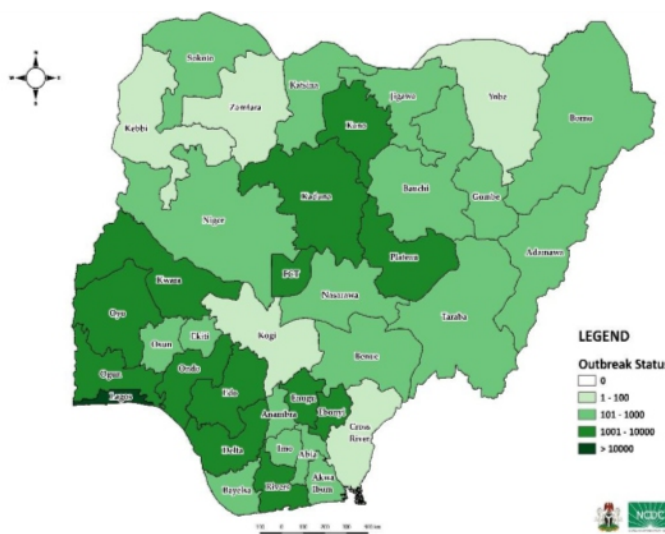
**Figure 1:** New number of confirmed COVID-19 deaths from mid-March to mid-October 2020 in African, American and European Regions<sup>3</sup>

## 2. Overview of COVID-19 in Nigeria:

The index case of COVID-19, a traveler from Europe was detected on February 27, 2020<sup>7</sup>. This spiraled the start of contact tracing and quick response of the virus containment in Nigeria. The Federal Government of Nigeria set up the Presidential Task Force (PTF) on COVID-19 on March 9, 2020, with a mandate to coordinate all aspects and provide strategic directions for Nigeria's response to COVID-19<sup>8</sup>. The Nigeria Center for Disease Control (NCDC) also stepped up to take on roles which include enhancing the country's readiness and response to the pandemic through public awareness campaigns, information dissemination, contact tracing of confirmed COVID-19 cases, training of healthcare personnel, and setting up COVID-19 laboratories (over 95) across the nation with about 157 accredited sample collection points staggered all over the states among others<sup>2</sup>.

### 2.1 NCDC epidemiology report

The NCDC report as at October 16, 2020 showing the spread of the pandemic across the 36 states of the federation including the Federal Capital Territory (FCT) is represented in Figure 2. The map shows that all states and the FCT have confirmed cases of the virus with Lagos state having the highest number of confirmed cases and therefore the epicenter in Nigeria. The report also shows a 64% prevalence in males and 36% in females (Fig. 3) with persons aged 31 – 40 years being most affected<sup>9</sup>.



**Figure 2:** Nigerian Map showing COVID-19 demographics across the 36 states and FCT<sup>3</sup>

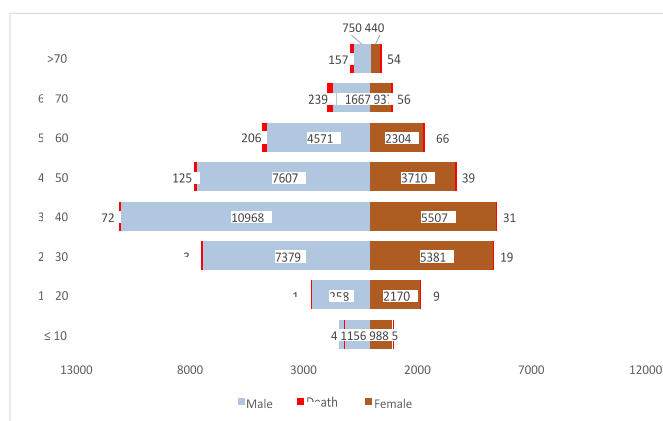


Figure 3: Age-gender breakdown of COVID-19 confirmed cases and deaths (29th February to 24th October, 2020) in Nigeria<sup>9</sup>.

### 3. COVID-19 response

The Federal Government declared a lockdown from the 30<sup>th</sup> of March to the 1<sup>st</sup> of June at the initial phase to mitigate the spread of the COVID-19 virus. Thereafter, there was a phased reopening of socioeconomic activities as the lockdown negatively impacted the Nigerian economy as witnessed globally. There was increased budgetary allocation, canvassing for funds from donors, and dedicated spending on tackling the COVID-19 pandemic<sup>10</sup>. Financial aid and materials were donated by different organizations and individuals.

Initially, sampling, sample turnaround, number of testing centers available were grossly inadequate. Currently, more laboratories, both private and public have been accredited for COVID-19 testing now totaling over 95<sup>11,12</sup>. Other challenges include lack of adequate diagnostic laboratories to meet up with the volume of testing, testing kits were not widely available which would be a lead to infected persons, contact tracing, and isolation of all infected persons.

### 4. Treatment and prevention

Series of training were set up to meet up with the skillsets necessary for healthcare workers. The Ministry of Health conducted a capacity building program on pandemic response and maintaining essential services via e-learning platforms; and trained national and state-level program managers who in turn trained the health workers at the local government level. There were information dissemination and orientation on prevention measures through radio jingles.

4.1 Community contact/Return travelers tracing: Control of entry into the country witnessed outright closure initially (March – Sept/Oct), followed by the phased reopening of the local airports, then international flights. Arranged repatriation flights accompanied by supervised quarantine initially were initiated and thereafter, the returnees were allowed to self-quarantine. Of note are the security issues and long-drawn conflicts in the North-Eastern region of Nigeria which culminated in the setting up camps for Internally Displaced Persons (IDPs). These IDPs Camps are mostly overcrowded making them a vulnerable population for the spread of COVID-

19<sup>13</sup>. Host communities in conflict-ridden areas also formed part of the inaccessible communities due to insecurity and were, therefore, cut off from essential health services. Therefore, a plan which entailed coordination of health organizations with other sectors involved in camp coordination and management, provision of water and shelter, was set in motion to control the spread in these vulnerable groups<sup>13</sup>.

The cost of controlling the pandemic is largely borne by the Government<sup>14</sup>. The National Health Insurance Scheme (NHIS) was not activated to offset the cost of care since most patients pay for health care out of pocket. In Nigeria, the norm is for privileged people to travel out of the country for health tourism (diagnosis and treatment). However, border closures and restricted travels made this practice impossible. This further exposed the vulnerability of the health system and its inadequacies.

Still, a percentage of Nigerians do not believe that COVID-19 truly exists. Therefore, there has been an open disregard for all the precautionary rules. This set of people do not adhere to social and or physical distancing guidelines, not wearing face masks and gloves; nor washing their hands or using hand sanitizers. This ultimately increased the risk of transmission in the communities. The open disregard has been associated with misinformation/propaganda, distrust in governance, and the belief that COVID-19 is a scam put in place to siphon public funds. This is aside from the erroneous belief that it is a disease that affects only elites and does not affect black people and people living in the tropics.

Some measure of success had been recorded in Nigeria in terms of initially identifying the index case, successfully treating him, identifying, and tracking individuals that physically encountered infected persons and suspected cases.

### 4.2 Limited focus on other diseases aside COVID-19

While COVID-19 takes the center stage in the year 2020, other diseases such as communicable, non-communicable, and chronic diseases like tuberculosis, HIV, cardiac-related diseases, diabetes had been given less attention. Human and financial resources were diverted from regular healthcare to combatting the pandemic<sup>15</sup>. The knock-on effects of the pandemic on other disease management can be devastating. Keeping the health care services accessible is important in averting preventable loss of additional lives.

The initial scare of the rapid spread of the virus gave way to reluctance by health care workers (HCWs) to attend to emergencies from patients who may have crises from other disease conditions. The hospitals were also less receptive to admitting patients. These decisions were based partly on the non-disclosure of patients' travel history or their exhibiting apparent COVID-19 like symptoms when they are being clerked on their first visits. This lack of disclosure had led to a v o i d a b l e e x p o s u r e o f H C W s t o t h e asymptomatic/symptomatic patients. Unfortunately, genuine patients with other disease states were sometimes denied access to treatment which led to the deaths of some patients. The hospitals initially turned away patients to reduce the risk of overcrowding and getting exposed to asymptomatic COVID-19 patients. The high-risk patients were reluctant to visit hospitals/consult physicians borne out of fear of being labeled

COVID-19 patients, had hampered the chronic disease management. Also, the erroneous belief that the hospitals are the breeding grounds for COVID-19 had kept most patients at home.

Surgeries were also delayed initially, and only emergency procedures were carried out. This decision was also taken to combat the spread of the virus and limit the risk of further endangering health workers and patients who already could be immunocompromised. Patients were faced with the rescheduling of non-urgent surgeries and monitoring appointments. This led to an overwhelming buildup of surgeries to be handled by an inadequate number of surgeons. There was a shift in the hospitalization of patients with other ailments as out-patient services were mainly advocated.

#### **4.3 Reliance on telehealth and teleconsultation**

Telehealth is related to the smart clerking and diagnostics of minor ailments over the phone between the health care provider and the patient which mitigates that of contracting the virus via physical meetings. There was an increase in the use of telehealth in Nigeria for consultations, although this was difficult to implement initially. Since national health data management, diagnostics data capture, and storage of Nigerian citizens are unavailable. Some routine clinics deployed patient follow-up through phone consultations to reduce their visits to the hospitals<sup>16</sup>.

#### **4.4 Setting up of dedicated isolation centers in different states in Nigeria**

In Nigeria, hospitals are divided into primary, secondary, and tertiary institutions. These are in the thirty-six states in the country and FCT. In preparation for the expected surge in COVID-19 cases, isolation centers were set up in different locations in each state. Lagos state, being the epicenter of the pandemic, had built an additional number of isolation centers to increase the number of hospitalization beds. This was in anticipation of a surge in the number of infected patients which would necessitate the provision of beds for the infected in designated areas.

However, infected patients or individuals who showed obvious symptoms sometimes refused to visit the hospitals and isolation centers for fear of being stigmatized. They preferred to stay at home and resort to self-medication and home-made remedies. Patients opting for self-medication and the use of herbal remedies<sup>17</sup> had led to overdose and complications arising from unsupervised therapy<sup>18</sup>.

#### **4.5 Reduced access to monitoring programs, health promotions, immunization and screening campaigns**

Routine checkups (dental, optical, and physiotherapy) and health monitoring of patients were de-emphasized. The impact on vaccination campaigns and deliveries had been huge as the restricted movement and reduced access to transport persisted.

#### **4.6 Impact on healthcare workforce**

The challenges affecting health care workers include limited access to protective gears such as personal protective equipment (PPE)<sup>19</sup>, low remuneration which has led to a lot of agitation, strike actions to get the FG to improve the salaries

and allowances of HCWs, the attendant low morale, and insufficient skilled HCWs in the workforce which has overstretched the few. In Nigeria, the medical doctor to patient ratio is 3.806 per 10,000 population, pharmacist to patient ratio is 1.259 per 10 000 while nurses and midwives are 11.792 per 10,000 population<sup>20</sup>

The workforce had further dwindled due to some of the Nigerian HCWs taking up appointments in advanced countries (who are massively recruiting to overcome the overwhelming need for skilled personnel to combat the pandemic). This has further led to brain drain and depletion of the grossly inadequate workforce in the health sector. The situation was further worsened by doctors and other health worker's strikes demanding PPE and increased hazard allowances. Unfortunately, some HCWs got infected, with some dying from COVID-19 complications<sup>19,23</sup>.

The most touted equipment, the ventilator was hardly acquired and utilized<sup>24</sup>. Local manufacturers stepped up to make face masks, PPEs, hand sanitizers, and make-shift wash areas (for washing of hands). PPEs and various medical supplies were donated by individuals, countries, foreign and local organizations, and associations<sup>25</sup>. Down the line, specific COVID-19 infection prevention and control measures have been put in place in healthcare facilities to reinstate patient's confidence in the safety of the facilities when visited.

#### **4.7 Impact on mental health and surge in consultation on mental health issues**

During this period, a lot of people experienced mental issues such as anxiety and depression<sup>26</sup>; stemmed from the loss of jobs, loss of daily income, prolonged lockdowns, non-access to religious/worship centers, schools, having to juggle working from home and taking care of young children at the same time, impact on physical health/activities<sup>27</sup> which led to weight gain, lack of access to balanced nutrition and so on.

#### **4.8 Drug importation, exportation, distribution, and impact on drug security**

Seamless and unrestricted access to essential medicines/pharmaceuticals is a key factor in the successful healthcare delivery of any country. Medicines are important in the prevention and cure of different ailments that affect patients. Nigeria depends largely on the importation of pharmaceuticals<sup>28</sup>. Over-reliance on the importation of medicines, active pharmaceutical ingredients (APIs), and excipients have created a big challenge at this time of restricted supplies due to the pandemic. It is increasingly difficult to import from other countries as there are policies in place in those countries to limit exports of essential medicines and materials<sup>29</sup>. These countries agreeably are looking out to ensure they safeguard their reserves for their citizens. Moreover, there is reduction in capacity of most manufacturing companies resulting from partial and total shut down.

An increase in the circulation of counterfeit, adulterated, and falsified medicines (thereby endangering the lives of the populace) is a direct fall out of the pandemic enacted restricted access to medicines<sup>28</sup>. Most hospitals were understocked with drugs as the supplies were depleted due to restricted movement. This increased the risk of patients getting

counterfeit or expired medicines, since the medications are purchased outside the hospital.

#### 4.9 Impact on maternal and child health

It is estimated that about 20% of the global maternal death occurs in Nigeria<sup>30</sup> and this could worsen with the COVID-19 pandemic. The under-five child mortality rate in Nigeria was also projected to increase to about 950 per day if routine health care services such as immunizations were disrupted<sup>31</sup>. To avert these predictions, the Lagos State Government pledged to bear the medical bills of pregnant women and patients in need of emergency services during the lockdown. Within three weeks of the lockdown, over 600 childbirths and 18,000 persons accessed this free medical care<sup>32</sup>.

#### 4.10 Drive to get COVID-19 herbal therapy

There have been concerted efforts to develop herbal drugs from natural products by academic researchers and traditional medical practitioners (TMPs). The dream to join the development of vaccines league is being truncated by the poor technological facilities in Nigeria. The research sector has been grossly underfunded with poorly equipped labs and non-availability of chemical consumables<sup>33</sup>. Currently, there is spotlight on the role of herbal medicine in the past pandemic, challenges of antiviral herbal therapies, higher education, science, and innovation as well as validation of local remedies. However, there are currently developed antiviral herbal remedies submitted to NAFDAC for listing.

### 5. Conclusion

Globally as of 28th October 2020, the count of confirmed COVID-19 cases is 42,512,186 with 1,147,301 deaths resulting in a case fatality rate of 2.7%. In Africa, the count of confirmed COVID-19 cases is 1,716,864 with 41,262 deaths resulting in a case fatality rate of 2.4%. The World Health Organization sounded an alarm that if the virus was not curtailed, it could lead to 190,000 deaths in the African continent. In contrast, the trend is not as earlier projected. Nigeria has observed a provenance of 72% travel history, 26% contacts, and 2% unknown exposure and has recorded 62,224 confirmed cases, 57,916 discharged cases with 1,113 confirmed fatalities as of 28th October 2020. Though Nigeria is faced with many challenges including inadequate testing, poor economy, and other co-morbidities (such as malaria, Lassa fever), other communicable and non-communicable diseases, she is not relenting in her fight against COVID-19 spread. The recent uprising of the youth against the proscribed Special Anti-Robbery Squad (SARS) that led to a wild near-uncontrollable protest with #ENDSARS, #EndPoliceBrutality, #Endbadgovernance, #Endcorruption, and other numerous crimes to end in Nigeria which made the youths not to observe the NCDC-WHO guideline on wearing of face masks, social and/or physical distancing among other things may have added more salt to the COVID-19 injury. It is worthy to note that economic downturn partly due to COVID-19 outbreak contributed to the frustration of the protesters. Yet, Nigeria remains committed to bringing the COVID-19 outbreak and community spread to a halt amid her fragile healthcare

systems.

### Recommendations and outlook

1. Implementation of Universal Health Coverage (UHC) to remove disparity; provision of a comprehensive health insurance scheme to include the informal sector of workers.
2. Put adequate measures in place to fight future potential pandemics
3. Adequate investment in the health sector by the Government of Nigeria
4. Implementation of the 2001 Abuja declaration where African leaders pledged to budget 15% annually for health-related matters<sup>34</sup>. Nigeria's budgets for health was 4.5% in the 2019 budget.
5. Invest in increasing the number of hospital beds, intensive care units, and recruitment of health care professionals
6. Provision of basic equipment in hospitals and standard diagnostic laboratories across the country
7. Need for continuous training of HCWs to improve their expertise and upgrade their skills based on current advanced practices available globally.
8. Investment in research and innovation
9. Invest in local drug production, APIs, excipients, and all materials required for seamless local production of essential medicines to make Nigeria self-reliant thereby reducing counterfeit, adulterated, and falsified medicines menace.
10. Increased education and awareness campaigns with the use of local languages to give a wider reach.
11. Consolidate on the support received from private individuals, organizations, and religious bodies during the COVID-19 era to improve the funding base for healthcare in general.
12. Setting up digital health management systems to incorporate e-medical records, e-prescriptions to improve the healthcare systems.

### Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the article.

### Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

### References

1. Lucero-Priso DE, Adebisi YA, Lin X. (2020) Current efforts and challenges facing responses to 2019-nCoV in Africa. *Glob Heal Res Policy* 5(1):20–2.
2. NCDC 2020. COVID-19 NIGERIA [Internet]. Available from: <https://covid19.ncdc.gov.ng/>. Accessed October 16, 2020.
3. World Health Organization 2020: COVID-19 Explorer [Internet]. [Accessed 2020 Oct 16]. Available from: <https://worldhealthorg.shinyapps.io/covid/>
4. York G. 2020: Africa's low COVID-19 death rate has multiple causes, WHO says [Internet]. *The Globe and Mail*. [Accessed 2020 Oct 16]. Available from:

- <https://www.theglobeandmail.com/world/article-africas-low-COVID-19-death-rate-has-multiple-causes-who-says/>
5. Soy A. 2020: Coronavirus in Africa: Five reasons why COVID-19 has been less deadly than elsewhere [Internet]. BBC News. 2020. Available from: <https://www.bbc.com/news/world-africa-54418613>
  6. Mormina M, Nsofor IM. 2020: What developing countries can teach rich countries about how to respond to a pandemic [Internet]. Quartz Africa. Available from: <https://qz.com/africa/1919785/what-africa-and-asia-teach-rich-countries-on-handling-a-pandemic/>. Accessed October 22, 2020.
  7. NCAA 2020: NCAA harmonizes COVID-19 preventive measures at airports [Internet]. Available from: <https://ncaa.gov.ng/media-center/news/ncaa-harmonises-COVID-19-preventive-measures-at-airports/>. Accessed October 15, 2020.
  8. Presidential Task Force on COVID-19 2020: About the PTF [Internet]. Available from: <https://statehouse.gov.ng/covid19/objectives/>. Accessed October 15, 2020.
  9. Nigeria Centre for Disease Control 2020: COVID-19 SITUATION REPORT [Internet]. Available from: [https://ncdc.gov.ng/diseases/sitreps/?cat=14&name=An update of COVID-19 outbreak in Nigeria](https://ncdc.gov.ng/diseases/sitreps/?cat=14&name=An%20update%20of%20COVID-19%20outbreak%20in%20Nigeria). Accessed October 15, 2020.
  10. Olaniyi M. 2020: Coronavirus: Buhari Approves N15bn Intervention Funds, Releases Aircraft For Emergency Operations. Daily Trust [Internet]. 2020 Mar 26; Available from <https://dailytrust.com/coronavirus-buhari-approves-n15bn-intervention-funds-releases-aircraft-for-emergency-operations>
  11. Healthwise 2020: COVID-19 tests in 61 laboratories free, says NCDC [Internet]. Punch Healthwise. Available from: <https://healthwise.punchng.com/COVID-19-tests-in-61-laboratories-free-says-ncdc/>. Accessed October 22, 2020.
  12. Afuwape A. 2020: Seven private laboratories get approval to commence COVID-19 testing in lagos [Internet]. Lagos State Health Service Commission Ministry of Health. Available from: <https://health.lagosstate.gov.ng/2020/06/30/seven-private-laboratories-get-approval-to-commence-COVID-19-testing-in-lagos/>. Accessed October 22, 2020.
  13. Health Cluster. 2020: Multi-sector collaboration in Nigeria's COVID-19 Response [Internet]. Health Cluster. Available from: <https://www.who.int/health-cluster/news-and-events/news/Nigeria-multi-sector-COVID-19/en/>. Accessed October 22, 2020.
  14. Healthwise. 2020: Lagos spends about N50,000 on each COVID-19 test –Commissioner. Punch Healthwise [Internet]. 2020 May 21; Available from <https://healthwise.punchng.com/said-lagos-spends-about-n50000-on-each-COVID-19-test-commissioner/>
  15. Brunier A. 2020: COVID-19 significantly impacts health services for non-communicable diseases [Internet]. World Health Organization. Available from: <https://www.who.int/news/item/01-06-2020-COVID-19-significantly-impacts-health-services-for-noncommunicable-diseases>. Accessed October 22, 2020.
  16. Olagunju A. 2020: Changing the face of COVID-19 response in Nigeria through Telemedicine [Internet]. Science Communication Hub Nigeria. Available from: <https://www.scicomnigeria.org/COVID-19/Changing-the-face-of-COVID-19-response-in-Nigeria-through-Telemedicine>. Accessed October 22, 2020.
  17. Igomu T. 2020: Most COVID-19 deaths caused by self-medication –Ehanire [Internet]. Punch Healthwise. Available from: <https://healthwise.punchng.com/most-COVID-19-deaths-caused-by-self-medication-ehanime/>. Accessed October 22, 2020.
  18. Busari S, Adebayo B. 2020: Nigeria records chloroquine poisoning after Trump endorses it for coronavirus treatment. CNN [Internet]. 2020 Mar 23; Available from <https://edition.cnn.com/2020/03/23/africa/chloroquine-trump-nigeria-intl/index.html>
  19. Amzat J, Aminu K, Kolo VI, Akinyele AA. (2020) Coronavirus outbreak in Nigeria: Burden and socio-medical response during the first 100 days. *Int J Infect Dis* 98(2020):218–24.
  20. Global Health Workforce Statistics 2018: The 2018 update, Global Health Workforce Statistics, World Health Organization, Geneva [Internet]. Available from: <http://www.who.int/hrh/statistics/hwfstats/>. Accessed October 17, 2020.
  21. Adegoke Y. 2019: Does Nigeria have too many doctors to worry about a 'brain drain'? BBC News [Internet]. 2019 Apr; Available from <https://www.bbc.com/news/world-africa-45473036#:~:text=The latest data from the, and 28 in the UK>.
  22. Clotley P, Dauda M. 2020: Striking Doctors in Nigeria Demand COVID-19 PPE, Hazard Pay. VOA News [Internet]. 2020 Jun 16; Available from <https://www.voanews.com/COVID-19-pandemic/striking-doctors-nigeria-demand-COVID-19-ppe-hazard-pay>
  23. Adebayo-Folorunsho F. 2020: COVID-19: 150 health workers infected, 25 dead, says NUAHP. Punch Healthwise [Internet]. 2020 Jul; Available from <https://healthwise.punchng.com/COVID-19-150-health-workers-infected-25-dead-says-nauhp/>
  24. Moshood Y, Igomu T, Onwuzoo, Angela Folorunsho-Francis A, Adejoro L. 2020: COVID-19: Nigeria can't boast of 500 ventilators across 36 states and FCT —Sources. Punch Healthwise [Internet]. 2020 Mar 24; Available from <https://healthwise.punchng.com/COVID-19-nigeria-cant-boast-of-500-ventilators-across-36-states-and-fct-sources/>
  25. U.S. Embassy and Consulate in Nigeria 2020: U.S. Government Donates Brand-New Ventilators To Help Nigeria Fight the COVID-19 Pandemic [Internet]. U.S. Embassy and Consulate in Nigeria. Abuja; 2020 Available from: <https://ng.usembassy.gov/u-s-government-donates-brand-new-ventilators-to-help-nigeria-fight-the->

- COVID-19-pandemic/. Accessed October 20, 2020.
26. Abayomi O. Olaseni, Olusola S. Akinsola, Samson F. Agberotimi, Rotimi Oguntayo. 2020 Psychological distress experiences of Nigerians during Covid-19 pandemic; the gender difference, *Soc Sci & Humanities Open*, 2 (1) 100052. <https://doi.org/10.1016/j.ssaho.2020.100052>
  27. Taibat Lawanson, Louise Foley, Felix Assah, Ebele Mogo, Clarisse Mapa-Tassou, Toluwalope Ogunro, Victor Onifade & Tolu Oni (2020) The urban environment and leisure physical activity during the COVID-19 pandemic: a view from Lagos, *Cities & Health*, DOI: [10.1080/23748834.2020.1806459](https://doi.org/10.1080/23748834.2020.1806459)
  28. Akande-Sholabi W, Adebisi YA. (2020) The impact of COVID-19 pandemic on medicine security in Africa: Nigeria as a case study. *Pan Afr Med J* 35(Supp 2):1–2.
  29. Emmanuel Awucha, N., Chinelo JaneFrances, O., Chima Meshach, A., Chiamaka Henrietta, J., Ibilolia Daniel, A., & Esther Chidiebere, N. 2020. Impact of the COVID-19 Pandemic on Consumers' Access to Essential Medicines in Nigeria. *The American journal of tropical medicine and hygiene*, 103(4), 1630–1634. <https://doi.org/10.4269/ajtmh.20-0838>
  30. WHO 2020: Maternal health in Nigeria: generating information for action [Internet]. World Health Organization. Available from: <https://www.who.int/reproductivehealth/maternal-health-nigeria/en/#:~:text=In 2015%2C Nigeria's estimated maternal, maternal deaths during that year. Accessed October 22, 2020.>
  31. Njoku G 2020. COVID-19: 950 more Nigerian children under five could die every day without urgent action [Internet]. UNICEF. Available from: <https://www.unicef.org/nigeria/press-releases/COVID-19-950-more-nigerian-children-under-five-could-die-every-day-without-urgent. Accessed October 22, 2020.>
  32. Premium Times. Lockdown 2020: Lagos govt to offset medical bills of pregnant women, patients on emergency – Sanwo-Olu. Premium Times [Internet]. 2020 Apr 4; Available from <https://www.premiumtimesng.com/regional/ssouth-west/386022-lockdown-lagos-govt-to-offset-medical-bills-of-pregnant-women-patients-on-emergency-sanwo-olu.html>
  33. UNESCO Office in Abuja 2000. The state of education in Nigeria. UNESCO Digital library. Available from <https://unesdoc.unesco.org/ark:/48223/pf0000149503. Accessed February 21, 2021.>
  34. WHO 2020: The Abuja Declaration: Ten Years On [Internet]. World Health Organization. Available from: [https://www.who.int/healthsystems/publications/abuja\\_declaration/en/#:~:text=In April 2001%2C the African, African country reached this target. Accessed October 22, 2020.](https://www.who.int/healthsystems/publications/abuja_declaration/en/#:~:text=In April 2001%2C the African, African country reached this target. Accessed October 22, 2020.)