Evaluation of the Lockdowns for SARS-CoV-2 Epidemic in South Eastern Nigeria

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INTRODUCTION

The novel SARS-CoV-2, the causative agent of COVID-19, is an enveloped, positive sense, single stranded RNA virus belonging to the family Coronaviridae and subfamily Orthocoronavirinae. SARS-CoV-2 is the seventh member of human coronaviruses in the Coronaviridae family, a family of zoonotic viruses, meaning that they are harbored in animals such as camels, cattle, cats, dogs and bats. SARS-CoV-2 shares 87.6% genome sequence similarity with bat coronavirus [1] and 79% and 50% respectively, genome homology with SARS-CoV and MERS-CoV [2]. This finding implicated bats as the most likely primary hosts for SARS-CoV-2 [3] while pangolins are thought to be the intermediate hosts since their genetic sequence were found to be 85.5% to 92.4% identical to SARS-CoV-2 [4].

SARS-CoV-2 has four important structural proteins which are (E) the envelope protein (M) the membrane protein (S) the spike protein and (N) the nucleocapsid protein, which are required to regulate their function and viral structure [5]. Among these four proteins the most important ones are N and S, where the former one helps the virus to develop the capsid and the entire viral structure appropriately and the latter helps in the attachment of virus to the host cells [6]. Coronaviruses, including SARS-CoV-2 derive their name from this crown-like spikes on their surface [7].

Coronaviruses are most commonly transmitted from person to person through droplet inhalation such as cough and sneeze and close personal contact with one another through touching or shaking of hands [8]. Viral RNAs have been found in nasal discharges, sputum, blood and feces [9]. This may indicate that the fecal-oral route of transmission may be possible as well. A possible airborne transmission has also been suggested. A high temperature and high humidity however reduce rate of transmission of the virus [10]. Coronaviruses are very stable in a frozen state and have been shown to survive for up to two years at -20˚C. They are however thermolabile and are susceptible to normal cooking temperatures of 70˚C [10].

COVID-19 was first reported in Wuhan, China in December, 2019, declared a pandemic by the World Health Organization (WHO) on March 11, 2020 and has been reported in 216 countries globally [10]. The SARS-CoV-2 is pathogenic, contagious, and spreads more easily and rapidly. The disease has affected 10,360,822 million and claimed the lives of 507,014 people worldwide as at June 30, 2020 [10], with the number of recoveries at 5,739,339. The elderly and those with impaired immune system may have specific immune response dysfunction which could lead to delayed immune response. Non-specific response may therefore be working continuously leading to cytokine storm which is responsible for the high mortality rate recorded among this group of patients [11].

The first case of COVID-19 in Nigeria was confirmed on the 27th of February, 2020. The case was an Italian citizen who works in Nigeria and returned from Milan, Italy to Lagos, on the 25th of February, 2020 [12]. Since then the disease has spread to 35 states and the FCT bringing total confirmed cases in Nigeria as at June 30th, 2020 to 25,694, 9,746 recoveries and 590 deaths, with more reported cases amongst the male than the female populace [13]. The five South Eastern Nigeria states of Abia, Anambra, Ebonyi, Enugu and Imo had their first confirmed cases of COVID-19 in April with the total figure, as at the 30th June, 2020, rising up to 310, 73, 438, 261 and 332 respectively [13].

In order to break the chain of transmission and flatten the exponential curve of SARS-CoV-2 in the region, the State Government of the five States introduced an initial fourteen-day lockdown of their states on the 30th of March, 2020 in line with that set up by the Federal Government of Nigeria in the major epicenters of the disease (namely, Lagos and Ogun states and the Federal Capital Territory) in the country. Shops, markets, churches and worship centers and offices were closed during the period as well as total ban on social activities including wedding and burial ceremonies. There was also a total restriction of movement except for those on essential duties. The first phase of the lockdown ended on the 13th of April and was renewed on the 14th for another two weeks. In addition, the states introduced a curfew from 10pm to 6am. At the end of the second phase, there was need to extend it for a further 14 days in line with the directive of the Federal Government of Nigeria in some states. However, at this third phase, the states had started a gradual relaxation of the lockdown rules with movements allowed within each state. But there were still total closure of interstate borders preventing travels between neighboring states, with the dusk-to-dawn curfew still in place. Total relaxation of the lockdown in each of the five states of the region was made on 31st May, 2020 by allowing offices, businesses, markets, and stores to resume operation with limited hours of operation and staff capacity, but with compulsory wearing of face masks in public and checking of body temperatures with infra-red thermometers as well as hand washing.

There are no effective drugs and vaccines to control the novel coronaviruses [14]. Preventive measures include non-pharmaceutical
interventions like social distancing (5-6 feet or more), hand hygiene (washing with soap and running water for 20 seconds or use of alcohol based sanitizers), avoid touching nose, eyes and mouth with unwashed hands, avoid close contact with anyone who has a fever and cough or who is sick, and wearing of masks.

In view of the efforts of the various governments of South Eastern Nigeria to introduce several measures aimed at preventing the spread of COVID-19, this study was designed to examine the impact of the lockdowns and border closures between the states on the spread and containment of SARS-CoV-2 in the five states that make up the region.

MATERIALS AND METHODS

COVID-19 data of the five South Eastern States of Abia, Anambra, Ebonyi, Enugu and Imo between April 1st and 30th June were retrieved from the Nigerian Center for Disease Control microsites (NCDC, 2020). Data were assessed by one-way Analysis of Variance (ANOVA) followed by Duncan multiple comparison, Turkey’s multiple comparison and student’s t-test. All statistical analysis was performed at the p < 0.05 level of significance. All the statistical analysis was done using GraphPad software version 5.01 (GraphPad Software Incorporated, U.S.A, 2007).

RESULTS

The result obtained from analysis of COVID-19 cases in South Eastern, Nigeria showed that the region recorded a total of 1,415 cases between April when all the five states had their first cases and June, 30th. Ebonyi with a total of 438 (31.0%) produced the highest rate of infection with 0.21%. Abia, Ebonyi and Imo States showed equal infection rate of 0.14% each while Anambra brought up the rear with 0.07%.

In the month of May, the highest rate of confirmed cases was recorded in Ebonyi State with 2.40%, followed by Imo State with 1.06%, while Abia State was the least with 0.57% (Figure 2).

In June, all the states witnessed a spike in cases with Ebonyi recording the highest (28.1%). Abia was second with 21.2%, Imo was third with 20.9%, while Enugu and Anambra States recorded 17.1% and 4.4% confirmed cases respectively as shown in figure 3.

An investigation into deaths caused by COVID-19 complications within the period under review showed that the state with the highest death rate in the region was Anambra (12.3%), followed by Imo (1.8%) and Enugu (3.4%) and Imo (1.8%). Abia showed 1.0% death rate while Ebonyi was the least with 0.7% (Figure 4).

DISCUSSION

Lockdown, including restricted social contact and keeping open only those businesses essential to the states’ supply chain has had a beneficial effect in South Eastern, Nigeria. The Federal Government of Nigeria introduced an initial lockdown of Lagos and Ogun States and the FCT on the 30th of March, 2020. Although the five South Eastern States of Abia, Anambra, Ebonyi, Enugu and Imo, like most other states in Nigeria, were yet to record any case of COVID-19, they followed the directive of the FG, locked down their States, closed their borders to their neighbors and continued campaigning, educating, and promoting measures that will ensure their States do not experience any outbreak of the disease. Yet, in spite of all these efforts, all the States recorded their first few pockets of cases of the diseases during the lockdown in April, with some experiencing the outbreak in the first phase while others were in the second. The disease was introduced into the region by asymptomatic indigenes of the respective states, ignoring the border closure, and returning home from the epicenters of the disease in Nigeria namely, Lagos, Ogun, Kano and the FCT.

The increased number of COVID-19 cases observed in Ebonyi, Imo, Abia and Enugu could be attributed to the scaling up of tests for COVID-19 data of the five South Eastern States of Abia, Anambra, Ebonyi, Enugu and Imo between April 1st and 30th June, 2020. The increased number of COVID-19 cases observed in Ebonyi, Enugu and Imo between April 1st and 30th June, 2020. The increased number of COVID-19 cases observed in Ebonyi, Enugu and Imo between April 1st and 30th June, 2020.
June and accounted for the high infection rate recorded. Mistrust of
government and lack of belief in the existence COVID-19 leading to
lack of compliance with government imposed safety protocols will
not be ruled out as another reason why there was an upsurge in cases
of the disease in June. In addition, since coronaviruses have been
reported to survive at low temperatures [10], the low temperature of
the South East occasioned by increase in the amount of rainfall in
the month of June could also have contributed to the high infection rate
in this month than in previous ones. There was a significant difference
\( \rho < 0.05 \) between the months of April and May, and June in rate
of transmission of the disease in the five states. All the COVID-19
related deaths observed in the states all occurred in the month of June
also.

Similar reasons could also have accounted for the surge in
infection in other states in Nigeria in the month of June. However,
the rates of infection within the months under review in the South
East was far less in comparison to other states such as Lagos (48.4%),
FCT (70.5%), Ogun (56.2%), and Kwara (73.3%) among others [13].

The lockdown measure was also implemented in other countries
as it was in Nigeria. In Italy and Spain, Aurelio [15] reported that
the lockdown implemented in the months under review in those
countries were quite effective in breaking the chain and flattening
the transmission curve. South Africa implemented lockdown
containment and their daily reported cases slowed abruptly, with the
number remaining more or less constant at about 70 new cases per
day [16]. Other countries, including China [17], South Korea [18],
Switzerland [19] etc. implemented lockdown restrictive measures
within the months under review and \( R_0 \) was decreased to below 1,
thereby flattening the transmission curve.

According to Iboi, et al. [20], the basic reproduction number \( (R_0) \)
of 2.24 transmission rate means that during the early stages of the
pandemic, a typical COVID-19 infected individual in Nigeria was
transmitting, on average, to two other people. In other words, the
pandemic was spreading at an exponential rate until the time control
and mitigation measures were implemented, when the Federal
Government of Nigeria announced lockdown measures in three
epicenters of the disease and other States, including the five in the
South East, thereby bringing down \( R_0 \) to below 1.

Some schools of thoughts believe that the lockdown implemented
in Nigeria should have been maintained for at least three or four
months to completely break the chain of transmission of the SARS-
CoV-2 in the country. Hence, relaxing or fully lifting the lockdown
sooner in other to reopen the economy, contributed to the upsurge in
the rate of infection in the country in the month of June as this study
has shown. COVID-19 exponential curve can however be flattened
and \( R_0 \) brought down to below 1 in the South East, and indeed,
the entire country, if the use of non-pharmaceutical interventions,
including social distancing, community lockdown, use of face masks
in public places, provision and use of Personal Protective Equipment
(PPE) by frontline healthcare providers, provision of well-equipped
molecular laboratories and widespread diagnostic testing, quarantine
and isolation of suspected and confirmed cases respectively, and
adequate personal hygiene including hand-washing could be further
sustained.

**CONCLUSION**

The declines of \( R_0 \) could be exploited as strong evidence for the
effectiveness of government interventions in the South East States,
and indeed, Nigeria. This included the use of face masks, social distancing, community lockdown and other containment and mitigation measures in April. Relaxation of the lockdown in June led to an upsurge in infection rate and higher $R_0$ in the region. The rate is likely to go up in subsequent months due to lack of compliance to the containment and mitigation measures laid down to control the spread of the virus.

Authors’ Contributions

Conception and design of the study was conducted by RKO, literature search was done by INC, while supervision was by CCI. All authors read and approved the contents of manuscript.

REFERENCES


