



(REVIEW ARTICLE)



Regional disparities in COVID-19 case fatality rates: A comparative analysis of Nigerian Geopolitical Regions in 2020 and 2023

Onoriode Okpako Diamreyan *, Kalio Awopolagha Justice, Horsfall Seleipiri, Jemina and Osakuade Felicia Oluwatoyin

Department of Medical Microbiology, University of Port Harcourt, Rivers State, Nigeria.

GSC Advanced Research and Reviews, 2024, 18(03), 281–290

Publication history: Received on 25 November 2023; revised on 01 March 2024; accepted on 04 March 2024

Article DOI: <https://doi.org/10.30574/gscarr.2024.18.3.0495>

Abstract

In December 2019, first case of COVID-19 was documented in the Wuhan, China. The symptoms commonly associated with COVID-19 include cough, fever, fatigue, and breathing difficulties. In 30th January 2020, the WHO declared COVID-19 a Public Health Emergency of International Concern. The coronavirus entered Nigeria through an infected Italian citizen who came in contact with a Nigerian citizen who was subsequently infected with the coronavirus. The coronavirus then spread to other citizens in Lagos and to other parts of the country. This study focuses on analysing the Case fatality rates (CFR) of COVID-19 in different geopolitical regions of Nigeria in the years 2020 and 2023. The regions considered are North Central, North East, North West, South South, South West and South East. This was a retrospective study using national surveillance data collected from all 36 States and Federal Capital Territory (FCT) in Nigeria. Epidemiological indices of COVID-19 of 12th July, 2020 and data as at 26th February, 2023 were downloaded from the official update database of the Nigeria Centre for Disease Control (NCDC) and World Health Organisation (WHO) weekly report within the same period of this study. The confirmed cases and deaths were extracted directly while the Case fatality rates (CFR) were computed. The total confirmed cases, death cases, and Cases Fatality Rates (CFR) as at 12th July 2020 was 31,323, 706 and 2.3% respectively. However, in 2023, the values had changed to 440,139 confirmed cases, 3156 death cases and a CFR of 0.7% respectively. The North Central region was observed to have the highest fatality rate of 62.1% and 47.2% in 2020 and 2023 respectively. The North East accounted for 32.5% and 12.6%, North West 36.4% and 16.4%, South- South, 37.5% and 12.4%, South East 16.9% and 4.7% and South West 15.4% and 10.1% respectively in 2020 and 2023. The 6 geopolitical regions of the country experience decrease at different proportion in Case Fatality Rates and this can be attributed to various factors, including increased vaccination coverage, better understanding of the virus, improved healthcare infrastructure and more effective public health measures. Despite the decrease in case fatality rate, regional disparities still exist which may be linked to underlying socioeconomic and healthcare disparities between regions. Addressing these disparities is crucial for a more equitable response to future pandemics.

Keywords: COVID-19; CFR; Geopolitical; NCDC

1. Introduction

Coronavirus disease 2019 (COVID-19) is caused by novel coronavirus severe acute respiratory syndrome coronavirus 2 (SARSCoV-2). It was first time reported in December 2019 in Wuhan, China and thereafter quickly spread across the globe (Agrawal et al 2021). The first case of COVID-19 from China was reported to the WHO on the 31st of December 2019. (Zhu, et al 2020, Nas, et al 2020), The infection was observed to spread relatively quickly to several other countries and by the 30th January 2020, the WHO declared COVID-19 a Public Health Emergency of International Concern (Agrawal et al 2021, Nas, et al 2020). The person-to-person transmission of SARS-CoV-2 is primarily through close contact with an infected person and through respiratory droplets, saliva or discharges from the nose when an infected

* Corresponding author: Onoriode Okpako Diamreyan

person coughs or sneezes (Clínico, & Belledevi, 2020). Clinical manifestations include fever, dry cough, fatigue, myalgia, headache, sore-throat, abdominal pain and diarrhea (Del Rio, & Malani, 2020, Sohrabi, et al 2020, Cascella, et al 2020, Lai et al 2020). The first confirmed case of COVID-19 infection in Africa was imported from Europe into Egypt on 14th February 2020 (Gilbert, et al 2020). The majority of the cases were in Southern Africa followed by North Africa. The least number of reported cases was in the Central Africa region (Nas, et al 2020). On February 27, 2020, Nigeria recorded its first confirmed case of COVID-19, which was a 44-year-old Italian Citizen who had arrived in Murtala Mohammed International Airport, Lagos, Nigeria at about 10 pm on February 24, 2020, via a Turkish airline from Milan Italy. He subsequently travelled to his company site in Ogun State on February 25, 2020. On 26th February of same the year, he presented at the staff clinic in Ogun State and there was a high index of suspicion by the managing physician. He was referred to Infectious Disease Hospital (IDH) Lagos and COVID-19 was confirmed on 27th February (Okoroiwu et al 2021., Elikwu, & Walker, 2020). Subjects within 31– 40 years age category were more susceptible to contracting the disease in Nigeria. It however, said more deaths have been recorded among people of 60 years and above. (Nas et al 2020)

1.1. Definition of terms

- Confirmed cases/cumulative confirmed cases: This refers to the total number of confirmed COVID-19 cases within the period of study. It is represented as frequency.
- Deaths/cumulative deaths: This refers to the total number of deaths that resulted owing to COVID-19 infection within the study period. It is represented as frequency.
- Case fatality rate: It refers to the proportion of cumulative deaths recorded in a state/country to the cumulative confirmed cases. It is represented in percentage
- Percentage of deaths: This refers to the proportion of COVID-19 deaths recorded in a particular State to the cumulative deaths recorded in all the States assessed within the study period. It is represented in percentage.

Despite the rapid spread of the virus and continuous increase cases and deaths particularly in Nigeria, there is still lack of studies estimating the CFR of the outbreak. This paper compares the regional disparities in COVID-19 between 2020 and 2023 of Case Fatality Rate across Geopolitical region in Nigeria. The CFR represents the proportion of cases who eventually die from the disease. Hopefully, the estimated CFR could provide a better understanding of near future trends for successful control of the global COVID-19 pan-demic in Nigeria

2. Methods

2.1. Study Design

The study is a retrospective analysis of Nigeria Centre for Disease Control (NCDC) and World Health Organization (WHO) surveillance data reported weekly of COVID-19 in Nigeria between 12th July, 2020 and 26th February 2023

2.2. Area of Study

Nigeria is situated in western Africa and lies between latitudes 4 and 14 N, and longitudes 2 and 15 E. Administratively, Nigeria is divided into six geopolitical zones consisting of 36 states and the Federal Capital Territory. The 36 states including the Federal Capital territory have reported COVID-19 cases and COVID-19 related deaths from the inception of the pandemic.

2.3. Data collection

The data used in this work were obtained from the Nigeria Center for Disease Control (NCDC) and World Health Organization (WHO) situation reports, which have been publicly released on their websites. The confirmed cases and deaths were extracted directly while the Case Fatality Rates were computed.

3. Results

Table 1 Case fatality rate across Nigeria (2020 and 2023)

No of Confirmed COVID-19 Cases (2020)	No of Deaths Due to COVID-19 Cases (2020)	Fatality Rate of COVID-19 Case (2020)	No of Confirmed COVID-19 Cases (2023)	No of Deaths Due to COVID-19 Cases (2023)	Fatality Rate of COVID-19 Case (2023)
31,323	709	2.3%	440,139	3,156	0.7%

The data represented in Table 1 demonstrates a notable increase in confirmed case of COVID-19 from 31,323 in 2020 to 440,139 in 2023. Simultaneously, the number of related death due to COVID-19 significantly increase from 709 in 2020 to 3,156 in 2023. However, the fatality rate exhibited a decline, decreasing from 2.3% in 2020 to 0.7% in 2023.

Table 2 Indicating the confirmed, death and case fatality rate of COVID-19 according to the geopolitical zone in Nigeria

Geopolitical Region	No of Confirmed COVID-19 Cases (2020)	No of Deaths Due to COVID-19 Cases (2020)	Fatality Rate of COVID-19 Case (2020)	No of Confirmed COVID-19 Cases (2023)	No of Deaths Due to COVID-19 Cases (2023)	Fatality Rate of COVID-19 Case (2023)
North Central	3,742	86 (12.1%)	62.1%	50,773	474 (15%)	47.2%
North East	1,821	84 (11.9%)	32.5%	10,434	215 (6.8%)	12.6%
North-West	3,540	126 (17.8%)	36.4%	21,825	324 (10.3%)	16.4%
South- East	1,831	40 (5.6%)	16.9%	136,620	172 (5.5%)	4.7%
South-South	4722	156 (22.0%)	37.5%	39,126	686 (21.7%)	12.4%
South-West	15677	217 (30.6%)	15.4%	181,361	1,284 (40.7%)	10.1%
Total	31,333	709		440,139	3,156	

The highest confirmed cases of COVID-19 according to the geographical zones in Nigeria were observed in the South-West, with 15677 (50%) accounting for half of the confirmed case in the country in 2020. In 2023, a confirmed case of 181,361 (41.2 %) was also recorded in the South-West. On the other hand, the fewest confirmed case was observed in the North-East 1,821 (5.8%) and 10,434 (2.3%) in 2020 and 2023 respectively. Interestingly, the South-West also had the least fatality rate of 15.4% in 2020 while in 2023, the South-East had the least.

The highest death case of 30.6% and 40.7% was noticed in the South-West in 2020 and 2023 respectively. This indicates an increase in the death rate from 2020 to 2023. The North Central also shown increased death rate from 12.1% in 2020 to 15.0% in 2023. The South-South, North-West, North-East and South-East experience reduction in death case from 22.0%, 17.8%, 11.9%, and 5.6% in 2020 to 21.7%, 10.3%, 6.8% and 5.5% in 2023 respectively

In addition, there was a decrease in Case Fatality Rate (CFR) in all geographical regions. In 2020, the North Central, South-South, North-West, North-East, South-East and South-West had a CFR of 61.1%, 37.5%, 36.4%, 32.5%, 16.9% and

15.4% respectively while in 2023 the CFR drastically reduced to 47.2%, 12.4%, 16.4%, 12.6%, 4.7% and 10.1% respectively

Table 3 Confirmed, death and case fatality rate of COVID-19 in the North-Central of Nigeria

NORTH CENTRAL						
State	No of Confirmed COVID-19 Cases	No of Deaths Due to COVID-19 Cases (2020)	Fatality Rate of COVID-19 Case (2020)	No of Confirmed COVID-19 Cases (2023)	No of Deaths Due to COVID-19 Cases (2023)	Fatality Rate of COVID-19 Case (2022)
Benue	121	6 (7.0%)	5.0%	2,311	25 (5.3%)	1.1%
Kogi	5	2 (2.3%)	40%	5	2 (0.4%)	40%
Kwara	311	12 (14.0%)	3.9%	4,691	64 (13.5%)	1.4%
Nasarawa	238	8 (9.3%)	3.4%	2,831	39 (8.2%)	1.4%
Niger	135	7 (8.1%)	5.2%	1,183	20 (4.2%)	1.7%
Plateau	499	16 (18.6%)	3.2%	10,349	75 (15.8%)	0.7%
Federal Capital Territory	2,433	35 (40.7%)	1.4%	29,403	249 (52.5%)	0.9%
Total	3,742	86 (100%)	62.1%	50,773	474(100%)	47.2%

In Table 3, notable improvements in fatality rate were observed in Benue, Kwara, Nasarawa, Niger, plateaus and Federal Capital Territory. These states show significant reductions in their fatality rates over the two -year period while Kogi state remained consistent with 40% fatality rate, indicating that there was no improvement in managing COVID-19 deaths between 2020 and 2022. The highest fatality rate in 2020 and 2022 was recorded in Kogi state while the least fatality was documented in plateaus state. Overall, the total fatality rate for the North Central region decreased from 62.1% in 2020 to 47.2% in 2023 which is a positive overall trend

Table 4 Confirmed, death and case fatality rate of COVID-19 in the North-East of Nigeria

NORTH EAST						
State	No of Confirmed COVID-19 Case (2020)	No of Deaths Due to COVID-19 Cases (2020)	Fatality Rate of COVID-19 Case (2020)	No of Confirmed COVID-19 Case (2023)	No of Deaths Due to COVID-19 Cases 2023)	Fatality Rate of COVID-19 Case (2023)
Adamawa	100	7 (8.3%)	7%	1,309	38 (17.7%)	3.0%
Bauchi	519	13 (15.5%)	2.5%	2,032	24 (11.2%)	1.2%
Borno	586	35 (41.7%)	6.0%	1,629	44 (20.5%)	2.7%
Gombe	527	21 (25%)	4.0%	3,313	66 (30.7%)	2.0%
Taraba	27	0 (0%)	0%	1,513	34 (15.8%)	2.3%
Yobe	62	8 (9.5%)	13%	638	9 (4.2%)	1.4%
Total	1,821	84(100%)	32.5%	10,434	215 (100%)	12.6%

From Table 4, the fatality rate in 2020 of Adamawa, Bauchi, Borno, Gombe, Taraba, and Yobe are 7%, 2.5%, 6.0%, 4.0%, 0%, and 13% respectively while in 2022, the documented fatality rate is 3.0%, 1.2%, 2.7%, 2.0%, 2.3%, and 1.4%, respectively. The fatality rate of Taraba state rose from 0% in 2020 to 2.3% in 2022. Yobe state show the most significant drops in fatality rates from 13% to 1.4%. Borno state had the highest number of confirmed cases (586) in 2020 while Taraba state had the least cases of 27. However, in 2023, Gombe state reported the highest number of confirmed cases, with 3,313 and Yobe had the fewest with 638 cases. However, the total fatality rate for the North East region of Nigeria decreases from 32.5% in 2020 to 12.6% in 2023

Table 5 Confirmed, death and case fatality rate of COVID-19 in the North-West of Nigeria

NORTH WEST						
States	No of Confirmed COVID-19 Case (2020)	No. of COVID-19 death casa (2020)	Fatality Rate of COVID-19 Case (2020)	No of Confirmed COVID-19 Case (2023)	No. of COVID-19 death casa (2023)	Fatality Rate of COVID-19 Case (2023)
Jigawa	321	11 (8.7%)	3.4%	669	18 (5.6%)	2.7%
Kaduna	946	12 (9.5%)	1.3%	11,662	90 (27.8%)	0.8%
Zamfara	76	5 (4.0%)	6.6%	375	9 (2.8%)	2.4%
Sokoto	153	16 (12.7%)	10.5%	822	28 (8.6%)	3.4%
Kebbi	86	7 (5.6%)	8.1%	480	16 (5.0%)	3.3%
Katsina	655	23 (18.3%)	2.5%	2,418	37 (11.4%)	1.5%
Kano	1,303	52 (41.3%)	4.0%	5,401	126 (38.9%)	2.3%
Total	3,540	126 (100%)	36.4%	21,825	324 (100%)	16.4%

In 2020, Kano had the highest number of confirmed COVID-19 cases of 1,303 whereas in 2023, Kaduna had the highest number of COVID-19 cases of 11,662. The least fatality case of 1.3% and 0.8% in 2020 and 2023 respectively was reported also in Kaduna while Sokoto recorded the highest fatality rate of 10.5% and 3.4% in 2020 and 2022 respectively. However, all the states in the North-West region show a decrease in case fatality rate. The total fatality rate of all states in 2020 was 36.4% and in 2023, it decreases to 16.4%.

Illustrated from the Table 6 (below), in the period from 2020 to 2023, Imo state witnessed a substantial rise in the number of confirmed COVID-19 cases, increasing from 359 to 126,620. However, during the same time frame, its fatality rate showed a significant decline from 2.2% to 0.1%. Anambra state, which had the highest fatality rate of 9.7% in 2020, made a notable improvement, reducing its fatality rate to 0.7 in 2023. In contrast, Abia state, and Ebonyi state initially with fatality rate of 0.8% and 1.2% and in 2020 increase to 1.5% and 1.6% in 2023 respectively. It is worth noting that the fatality rates in three South-South state (Anambra state, Enugu state, and Imo state) reduced significantly from 2020 to 2023, indicating improved management and treatment of COVID-19 cases. However, Abia state and Ebonyi state bucked this trend by showing an increase in fatality rates. The overall rate was 16.9% in 2020 and reduced to 4.7% in 2023

Table 6 Confirmed, death and case fatality rate of COVID-19 in the South-East of Nigeria

SOUTH EAST						
State	No of Confirmed COVID-19 Case (2020)	No. of COVID-19 death casa (2020)	Fatality Rate of COVID-19 Case (2020)	No of Confirmed COVID-19 Case (2023)	No. of COVID-19 death casa (2023)	Fatality Rate of COVID-19 Case (2023)
Abia	402	3 (7.5%)	0.8%	2,260	34 (19.8%)	1.5%
Anambra	93	9 (22.5%)	9.7%	2,825	19 (11.1%)	0.7%
Ebonyi	508	6 (15%)	1.2%	2,064	32 (18.6%)	1.6%
Enugu	469	14 (35%)	3.0%	2,952	29 (16.9%)	1.0%
Imo	359	8 (20%)	2.2%	126,519	58 (33.7%)	0.1%
Total	1,831	40 (100%)	16.9%	136,620	172(100%)	4.7%

Table 7 Confirmed, death and case fatality rate of COVID-19 in the South-South of Nigeria

SOUTH SOUTH						
State	No of Confirmed COVID-19 Case (2020)	No. of COVID-19 death casa (2020)	Fatality Rate of COVID-19 Case (2020)	No. of COVID-19 death casa (2023)	No. of COVID-19 death casa (2023)	Fatality Rate of COVID-19 Case (2023)
Akwa Ibom	134	3 (1.9%)	2.2%	4,976	44(6.1%)	0.9%
Bayelsa	299	18 (11.5%)	6.0%	1,373	28(4.1%)	2.0%
Cross River	5	1 (0.6%)	20%	948	25(3.6%)	2.6%
Rivers	1,343	46 (29.5%)	3.4%	18,089	155(22.6%)	0.9%
Delta	1,348	31 (19.9%)	2.3%	5,812	112(16.3%)	1.9%
Edo	1,593	57 (36.5%)	3.6%	7,928	322(46.9%)	4.1%
Total	4722	156 (100%)	37.5%	39,126	686 (100%)	12.4%

Table 7 indicated that in 2020, Cross River State had the least confirmed COVID-19 cases of 5 with just one death recorded with Edo state having the highest confirmed COVID-19 case of 1,593 and Bayelsa state the highest fatality rate of 6.0%. In 2023, However, Rivers state had the highest confirmed case of 18,089 in 2023. The highest fatality rate of 4.1% was documented in Edo state while Akwa Ibom and Rivers state both had 0.9% fatality rate. Edo state show an increase in fatality rate from 3.6% in 2020 to 4.1% in 2023. The total fatality rates in the South South region reduced from 37.5% in 2020 to 12.4% in 2022

Table 8 Confirmed, death and case fatality rate of COVID-19 in the South-West of Nigeria.

South-West						
State	No of Confirmed COVID-19 Case (2020)	No. of COVID-19 death casa (2020)	Fatality Rate of COVID-19 Case (2020)	No of Confirmed COVID-19 Case (2023)	No. of COVID-19 death casa (2023)	Fatality Rate of COVID-19 Case (2023)
Ekiti	46	2 (0.9%)	4.4%	2,451	28 (2.2%)	1.1%
Lagos	12,051	147 (67.7%)	1.2%	104,266	771 (60.1%)	0.7%
Ogun	1,063	22 (10.1%)	2.1%	5,810	82 (6.4%)	1.4%
Ondo	606	20 (9.2%)	3.3%	5,173	109 (8.5%)	2.1%
Osun	212	7 (3.2%)	3.3%	3,311	92 (7.2%)	2.8%
Oyo	1,689	19 (8.8%)	1.1%	10,350	202 (15.7%)	2.0%
Total	15667	217 (100%)	15.4%	181,361	1,284 (100%)	10.1%

Revealed in the Table 8, the confirmed COVID-19 case of 12,051 and 104,266 with fatality of 1.2% and 0.7% was observed in Lagos state in 2020 and 2023 respectively. Lagos was observed to have the highest confirmed case in both years. However, the least fatality rate was observed in Oyo state with 1.1% fatality in 2023. The fatality rate of the disease in Lagos State decreased from 1.2% in 2020 to 0.7% in 2023. In contrast, Oyo state observed an increase in fatality rising from 1.1% in 2020 to 2.0% in 2023. There was a reduction in the total fatality rate in the South-West region from 15.4% in 2020 to 10.1% in 2023

4. Discussion

The emergence of COVID-19 which almost locked down the entire universe claimed many lives with Nigeria inclusive (Yusuf & Lawan 2022). Since its outbreaks, numerous preventive and control strategies have been deployed globally to contain the disease (Omaka-Amari et al 2020). According to Aitafo et al (2022) reported that globally in December 27th 2020, there were 79,232,555 confirmed cases, 1,754,493 deaths with a case fatality rate of 2.2% whereas in Africa, 2,644,112 cases were confirmed positive 62,366 deaths with a case fatality rate of 2.4% and in Nigeria, total number of confirmed cases was 84,414 and 1,254 deaths with a case fatality rate of 1.5%. This is slightly lower than the CFR of 2.3% identified on 12th July, 2020 and higher than the 0.7% as at 26th February, 2023 in this study. However, based on the findings of this study on the CFR of COVID-19 during 2020 and 2023 in Nigeria, the study revealed that there was a reduction in CFR of COVID-19 from 2.3% in July, 2020 to 0.7% as at 26th February, 2023. This can be attributed to the effort by the Nigeria government. However, the government undertook numerous health, social, and economic measures to cushion the impact of COVID-19 (Dixit et al., 2020). Prior to the introduction of COVID-19 in Nigeria, the government formed a "Coronavirus preparedness group" which commenced point-of-entry screening for travellers (Ajisegiri et al., 2020). The NCDC assisted many states across the country to establish Emergency Operation Centres (EOC), conducted training for rapid response teams in all the 36 states, provided relevant public health guidance to the Nigerians populace, disseminated case-definition and preventive information to national and subnational networks of public health professionals, enhanced capacities for contact tracing and case management, and reinforced the diagnostic capacities of five laboratories (Adepoju, 2020). The government through the Presidential Task Force on COVID-19, Federal Ministry of Health, and Nigeria Centre for Disease Control has been working closely in collaboration with relevant ministries, departments, agencies, partners, and other stakeholders to coordinate and review the national response strategies and implementation activities daily to effectively contain the spread of COVID-19. (Okoye & Nwatu 2020). Healthcare professionals and various affiliated institutions adopted a variety of approaches to inform the public about safeguarding against COVID-19 through widespread media channels, social media, billboards, and banners displaying symbols and guidelines for protection. These measures encompassed advice such as staying at home, wearing face masks, practicing regular handwashing, adhering to social distancing guidelines, avoiding touching eyes,

nose and mouth, practicing respiratory hygiene, seeking medical care early, (Bruns, Kraguliac & Bruns, 2020; Raimi, 2020). Additional actions include flight cancellations, suspension of international air travel, work-from-home by civil servants, partial closure of major food markets, prohibition of all religious activities, and halt on all sporting events. In addition, contact tracing and other public health strategies were strengthened. NCDC has also deployed Surveillance Outbreak Response Management and Analysis System (SORMAS) to support contact tracing (Grainger, 2020).

The South-West region of Nigeria consistently reported the highest confirmed cases of COVID-19 in both 2020 and 2023, aligning with the findings of Moroh, et al (2023) research where the reason may be attributed to the fact that the first confirmed case of COVID-19 infection was observed in a state in South-West, Nigeria: thus, the area is susceptible to the transmission of the viral infection. Additionally, the government of Lagos State and the Federal government of Nigeria notably expanded testing facilities, contributing to an increased identification of cases. The North-East had the least confirmed COVID-19 case in both 2020 and 2023. This contradicts findings by Moroh, et al (2023) where the lowest confirmed case was observed in the North-Central.

The increase COVID-19 confirmed case from 2020 to 2023 and death case observed from 2020 to 2023 in South-West and North Central regions could be attributed to logistical, administrative, and social obstacles. These challenges ranged from shortage of testing and isolation centres, lack of medical equipment and personnel, non-involvement of social workers and low motivation of medical personnel. (Okoye & Nwatu, 2022) There is also the issue of insufficient workforce (both medical and non-medical), medical supplies, healthcare infrastructure, technologies, and available information. This shortage hinders the achievement maximum health coverage and quality delivery, (Okoye & Nwatu, 2022) Furthermore, the health sector in Nigeria has been historically underfunded as it only receives 5% of the total budget rather than the 15% recommended by the Abuja Declaration of 2001 (Plan International Nigeria, 2020). This has contributed to the poor health condition of the country (Benson, 2020). Even with the implementation of government initiative and efforts by healthcare professionals and civil organisations using messages to educate people on how to safeguard themselves from the virus, a significant portion of the population remain adamant about the disease based on cultural beliefs and practices. (Yusuf & Lawan 2022). Some traditional healers and religious leaders in Nigeria tend to rely on supernatural and paranormal explanations when approaching this public health issue (Okoye & Nwatu, 2022) Some also considered COVID-19 to be a disease afflicting only the “highly influential persons” especially given the fact that it killed some political figures (Egbunike, 2020).

5. Conclusion

Nigeria is also a country largely affected by the global coronavirus 2019 (COVID-19) pandemic caused by coronavirus 2 (SARS-CoV-2). The first case of COVID-19 in Nigeria was reported on the 27th of February 2020 and since then the numbers of confirmed cases has been on the increase, at least in Nigeria. This study has provided insight into epidemiological events, responses, combative measures, and lessons learned from the COVID-19 pandemic. COVID-19 has been reported in all states in Nigeria as well as the Federal Capital Territory. According to NCDC, as of 12th July 2020, the number of confirmed cases was 31,323, death case 709 and the case fatality rate was 2.3% while in 26th February, 2023, the confirmed case had increase to 440,139 with death case of 3,156 and case fatality rate of 0.7%. There was a reduction in the case fatality rate from 2020 to 2023. The reason for this decrease could be attributed to increase testing and diagnosis, improved medical understanding and treatment, public health measures such as widespread mask-wearing, social distancing and lockdown can reduce the spread of the virus, leading to fewer severe cases and a lowercase fatality rate (CFR)

Compliance with ethical standards

Acknowledgments

Special thanks to Dr. Ezebuio Victor (PhD) of Regional Centre for Biotechnology and Bioresource Centre (RCBBR) for his academic mentorship during this study.

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Availability of data and material

Datasets generated and analyzed in this study are within the article. The primary source of data, NCDC and WHO database is publicly available

References

- [1] Okoroiwu, H. U., Ogar, C. O., Nja, G. M. E., Abunimye, D. A., & Ejemot-Nwadiaro, R. I. (2021). COVID-19 in Nigeria: account of epidemiological events, response, management, preventions and lessons learned. *Germs*, 11(3), 391.
- [2] Nas, F. S., Ali, M., Abdallah, M. S., & Yusuf, S. F. (2020). Epidemiology of novel COVID-19 in Nigeria. *Microbes and Infectious Diseases*, 1(2), 49-56.
- [3] Yusuf, U.L., & Iwan, S. (2022): Socio-cultural practices and covid-19 prevention in Nigeria: an overview. *International Journal of Modern Sociology and Security Studies* 4(1)
- [4] Agrawal, H., Das, N., Nathani, S., Saha, S., Saini, S., Kakar, S. S., & Roy, P. (2021). An assessment on impact of COVID-19 infection in a gender specific manner. *Stem cell reviews and reports*, 17, 94-112
- [5] Clínico, C., & Belledevi, S. (2020). Modes of transmission of virus causing COVID-19: implications for IPC precaution recommendations.
- [6] Gilbert, M., Pullano, G., Pinotti, F., Valdano, E., Poletto, C., Boëlle, P. Y., ... & Colizza, V. (2020). Preparedness and vulnerability of African countries against importations of COVID-19: a modelling study. *The Lancet*, 395(10227), 871-877
- [7] Elikwu, C., & Walker, O. (2020). COVID-19 Pandemic in Nigeria: A review: SARS-CoV-2 Pandemic in Nigeria. *Babcock University Medical Journal*, 3(1), 11-26.
- [8] Omaka-Amari, L. N., Aleke, C. O., Obande-Ogbuinya, N. E., Ngwakwe, P. C., Nwankwo, O., & Afoke, E. N. (2020). Coronavirus (COVID-19) pandemic in Nigeria: Preventive and control challenges within the first two months of outbreak. *African journal of reproductive health*, 24(2), 87-97.
- [9] Bruns, D. P., Kraguljac, N. V., & Bruns, T. R. (2020). COVID-19: Facts, Cultural Considerations, and Risk of Stigmatization. *Journal of transcultural nursing*, 31(4), 326-332.
- [10] Okoye, U. O., & Nwatu, U. L. (2022). COVID-19 pandemic in Nigeria: A story worth telling from the eyes of social workers. *The Coronavirus Crisis and Challenges to Social Development: Global Perspectives*, 281-293.
- [11] Ajisegiri, W. S., Odusanya, O. O., & Joshi, R. (2020). COVID-19 outbreak situation in Nigeria and the need for effective engagement of community health workers for epidemic response. *Global Biosecurity*, 1(4). <https://doi.org/10.31646/gbio.69>
- [12] Adepoju, P. (2020). Nigeria responds to COVID-19: First case detected in Sub-Saharan Africa. *Nature Medicine*, 26(4), 444–448.
- [13] Benson, E. A. (2020). COVID-19: Best- and worst-case scenarios for the Nigerian economy. *Nairametrics*. <https://nairametrics.com/2020/05/19/covid-19-bestand-worst-case-scenarios-for-these-smes/>
- [14] Egbunike, N. (2020). Nigerian pastor spreads COVID-19 conspiracies and disinformation. <https://globalvoices.org/2020/05/15/nigerian-pastor-spreads-covid-19-conspiracies-and-disinformation/>
- [15] Bruns, D. P., Kraguljac, N. V., & Bruns, T. R. (2020). COVID-19: Facts, Cultural Considerations, and Risk of Stigmatization. *Journal of transcultural nursing*, 31(4), 326-332.
- [16] Grainger, C. (2020). A software for disease surveillance and outbreak response: Insights from implementing SORMAS in Nigeria and Ghana. Federal Ministry for Economic Cooperation and Development. http://health.bmz.de/en/healthportal/ghpc/case_studies/software_disease_surveillance_outbreak_response/index. Html
- [17] Del Rio, C., & Malani, P. N. (2020). COVID-19—new insights on a rapidly changing epidemic. *Jama*, 323(14), 1339-1340.
- [18] Sohrabi, C., Alsafi, Z., O'Neill, N., Khan, M., Kerwan, A., Al-Jabir, A., ... & Agha, R. (2020). World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). *International journal of surgery*, 76, 71-76.
- [19] Cascella, M., Rajnik, M., Aleem, A., Dulebohn, S. C., & Di Napoli, R. (2020). Features, evaluation, and treatment of coronavirus (COVID-19). In *StatPearls Publishing*. 2020 Jan. [Updated 2020 Jul 4]. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK554776/>

- [20] Lai, C. C., Shih, T. P., Ko, W. C., Tang, H. J., & Hsueh, P. R. (2020). Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease-2019 (COVID-19): The epidemic and the challenges. *International journal of antimicrobial agents*, 55(3), 105924.
- [21] Aitafo, J. E., Wonodi, W., Briggs, D. C., & West, B. A. (2022). Self-Medication among health workers during the COVID-19 pandemic in southern Nigeria: knowledge, patterns, practice, and associated factors. *Int J Health Sci Res*, 12, 1-14.
- [22] Moroh, J. E., Innocent, D. C., Chukwuocha, U. M., Vasavada, A., Kumar, R., Siddiq, M. A., ... & Sah, R. (2023). Seasonal Variation and Geographical Distribution of COVID-19 across Nigeria (March 2020–July 2021). *Vaccines*, 11(2), 298.