

Analysis of Covid-19 Cases in Nigeria: A Short-Term Projection of its Current Status

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Keyword: COVID-19, Confirmed cases, Case fatality rate, Projection, Lockdown, and Quarantine

Abstract

Forecasting the future trajectory of cases during an infectious disease outbreak can make an important contribution to public health and intervention planning. The growing importance of infectious disease forecasts is epitomised by the growing number of so-called forecasting challenges. The New Coronavirus also named as COVID-19 by WHO on Feb 11, 2020, is now causing a severe public health emergency in Nigeria. The data for this study was compiled by the author from the daily updates given by the Nigerian Centre of Disease Control (NCDC) from 27th February to 19th April, 2020, making a total of 52 days. The data covers infected cases, deaths related cases, recovery cases, active cases and Case Fatality Rates across Nigeria for the period under study. The nonlinear regression was used in the projection with the aid of Statistical Packages for Social Sciences (SPSS) and Ms Excel was used in analyzing the data for CFR, trend analysis in charts and Tables. Results showed that, Nigeria recorded the first confirmed case of COVID 19 on 29th February, 2020, and as of 19th April, 2020, 627 cases had been confirmed. During this period, the Nigerian Centre for Disease Control (NCDC) confirmed 21 mortality cases and 170 recoveries from COVID 19 (NCDC, 2020). The

projected figure shows that by Day 75 which is 12th May 2020 other things being equal Nigeria might hit 3179. Results also showed that Lagos was leading; followed by FCT and Kano that is fast recording high cases. As a curbing strategy against further spread of the disease, the Federal government closed down all learning institutions (public and private institutions) in the country. To further curb the pandemic, the federal government closed all public services; social gathering and any form of commercial activities that will disregard the rule of social distances in FCT, Lagos and Ogun state and asked everybody to stay at home while observing their personal hygiene. All religion gatherings are thereby banned public gatherings in excess of 10 people. In addition, all international and National flights including road services were closed except those on essential services.

Introduction

First case of corona virus was notified as cold in 1960. According to the Canadian study 2001, approximately 500 patients were identified as Flu-like system. 17-18 cases of them were confirmed as infected with corona virus strain by polymerase chain reaction. Corona was treated as simple non-fatal virus till 2002. In 2003, various reports published with the proofs of spreading the corona to many countries such as United States of America, Hong Kong, Singapore, Thailand, Vietnam and in Taiwan. Several case of severe acute respiratory syndrome caused by corona and their mortally more than 1000 patient was reported in 2003. This was the black year for microbiologist. When microbiologist was started focus to understand these problems. After a deep exercise they conclude and understand the patho-genesis of disease and discovered as corona virus. But till a total of 8096 patient was confirmed as infected with corona virus. So in 2004, World Health Organization and Centers for Disease Control and Prevention declared as "state emergency". Another study report of Hong Kong confirmed 50 patient of severe acute respiratory syndrome while 30 of them were confirmed as corona virus infected. In 2012,

Saudi Arabian reports were presented several infected patient and deaths (Centers for Disease Control and Prevention, 2003; WHO, 2003; WHO, 2020; Peiris, *et al.*, 2003, Lancet. 2003; Zhu *et al.*, 2020, Mailles, *et al.*, 2013; Buchholz, *et al.*, Saif, *et al.*, 2004; Woo., *et al*; 2009; Letko & Munster, 2020; Zhu, *et al.*, 2020; Huang, *et al.*, 2020; Chan, *et al.*, 2020; ECDC, 2020). COVID-19 was first identified and isolated from pneumonia patient belongs to Wuhan, china.

Microbiology

Corona virus is spherical or pleomorphic, single stranded, enveloped RNA and covered with club shaped glycoprotein. Corona viruses are four sub types such as alpha, beta, gamma and delta corona virus. Each of sub type corona viruses has many serotypes. Some of them affect human and other affected animals such as pigs, birds, cats, mice and dogs, Zhu *et al.*, 2020, Mailles, *et al.*, 2013; Buchholz, *et al.*, Saif, *et al.*, 2004; Woo., *et al*; 2009.

Mode of Spreading, Management

People can get the infection through close contact with a person who has symptoms from the virus includes cough and sneezing. Generally corona virus was spread via airborne zoonotic droplets. Virus was replicated in ciliated epithelium that caused cellular damage and infection at infection site.

There is no special vaccine for this yet. Only supportive therapy is the treatment strategy followed by health professionals. Supportive therapy includes administration of antipyretic and analgesic, maintenance of hydration, mechanical ventilation as respiratory support and uses of antibiotic in bacterial infections. Some research studies claimed that ribavirin and interferon alpha have offered synergetic effect in early stage. While other studies reported mycophenolic acid as monotherapy. Still health professionals were not fully satisfied with any therapy so further clinical research needed (Zhao, 2003; Chan, *et al.*, 2013; Al-Tawfiq, *et al*, 2014; Al-Qahtani, *et al.*, 2017; Bin, *et al.*, 2017, Arabi, 2017).

Spreading History of 2019-nCoV

On 31 Dec. 2019, China, East Asia, most populated country in the world was informed to WHO regarding pneumonia cases with unknown etiology. Till 3

Jan. 2020 a total of 44 pneumonia cases were detected. On 7 Jan, 2020, Chinese research authorities announced that they were isolated new virus from sea food market in Wuhan city; Named as 2019-nCoV. On 13 Jan. 2020 Ministry of Public Health Thailand reported 01 patient imported from Wuhan, China. On 15 Jan. 2020, the Ministry of Health, Labour and Welfare Japan reported first case imported from Wuhan China. On 20 Jan. 2020, National IHR Focal point from the Korea was reported first case 2019-nCoV in Korea. On 23 Jan. 2020, United State of America were confirmed first case of 2019-nCoV in America. On 24 Jan. 2020, Vietnam reported her First case of 2019-nCoV with not travel history from China, while his family member was the China traveler. So it's the first incidence of human to human transmission of corona virus. On 24 Jan. 2020, the government of Singapore confirmed First case of 2019-nCoV. On 25 Jan. 2020, the government of Australia, Federal Democratic Republic of Nepal and French Republic confirmed their first 2019-nCoV. Other countries also were detected and reported the cases of 2019-nCoV, on, 26 Jan. 2020 (Malaysia), 27 Jan. 2020 (Canada), 28 Jan. 2020 (Cambodia, Germany, Sri Lanka), 29 Jan. 2020 (United Arab Emirates), 30 Jan. 2020 (Philippines, India , Finland), 31 Jan. 2020 (Italy), 1 Feb. 2020 (Russian Federation, Spain, Sweden, United Kingdom), 5 Feb. 2020 (Belgium), 6 Feb. 2020 (Japan), 15 Feb. 2020 (Egypt). Since 31 December 2019 and as of 18 April 2020, 2 197 593 cases of COVID-19 (in accordance with the applied case definitions and testing strategies in the affected countries) have been reported, including 153090 deaths. Cases have been reported from Africa, 19897 cases; the five countries reporting most cases are Egypt (2844), South Africa (2783), Morocco (2564), Algeria (2418) and Cameroon (1016). Asia: 354549 cases; the five countries reporting most cases are China (83785), Iran (79494), Turkey (78546), India (14378) and Israel (12982). America: 826282 cases; the five countries reporting most cases are United States (702164), Brazil (33682), Canada (31872), Peru (13489) and Chile (9252). Europe: 988295 cases; the five countries reporting most cases are Spain (188068), Italy (172434), Germany (137439), France (109252) and United Kingdom (108692). Oceania: 7874 cases; the five countries reporting most cases are Australia (6533), New Zealand (1 094), Guam (136), French Polynesia (55) and New Caledonia (18). Other: 696 cases have been reported from an international conveyance in Japan.

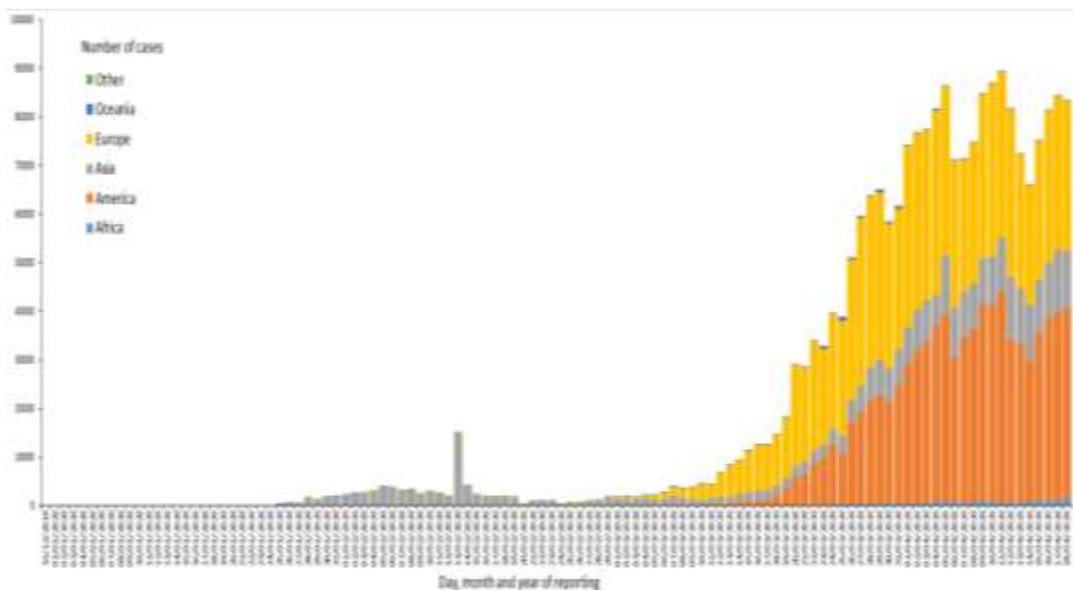


Figure 1: Distribution of COVID-19 cases worldwide, as of 18 April 2020

Source: <https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases>

About 1016 deaths have been reported from Africa; the five countries reporting most deaths are Algeria (364), Egypt (205), Morocco (135), South Africa (50) and Tunisia (37). Asia: 13984 deaths; the five countries reporting most deaths are Iran (4958), China (4636), Turkey (1769), Indonesia (520) and India (480). America: 42751 deaths; the five countries reporting most deaths are United States (37054), Brazil (2141), Canada (1309), Mexico (546) and Ecuador (421). Europe: 95247 deaths; the five countries reporting most deaths are Italy (22747), Spain (19478), France (18681), United Kingdom (14576) and Belgium (5163). Oceania: 85 deaths; the five countries reporting most deaths are Australia (67), New Zealand (11), Guam (5), Northern Mariana Islands (2) and Fiji (0).

The first confirmed case of the [pandemic](#) of [coronavirus disease 2019](#) in [Nigeria](#) was announced on 27 February 2020, when an Italian citizen in [Lagos](#) tested positive for the virus, caused by [SARS-CoV-2](#) (NCDC, 2020 and Maclean, 2020). On 9 March 2020, a second case of the virus was reported in [Ewekoro, Ogun State](#), by a Nigerian citizen who had contact with the Italian citizen. (<https://www.pmnewsnigeria.com/2020/03/09/>).

The President, Major General Muhammadu Buhari (rtd.) in attempt to curb the spread of the coronavirus pandemic, set up a Presidential Task Force for the Control of the Coronavirus by appointing a 12-member task force chaired by the Secretary to the Government of the Federation, Mr. Boss Mustapha and Dr. Sani Aliyu as the National Coordinator of the committee. The committee has a mandate of six months to deliver on the assignment. Other members are Minister of Health, Prof. Osagie Ehanire; Minister of Interior, Ogbeni Rauf Aregbesola; Minister of Aviation, Mr. Hadi Sirika; Minister of Humanitarian Affairs, Disaster Management and Social Services, Sadiya Umar-Farouk; Minister of Education, Mr. Adamu Adamu; Minister of Environment, Mr. Mohammed Mahmoud; Director-General, Department of State Services, Mr. Yusuf Bichi; Director-General, Nigeria Centre for Disease Control; Dr. Chikwe Ihekweazu; and World Health Organisation Country Representative.

However, the Federal Government has made a provision of N920million for health agencies to plan and guard against further spread of COVID-19 in Nigeria. “This action is in preparation for the unlikely but probable major outbreak of the disease in the country which will require a multi-sectoral inter-governmental approach as advised by the World Health Organisation similar to that adopted for the HIV epidemic in the last two decades. Some well meaningful Nigerians also support the Federal Government by donating money to curb the pandemic and the sufferings associated with it.

The whole instruments of government are now mobilized to confront what have now become both a health emergency and an economic crisis. Nigeria, unfortunately, confirmed its first case on 27th February, 2020. Since then, we have seen the number of confirmed cases rise slowly. By March 29th, 2020, the total confirmed cases within Nigeria had risen to ninety-seven. Regrettably, we also had our first fatality, a former employee of PPMC, who died on 23rd March 2020. As of today, COVID-19 has no cure. Scientists around the world are working very hard to develop a vaccine. We are in touch with these institutions as they work towards a solution that will be certified by international and local medical authorities within the shortest possible time. For now, the best and most efficient way to avoid getting infected is through regular hygienic and sanitary practices as well as social distancing. Since the outbreak was reported in China, our Government has been monitoring the situation closely and studying the various responses adopted by other countries.

The NCDC has been implementing numerous strategies and programs in Nigeria to ensure that the adverse impact of this virus on our country is minimized. Healthcare measures have been introduced, border security, fiscal and monetary policies in response to the pandemic and many more continue as the situation unfolds. Some of these measures are causing some inconveniences to many citizens. But these are sacrifices we should all be willing and ready to make for the greater good of our country. This is a matter of life and death, if we look at the dreadful daily toll of deaths in Italy, France and Spain. The citizens were urged to adhere to their guidelines as they are released from time to time. Advised to continue to rely on guidance of our medical professionals and experts at the Ministry of Health, NCDC and other relevant agencies through this difficult time.

In Nigeria, Lagos and Abuja are the epicenter of this pandemic. Based on the advice of the Federal Ministry of Health and the NCDC, cessation of all movements in Lagos and the FCT for an initial period of 14 days (total lockdown) with effect from 11pm on Monday, 30th March 2020 was imposed and another 14days was extended as the infection keeps increasing. This restriction also applied to Ogun State due to its close proximity to Lagos and the high traffic between the two States. All citizens in these areas are to stay in their homes. All businesses and offices within these locations are fully closed during this period except those on essential services such as commercial establishments as; food processing, distribution and retail companies; petroleum distribution and retail entities, power generation, transmission and distribution companies; and private security companies among others, though exempted, access are restricted and monitored.

All seaports in Lagos shall remain operational in accordance with the guidelines issued earlier. Vehicles and drivers conveying essential cargoes from these Ports to other parts of the country will be screened thoroughly before departure by the Ports Health Authority. All vehicles conveying food and other essential humanitarian items into these locations from other parts of the country will also be screened thoroughly before they are allowed to enter these restricted areas. Movements of all passenger aircraft, both commercial and private jets, are hereby suspended except issued with special permits.

The problem here is that despite the different measures; distribution of relief materials and cash transfer to the most vulnerable. Though, mismanagement exists as the personnel in charge are not credible enough, the hardship keeps

increasing and most of the people are resisting the restriction as such making it more difficult to control the spread. Above all, the death that broke the camel's back was the death of Chief of Staff and Senior Adviser to **Nigerian Head of State** Mallam Abba Kyari, who died on Friday, 17th April, 2020 and many more cases are still being reported. It is against this background that this study attempts to project the coronavirus cases, with the view of investigating the trend to see which of the phases we are and the way forward.

METHODOLOGY

Nigeria is located in Western Africa, and borders the Gulf of Guinea, between Benin on the west and Cameroon on the east. It has a compact area of 923,768 square kilometers (356,376 square miles). The country's land mass extends from the Gulf of Guinea in the south to the Sahel (the shore of the Sahara Desert) in the north. Abuja, the capital city of the Federal Republic of Nigeria, replaced the former capital city, Lagos, in December 1991, because of its more central location, among other reasons. Lagos remains Nigeria's commercial capital. Other major Nigerian cities include Ibadan, Kaduna, Kano, Maid-uquri, Jos, Port Harcourt, and Enugu.

The population was estimated at 123,337,822 in 2000. This figure represents an increase of 39.36 percent over the 1991 population census figure of 88.5 million, which was hotly debated and widely believed to have been an undercount. In the year 2000, the birth rate was estimated at 40.12 per 1,000, while the death rate was estimated at 13.72 per 1,000. Nigeria has a tropical climate with variable rainy and dry seasons, depending on location. It is hot and wet most of the year in the southeast but dries in the southwest and farther inland. In general, the length of the rainy season decreases from south to north.

Healthcare delivery in Nigeria has faced major challenges toward achieving universal health coverage. While significant progress was made in the first two decades after the country's independence in 1960, the economic downturn resulting from the plummeting of oil price of which Nigeria was dependent led to a series of twists and turns in the health sector. Health policies were subsequently influenced by external forces, and the adoption of the structural adjustment program signaled a shift from a predominantly welfare scheme to the introduction of user fee and the resultant proliferation of private healthcare provision.

The data for this study was compiled by the author from the daily updates given by the Nigerian Centre of Disease Control (NCDC, 2020) from 27th February to 20th April, 2020, making a total of 52 days. The data covers data on infected cases, data on deaths, recovery, active cases and Case Fatality Rates across the infected states for the period under study. The statistical model for an epidemic has five phases as described in Figure 3 above. Phase 1 and Phase 2 are characterized by exponential growth. While phase 1 is characterized by a slow growth, phase 2 is characterized by an accelerated fast growth. Phase 3 and 4 are characterized by a negative growth, with phase 4 recording an accelerated negative growth. Phase 5 is the ending phase where limited cases are recorded or are completely not there. As noted by Chen Chen, and Yu, (2019), the coronavirus epidemic appear to be nonlinear and chaotic, as such, this paper focused on a short-term prediction of COVID-19 cases specifically under phase 1 and 2 of the epidemic in Nigeria. Using data from the NCDC daily reports on COVID-19 cases, the model was developed to provide estimates until the 28th of April, 2020 which is the 61st day since the 1st case was confirmed in Nigeria.

Using the calculated initial guess, the parameters K , r , and A are then calculated by least-square fit using the MATLAB functions `lsqcurvefit` and `fitnlm`.

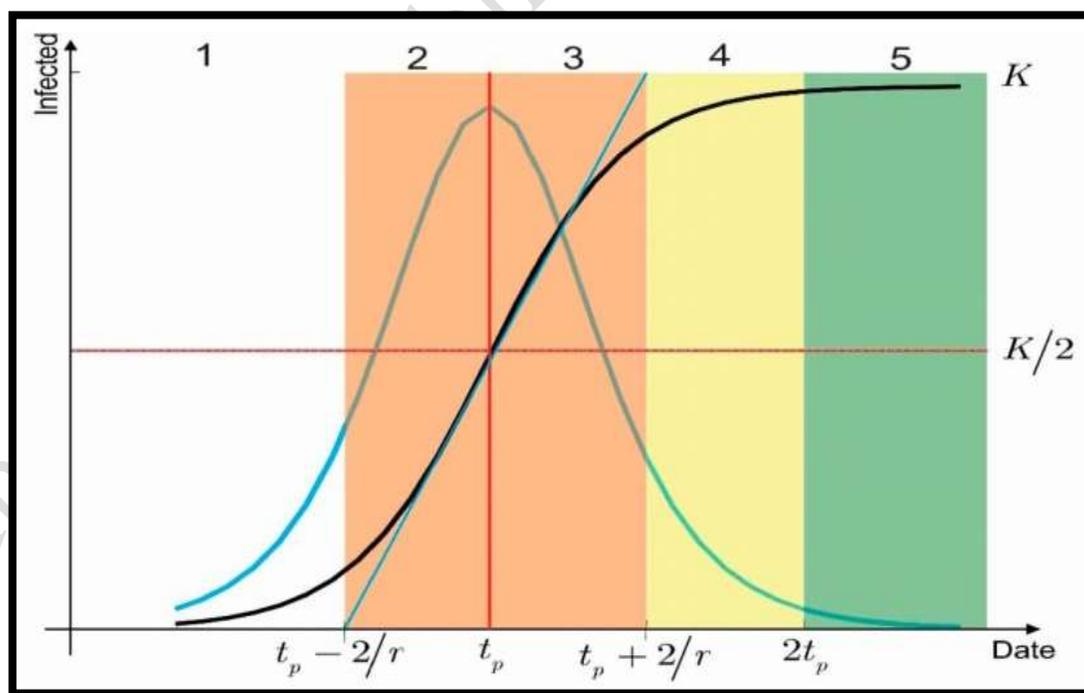


Figure 2: Epidemic phases

Source: Milan, (2020)

Figure 2 presents Epidemic Phases adopted from Milan, 2020, the figure shows that,

Phase 1: Exponential growth (lag phase, slow growth): $t < t_p - \frac{2}{r}$

Phase 2: Fast growth (positive growth phase, acceleration phase) to an epidemic turning point: $t_p - \frac{2}{r} < t < t_p$

Phase 3: Fast growth to steady-state (negative growth phase, deceleration phase): $t_p < t < t_p + \frac{2}{r}$

Phase 4: Steady-state (transition phase, slow growth, asymptotic): $t_p + \frac{2}{r} < t < 2t_p$

Phase 5: Steady ending phase (plateau stage): $t > 2t_p$

Assuming a continuous spread of the disease, the numbers of detected cases are expected to follow an exponential model (Nelson, and Williams, 2014). The daily cumulative confirmed cases have been estimated using the exponential series model, by fitting the observed confirmed cases between the study periods in Nigeria. This paper also analyzed the COVID-19 Case Fatality Rate (CFR) in Nigeria. The CFR also called case fatality ratio in epidemiology is the proportion of people who die from a specified disease among all individuals diagnosed with the disease over a certain period of time (Mathur, 2007). The data was analysis using Statistical Package for Social Sciences (SPSS) Version 16 and MS Excel 2010.

RESULTS AND DISCUSSION

Descriptive Analysis of COVID-19 cases

As of 21st April, 2020, a total of 492 COVID-19 confirmed cases were reported in Nigeria. Out of this number, 169 infected patients were recovered and discharged, 13 people were reported death, and a total of 317 active cases.

Table 1: Daily and Cumulative Records of COVID-19 Cases in Nigeria

<i>Day/Date</i>	<i>New case</i>	<i>Active cases</i>	<i>Daily death</i>	<i>Cumulative deaths</i>	<i>Cumulative recovery cases</i>	<i>Cumulative cases</i>	<i>CFR</i>
<i>Day 1-28-02-2020</i>	1	1	0	0	0	1	0
<i>Day 2-29-02-2020</i>	0	1	0	0	0	1	0
<i>Day 3-01-03-2020</i>	0	1	0	0	0	1	0
<i>Day 4-02-03-2020</i>	0	1	0	0	0	1	0
<i>Day 5-03-03-2020</i>	0	1	0	0	0	1	0

<i>Day 6-04-03-2020</i>	0	1	0	0	0	1	0
<i>Day 7-05-03-2020</i>	0	1	0	0	0	1	0
<i>Day 8-06-03-2020</i>	0	1	0	0	0	1	0
<i>Day 9-07-03-2020</i>	0	1	0	0	0	1	0
<i>Day 10-08-03-2020</i>	0	1	0	0	0	1	0
<i>Day 11-09-03-2020</i>	1	2	0	0	0	2	0
<i>Day 12-10-03-2020</i>	0	2	0	0	0	2	0
<i>Day 13-11-03-2020</i>	0	2	0	0	0	2	0
<i>Day 14-12-03-2020</i>	0	2	0	0	0	2	0
<i>Day 15-13-03-2020</i>	0	2	0	0	0	2	0
<i>Day 16-14-03-2020</i>	0	2	0	0	0	2	0
<i>Day 17-15-03-2020</i>	0	2	0	0	0	2	0
<i>Day 18-16-03-2020</i>	0	2	0	0	0	2	0
<i>Day 19-17-03-2020</i>	0	2	0	0	0	2	0
<i>Day 20-18-03-2020</i>	5	7	0	0	0	8	0
<i>Day 21-19-03-2020</i>	4	11	0	0	0	12	0
<i>Day 22-20-03-2020</i>	0	0	0	0	0	12	0
<i>Day 23-21-03-2020</i>	10	21	0	0	1	22	0
<i>Day 24-22-03-2020</i>	8	28	0	0	1	30	0
<i>Day 25-23-03-2020</i>	10	37	1	1	2	40	2.5
<i>Day 26-24-03-2020</i>	4	41	0	0	0	44	2.5
<i>Day 27-25-03-2020</i>	7	48	0	0	0	51	2.5
<i>Day 28-26-03-2020</i>	14	61	0	0	0	65	2.5
<i>Day 29-27-03-2020</i>	5	66	0	0	0	70	2.5
<i>Day 30-28-03-2020</i>	27	93	0	0	0	97	2.5
<i>Day 31-29-03-2020</i>	14	107	0	0	0	111	2.5
<i>Day 32-30-03-2020</i>	20	121	0	0	0	131	2.5
<i>Day 33-31-03-2020</i>	4	125	1	2	0	135	1.5
<i>Day 34-01-04-2020</i>	39	163	0	0	0	174	1.5

Day 35-02-04-2020	10	162	0	0	20	184	1.5
Day 36-03-04-2020	26	181	2	4	20	210	1.9
Day 37-04-04-2020	4	185	0	0	25	214	1.9
Day 38-05-04-2020	18	194	1	5	27	232	2.2
Day 39-06-04-2020	6	198	0	0	35	238	2.2
Day 40-07-04-2020	16	204	1	0	44	254	2.2
Day 41-08-04-2020	22	226	0	6	44	276	2.2
Day 42-09-04-2020	12	230	1	7	51	288	2.4
Day 43-10-04-2020	17	240	3	10	58	305	3.3
Day 44-11-04-2020	13	238	0	0	70	318	3.3
Day 45-12-04-2020	5	228	0	0	85	323	3.3
Day 46-13-04-2020	20	242	0	0	91	343	3.3
Day 47-14-04-2020	30	263	1	11	99	373	2.9
Day 48-15-04-2020	34	297	1	12	128	407	2.9
Day 49-16-04-2020	35	277	1	13	152	442	2.9
Day 50-17-04-2020	51	317	4	17	169	493	3.4
Day 51-18-04-2020	49	364	2	19	169	542	3.4
Day 52-19-04-2020	89	446	2	21	170	627	3.3

Source: Daily compilation from NCDC Reports, (2020)

Table 1 presents the number of daily new cases reported, the cumulative case, active cases and case fatality rate. The first confirmed case was announced on 28th February, 2020 in Nigeria, after ten days (9th March, 2020), the second case was confirmed making a total of two persons. In Day 20, another 5 cases were confirmed; Day 22 recorded no case, after which more and more cases were reported despite the curbing strategies put in place.

The first death was recorded on 25th March, 2020, and in 30 days, 97 cases of COVID-19 was confirmed. Out of 8003 samples tested from 22 states, Nigeria have recorded 627 cases of COVID-19, 21 deaths and 170 recovery cases in 52 days since the first case was confirmed. The demographic characteristics revealed that out of the confirmed cases, 441 representing 70% of the cases is

Male, and 186 (30%) is female. The most affected age group is (31-40) years which represents 21% of the confirmed cases. Going by the source of their infection shows that, 210 (34%) have travel history, 235 (37%) attributed theirs to personal contacts, 84 (13%) have unknown sources and incomplete source cases are 98 (16%). This could be attributed to the fact that there is non-compliance of the citizens on the NCDC/WHO guidelines on curbing the spread of COVID-19 pandemic. Figure 3 present the temporal distribution of the confirmed cases in Nigeria for the period under review.

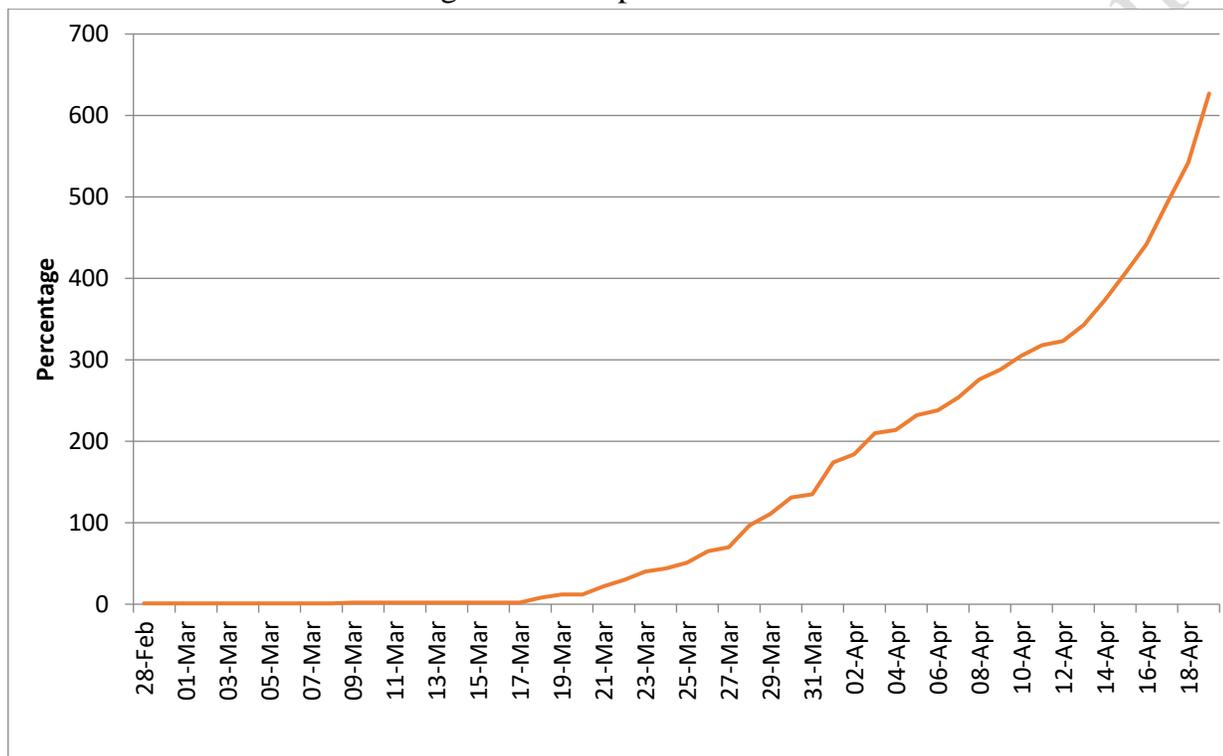


Figure 3: Temporal distribution of Confirmed cases of COVID-19 cases in Nigeria (52 days)

Source: Daily compilation from NCDC Reports, (2020).

Figure 3 presents the cumulative cases of confirmed COVID-19 cases in Nigeria for 52 days since the first case was confirmed. From the figure it will be observed that the cases start rising as from 18th March, 2020 to a tune of 627 cases in 52 days despite government efforts in curbing the spread.

Case Fatality Rate and Recovery Rate

Case fatality rate, also called case fatality ratio, in [epidemiology](#), is the proportion of people who die from a specified [disease](#) among all individuals

diagnosed with the disease over a certain period of time. Case fatality rate typically is used as a measure of disease severity and is often used for prognosis (predicting disease course or outcome), where comparatively high rates are indicative of relatively poor outcomes. It also can be used to evaluate the effect of new treatments, with measures decreasing as treatments improve.

The recovery rate refers to the ratio of people who recovered from a specified [disease](#) among all individuals diagnosed with the disease over a certain period of time. This index measures the level of management, and the effectiveness of the treatment in respect to the diseases under review. Figure 4 presents the case fatality rate and recovery rate for comparison purposes.

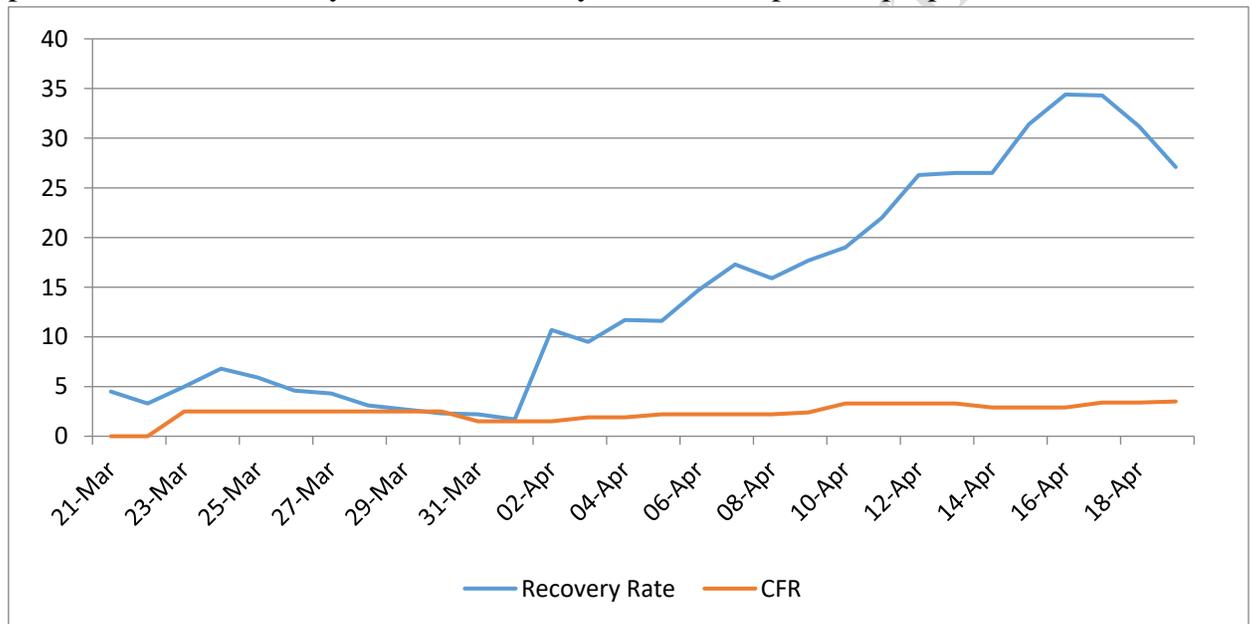


Figure 4: Case Fertility Rate and Recovery Rate

Source: Daily compilation from NCDC Reports, (2020)

The Case Fatality Rate (CFR) in Nigeria on COVID-19 as of 23rd March, 2020 which is day 25 is estimated as 2.5% this rate was maintained till day 33 which is 31st march, 2020 where it dropped to 1.5% and remained for three days then pick up again. The minimum CFR is 1.5% while the Maximum is 3.4 and the average of 2.6%. The CFR has been fairly constant (3.4%) from day 50 to day 52. (Figure 4).

The recovery rate on the other hand fluctuates between 1.7% to 6.8% since the date of first discharged case from 23rd March, to 1st April, 2020 after which there experience a fast recovery rate up to 34.4% on 16th April 2020 then drops

to 21.7% on 19th April, 2020. This result implies that there is improvement in the prevention and recovery cases, except that it starts dropping again from 17th to 19th April, 2020. This could probably be due to the sudden increase in the number of confirmed cases during those days.

The Case Fatality Rates is high and going by the Epidemic phases, this trend fits the 1st and 2nd phases, which is described as slow and fast growth (positive growth phase, acceleration phase) to an epidemic turning point. New cases are still coming up; Kano that just confirmed her first COVID-19 case on 11th April, 2020 has is now risen to 37 confirmed cases as at 19th April, 2020, and a total of 22 states have been confirmed having COVID-19.

Trend of COVID-19 Cases from 28th Feb. to 19th April, 2020.

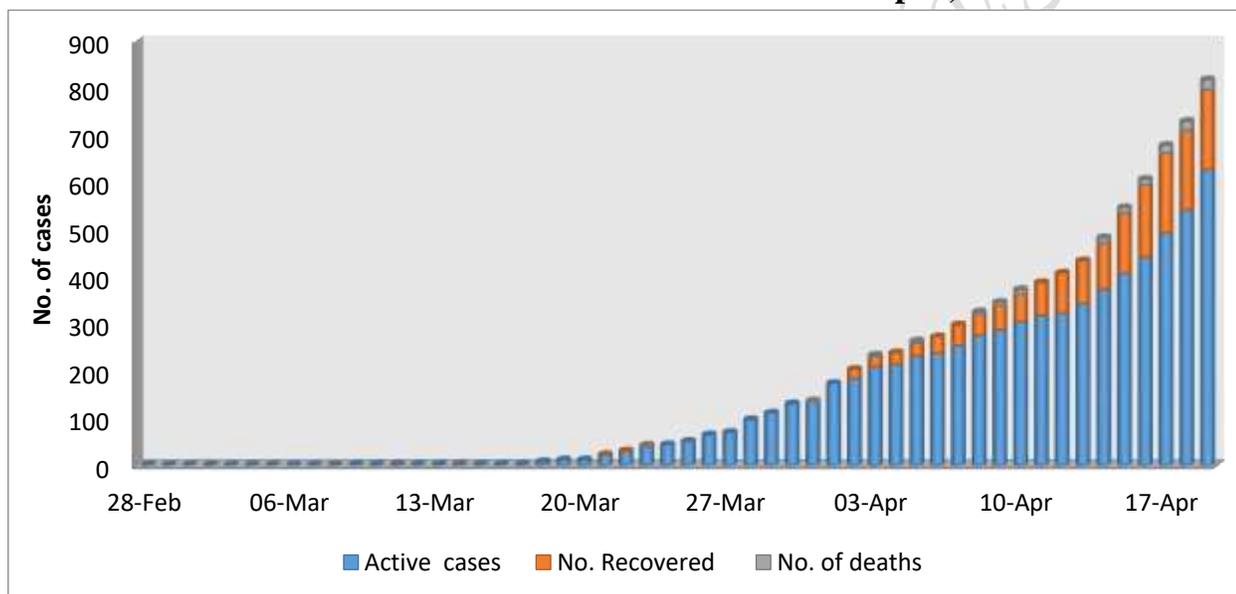


Figure 5: Cumulative Cases of COVID-19 from 28th Feb. to 19th April, 2020.

Source: Daily compilation from NCDC Reports, (2020)

Figure 5 presents the number of confirmed active cases, number of recovered cases and the number of death. Analysis shows that the active cases is on the increase though at a slow and steady rate until around March 20th 2020 when it started rising up to 446 active cases. The first recovered case was confirmed on 21st March 2020, for three consecutive days, three people were discharged, on 2nd April, 2020 another 17 recoveries were confirmed, then risen to 170. Deaths

were also confirmed, the first death was confirmed on 23rd March, 2020 and staggered rising gradually 21 deaths in 52 days.

States Analysis of COVID-19 pandemic distribution in Nigeria

The confirmed cases since the first case was confirmed were analysed by states for 52 days and the result is presented in Figure 7.

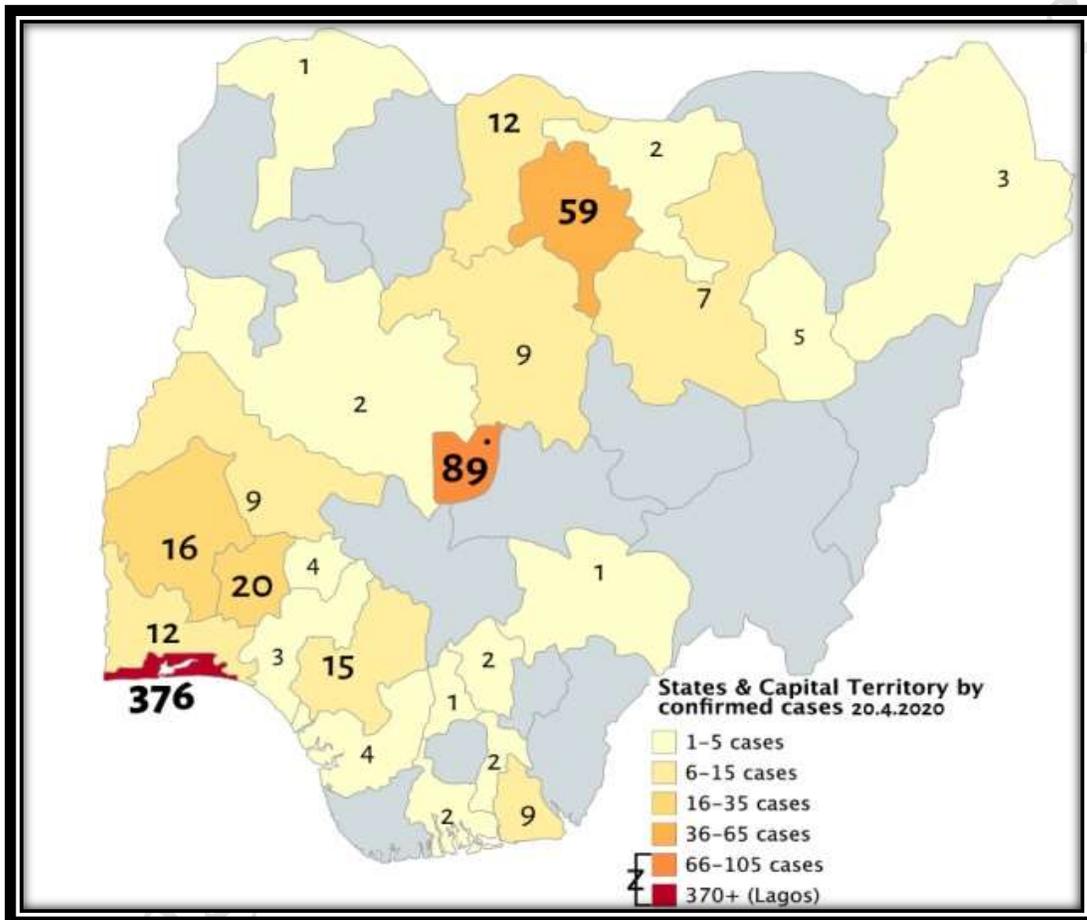


Figure 6: Spatial distribution of Coronavirus Pandemic in Nigeria, 2020

Source: NCDC daily reports, (2020)

The state analysis of COVID-19 confirmed cases as at 20th March, 2020 show that three states are leading; these are Lagos with 376 cases, FCT with 89 cases, and Kano with 59 cases within a shortest period of time. The next set though moderate is Osun (20), Oyo (16), Edo (15), and Ogun (12), while the rest are few and others yet to report any case. Globally as at 19th April, 2020, 210 countries are affected, with 2,241,359 confirmed cases and 152,551 deaths.

Projection of COVID 19 Cases in Nigeria

The number of confirmed cases from 29th February–19th April, 2020 was used in the projection of the expected number of infections if management strategies remain unchanged as presented in Figure 7.

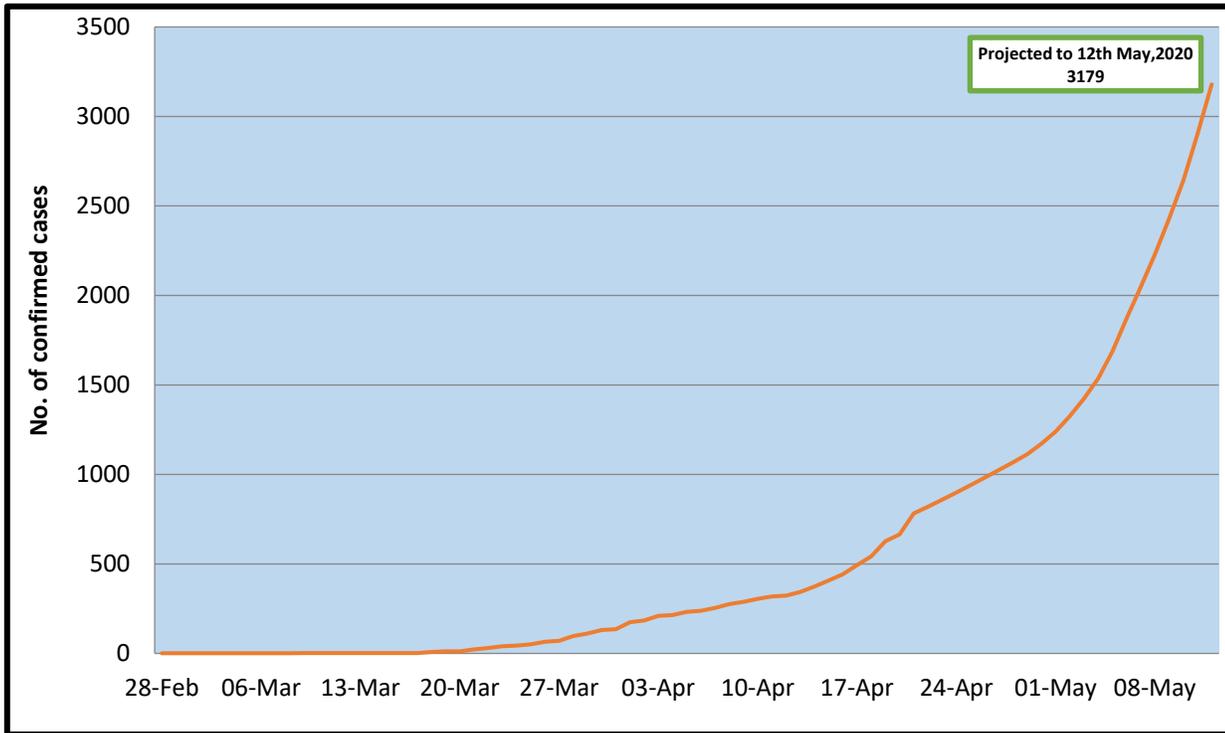


Figure 7: Projected trends of COVID-19 cases in Nigeria to 27th April, 2020

Source: Daily compilation from NCDC Reports, (2020)

Figure 7 presents the projected trends of COVID-19 cases in Nigeria to 27th April, 2020; which is Day 60 since the first case was confirmed. The result of the projection revealed that Nigeria might record 3,179 confirmed cases of COVID-19 on 12th May, 2020 if situation is not improved.

DISCUSSION OF RESULTS

Nigeria, a sub-Saharan Africa's most populous country and biggest energy producer, has recorded 627 confirmed cases of COVID-19 and 31 deaths and 170 recovered persons from the highly contagious lung disease between within 52 days that is from 28th February to 19th April, 2020. The diseases as earlier stated originated from China and gradually spread to other countries. This was possible through travelers to china and other infected countries. The

government was very reluctant to take action on time; there was need to have close borders to guard against those who traveled abroad so that a complete control would be properly executed.

Lockdowns initially slated to last for 14 days were put in place on March 30th, 2020 in the southern commercial hub Lagos, neighbouring Ogun state and the Federal Capital Territory Abuja. The lockdown was extended on Sunday by two weeks again to end on 27th April, 2020. Other states, such as the northern economic hub Kano, have also imposed restrictions. Apart from that the government wants to evacuate all the none indigene Almajirai from the state. According to television conversation, Kano state has not properly swing into action of testing and management of the COVID-19 cases. This is due to insufficient Personal Protective Equipment (PPE), Culture, Testing Centres, people's perception which seems not believing of the presence of **COVID-19 pandemic** among others.

The estimation indicates that Nigeria will likely record the first 1,000 confirmed cases on 27th April, 2020 which is Day 60 since the 1st case was confirmed. Comparing it with some countries, the result indicates that the in South Africa, it took them 23 days to reach 1,000 cases, in Italy it took 30 days; it took 40 days in Spain to reach 1,000 cases and 51 days in the United States of America. This study found that the CFR in Nigeria on Day 25 (23-03-2020) was 2.5%, by 31-03-20 it drops to 1.5% and rise gradually to 3.5% in day 52. Similarly, the CFR as documented in other countries have been changing overtime. This is orchestrated by the fact that the indicator is not constant and changes with time, specifically being higher at the on-set of an epidemic. Comparison of CFR on day 25 in Nigeria with other countries show mixed results. For instance, the CFR in Nigeria was higher than in China where the CFR on Day 25 was estimated as 1.3%, Italy with an estimated CFR of 1.5%, in Spain and South Africa where no death had been recorded by Day 25. On the other hand, the CFR in Nigeria was slightly lower than that of Ghana on Day 25 which recorded a CFR of 3.3% ([Max, et al., 2020](#)).

The implication of this results is that it is expected that the CFR should be lower as the days go by but the cases is different in Nigeria as we are still in the second phase of Epidemic. This so because about one third of the states in Nigeria are yet to register a confirmed case of COVID-19 in their states. Kano that just confirmed her first index is now growing faster and might even pass FCT and Lagos.

Using the CFR estimate, then it is expected that 27 deaths will be recorded in Nigeria from COVID-19 by 14th April 2020. Additionally, by the 40th day of COVID-19 in Nigeria, 108 deaths are expected to be **recorded**.

CONCLUSION AND RECOMMENDATIONS

Corona virus was spreading human to human to transmission by close contact via airborne droplets generating by coughing, sneezing, kissing and smooching. Nigeria recorded the first confirmed case of COVID-19 on 27th February, 2020, and as of 19th April, 2020, 627 cases had been confirmed. During this period, the Nigerian Centre for Disease Control confirmed 21 mortality cases and 170 recoveries from COVID-19. The confirmed cases of COVID-19 were spread in only 22 states and the Federal capital Territory Abuja. There is no anti-coronavirus vaccine to prevent or treat the diseases, but some supporting therapy work. Therefore one can say that if people resisted the curbing strategies, the observed cases might not differed from the expected.

Base on the forego conclusion, the following recommendations are made:

1. With the high CFR Rate, there is need to expedited massive screening and contact tracing of all individuals who might have been infected leading to increasing the chances of getting active cases, and possible transmission through their contacts.
2. As the country likely to hit the 1,000 mark on 27th April, 2020, then the NCDC in conjunction with the Ministry of Health should explore possibilities of mapping soonest possible facilities which could hold such capacity and ensure their functionalities.
3. The WHO and NCDC guidelines of avoiding contact with people especially sick persons, use of personal mask, observing social distance washing of hands at all times with soap and use of hand sanitizers; above all, stay at home/lockdown among others will go a long way to minimized the spread.
4. The government as part of the support for the lockdown should develop a workable mechanism to reduced peoples' suffering, since the attempted food distribution and money transfer never reach the rightful deserved persons and the proposed free supply of electricity is not real, to speak less, most areas that have electricity never have constant supply and yet they pay for no service.
5. There is need for government subsidy on public PPE, as most Nigerians are struggling to feed their selves.

6. There is need for aggressive community testing in order to minimize rapid spread an increased mortality. This is because prevention is better than cure as our health centres lack credibility.
7. Other things being equal, further sensitization, and locked down will yield a better results and give room for further planning.

SUGGESTION FOR FURTHER STUDIES

1. Further studies should be conducted on the impact of mandatory quarantine, total lockdown, suspension of international flights, and night curfew among others on the people.
2. Studies to be conducted on life during and life after coronavirus among the people.
3. Occupational Health Risk of the management and containment of COVID-19 Pandemic in Nigeria.
4. The effectiveness of COVID-19 curbing strategies in Nigeria.

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