Review Article

Coronavirus Pandemic and Macroeconomic Indicators: A Study on the Structural Factors that Worsen Economic Crisis in Nigeria

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Abstract - *This study analyses the effect of COVID-19 pandemic on selected macroeconomic indicators in Nigeria, its effect on the economy and the structural factors that worsen the coronavirus (COVID-19) crisis. Using data from the Central Bank of Nigeria, and the World Bank, this study employs Johansen-Juselius multivariate cointegration techniques to estimate the relationship between exchange rate, crude oil price, inflation and economic growth in Nigeria. Findings reveal that the economic downturn in Nigeria was triggered by a combination of declining oil price, high rate of inflation, exchange rate and spillovers from the COVID-19 outbreak, which not only led to a fall in the demand for oil products but also stopped economic activities from taking place when social distancing policies were enforced. The government responded to the crisis by providing financial assistance to businesses and a small number of households that were affected by the coronavirus (COVID-19) outbreak. Therefore, the study recommended the need for government to build appropriate digital infrastructure to facilitate the transition from 'face-to-face' business activities to a 'digital or online' business activities, which can help to grow the digital economy.*

Keywords - COVID-19, Macroeconomic Indicators, Economic crisis, Johansen Cointegration

I. INTRODUCTION

The World Health Organization (WHO) in December 2019 received reports on clusters of pneumonia cases of unknown causes in Wuhan City, Hubei Province of China. The Chinese authorities subsequently identified a novel strain of Coronavirus (SARS-COV 2) as the causative agent. Sequel to the advice of the International Health Regulation Emergency Committee, the Director-General of the WHO declared the COVID-19 outbreak as a Public Health Emergency of International Concern (PHEIC) on 30 January 2020 and characterized it as a pandemic on 11 March 2020. The outbreak has been reported in all continents, with first case in Africa reported in Egypt in February 2020. Globally, over 52.9 million confirmed cases and over 1.2 million deaths have been recorded [1].

Africa, being a highly vulnerable continent, soon recorded imported cases of Covid-19. As at the time of writing this paper, the total confirmed cases of Covid-19 in Africa stand at 874,036 cases; with about 524,557 recoveries and 18,498 deaths recorded [1]. These represent a 46.3% recovery rate and about 4.3% fatality rate, respectively. However, there have been a lot of debates on the reasons for the low cases of Covid-19 recorded in Africa ([2]; [3]; [4]). This seems ironical given the level of public health infrastructure, governance structure, porous borders, weak institutions, inter alia, in the region. It was rather argued that the low number of confirmed cases of Covid-19 recorded in Africa was due to low testing capacity and not necessarily because of location or the effectiveness of containment policies.

Nigeria is one of the 210 countries affected globally. The first case was confirmed in Lagos State on 27 February 2020. This index case was a 44-year old man, an Italian citizen who returned from Milan, Italy, on 24 February and presented at a health facility on 26 February 2020. Following the confirmation of the index case, 216 people were identified as contacts to be followed up. Of these, 45 travelled out of Nigeria and one of the remaining 176 contacts was confirmed to be positive for COVID-19 on 9th March, 2020 ([5]; [6]).

The WHO estimated that the novel Coronavirus case fatality rate has been estimated at around two percent [6], substantially lower than Middle East Respiratory Syndrome MERS (34 percent) and Severe Acute Respiratory Syndrome SARS (10 percent) [3]. The incubation period of the virus may appear in as few as two (2) days or as long as fourteen (14) days (World Health Organization (WHO): 2-10 days; China's National Health Commission (NHC): 2-14 days; The United States' Centers for Disease Control and Prevention

(CDC) and 10-14 days), during which the virus is contagious but the patient does not display any symptom (asymptomatic transmission). All population groups can be infected by the Covid-19, however, the aged and people with pre-existing medical conditions (such as asthma, diabetes, heart disease) appear to be more vulnerable to becoming severely ill with the virus. Considering that Coronavirus disease spreads primarily through contact with an infected person when they cough or sneeze, it also spreads when a person touches a surface or object that has the virus on it, then touches their eyes, nose, or mouth [6].

Covid-19 infected patients are the main infection sources ([6]; [5]). However, importance should also be attach to asymptomatic cases which may play a critical role in the transmission process. Respiratory droplets and contact are the main transmission routes [6]. Close contact with symptomatic cases and asymptomatic cases with salient infection are the main transmission routes of Covid-9 infection in children. People of all ages are susceptible to Covid-19. The elderly and those with underlying chronic diseases are more likely to become severe cases [6]. Thus far, all pediatric cases with laboratory-confirmed Covid-19 infection were mild cases, and no deaths had been reported.

According to [7], based on the current epidemiological data, the incubation period of Covid-19 infections ranges from 1 to 14 days, mostly ranging from 3 to 7 days. Current reported data of pediatric cases revealed that the age of disease onset ranged from 1.5 months to 17 years, most of whom had a close contact with infected cases or were family cluster cases. Infected children might appear asymptomatic or present with fever, dry cough, and fatigue, and few have upper respiratory symptoms including nasal congestion and running nose; some patients presented with gastrointestinal symptoms including abdominal discomfort, nausea, vomiting, abdominal pain, and diarrhea.

Most infected children have mild clinical manifestations. They have no fever or symptoms of pneumonia with a good prognosis. Most of them recover within 1–2 weeks after disease onset. Few may progress to lower respiratory infections. No newborns delivered by Covid-19 infected mothers have been detected positive; and no newborn cases have been reported yet. It should be noted that clinical manifestations in pediatric patients should be further defined after collecting more pediatric case data. Furthermore, the number of confirmed infected cases will increase after a wide use of pathogen analysis [8].

Furthermore, [9] argued that, data from adults reveal that severe cases often develop dyspnea one week after disease onset. Severe cases may rapidly progress to Acute Respiratory Distress Syndrome (ARDS), septic shock, refractory metabolic acidosis, and coagulation dysfunction. Although no deaths in children have been reported up to now, the potential risk of death should be highlighted. Though clinical symptoms in pediatric patients are relatively milder compared with those in adult patients, ARDS and death cases also occurred in infected children during the SARS and MERS epidemics. Differential diagnosis should be made to distinguish from influenza virus, para-influenza virus, adenovirus, respiratory syncytial virus, rhinovirus, human metapneumovirus, SARS coronavirus, and other known viral infections, as well as mycoplasma pneumoniae and chlamydia pneumonia and bacterial pneumonia. The coinfection of Covid-19 with other viruses and/or bacteria should be considered in diagnosis.

According to [10], beyond the public health impacts of regional or global emerging and endemic infectious disease events lay wider socioeconomic consequences that are often not considered in risk or impact assessments. Endemic infectious diseases set in motion a complex chain of events in the economy. They are rare and extreme events, highly diverse and volatile over time and across countries. Estimating terrorism risk depends upon several factors that varied by the type of activity. The idiosyncratic nature of endemic infectious diseases is based, among others, on the magnitude and duration of the event, the size and state of the local economy, the geographical locations affected, the population density and the time of the day they occurred. If the calculation of costs associated with death loss, chronically ill cattle marketed prematurely at a discount, and treatment are readily traceable. the estimation of indirect costs such as reduced performance of the local labor force and/or the impact on the international travel and trade can be an onerous task.

In view of the aforementioned, it will be difficult for a single researcher to study the effect of covid-19 on the economic growth of Nigeria. This research therefore covered selected macroeconomic variables. That is crude oil price, exchange rate and inflation. It also considers the structural factors that worsen the economic crisis in Nigeria due to the covid-19 pandemic. Specifically, it looks at health care infrastructure, digital economy and social welfare among others.

II. LITERATURE REVIEW
This section provides a general review of COVID-19 pandemic in Nigeria taking into cognizance the behavior of exchange rate, crude oil prices and inflation rate. In addition, the structural factors that worsen the economic crises and the mitigating measures are also highlighted.

A. General Review of COVID-19 Pandemic in Nigeria
Since the debut of COVID-19 in Nigeria on 27th February 2020, the Nigerian economy appeared to have entered turbulence (National Bureau of Statistics, 2020; page104, second quarterly report). Thirteen days after its

importation from Italy, precisely March 11, the World Health Organisation (WHO) declared COVID-19 a global pandemic. As the spread of the virus continues internationally and locally at an unimaginable scale, the official responses appear to focus mainly on limiting the spread within the country through social isolation policies, which include shutting educational institutions, limiting work and restricting movement of people, providing palliatives to the "vulnerable and poorest of the poor", imposition of night time curfews, and so on [5].

Many observers believe that as much as the virus keeps spreading, assessment of the depth and the breadth of the impact of the pandemic on the social and economic life of the nation is difficult, if not impossible, until the situation returns to normal (Dingl & Neiman, 2020). But, how will the pandemic end? What will be the aftermath effect? This uncertainty is pervasive and have created a strong sense of foreboding among the general public, researchers and policy makers. The uncertainty surrounding the emergence of the disease notwithstanding, even as the outbreak persists, several strands of studies have emerged to examine the macroeconomic impact of it at global, continental and country level.

The study by [11] which is an extension of [12] explores seven different scenarios of how COVID-19 might evolve in the coming year. The paper alluded to the fact that the evolution of the disease and its economic impact is highly uncertain thereby making it difficult for policy makers to formulate appropriate macroeconomic policy response.

The scenarios investigated in the study demonstrate that containment of the outbreak notwithstanding, its impact on the global economy in the short run would still be significant. Other recent studies with global concern include [13]; [3]; [14]; [15]; [16]. Furthermore, [16] and [17] review the economic impact of COVID-19 crisis across industries, and countries is investigated. The study shows that in the sample of 30 countries covered, a median decline of -2.8% in GDP in 2020 is observed. In other scenarios, the study shows that GDP is expected to fall more than 10% and, in some countries, more than 15%. Orlik et al (2020) even predicted that coronavirus could cost the global economy US$2.7 trillion. "A baseline global pandemic scenario sees gross domestic product fall by 2 percent below the benchmark for the world, 2.5 percent for developing countries, and 1.8 percent for industrial countries" [18].

In what looks like a subtle criticism of the public media and academic writings for focusing mainly on global macroeconomic impact of COVID-19 pandemic. In addition, [19] argues that it "is only one part of the bigger picture of economic impact". Citing Africa in particular, with its high disease burden, poorly developed infrastructure and safety nets and weak health systems, the impact of the pandemic is expected to be severe in the continent. Using the same argument, a country level impact analysis is not only desirable but inevitable to guide the policy authorities. The likely exacerbating impact of the pandemic on the Nigerian economy is inevitable for several reasons.

Firstly, the economy is yet to fully recover from the aftermath of the recession experienced in 2016. Secondly, the economy depends largely on crude oil whose price has plummeted in the international market. Thirdly, the foreign exchange reserves have been drawn down from US$45.1bn at the end of 2019 to US$35.3bn at the end of March 2020. Fourthly, the country's debt burden has been mounting since 2015. Fifthly, inflation is still firmly in double digits and the naira is under pressure. Finally, the health system capacity is abysmal. These and other factors have led to the growing concerns and uncertainties that COVID-19 will bring on the Nigerian economy. According to [20], the economic downturn in Nigeria was triggered by a combination of declining oil price and spillovers from the COVID-19 outbreak.

B. COVID-19 and Selected Macroeconomic Fundamentals

According to [15]; [17], the imposition of some strict measures, as a means to curb the spread of the coronavirus, may have its merits; it also bears some burdens on several aspects of a nation's existence, especially, her economic activities. In addition to posing major challenges to the health sector (in terms of mortality rate at different levels), other impacts could be measurably observed from the performance of the economy's macroeconomic fundamentals such as economic growth, general price level (consumer price index or inflation), exchange rate (strength of local currency), interest (bank lending) rate, private investments, employment among others; as well as stocks and global oil prices [16]

These economic set-backs may consequently affect general economic activities especially, given the non-consideration of the COVID-19 pandemic during the budgeting process [20]. Therefore, it becomes necessary to examine the historic pattern of some of these fundamentals, since the WHO announcement of the pandemic, in a bid to ascertain its impact on the Nigerian economy through the relationship between the COVID-19 and these fundamentals. Four prominent fundamentals are therefore considered – global crude oil prices, foreign exchange rate, all share index and inflation are discussed in this sub sections.

a) COVID-19 Cases and Exchange Rate

According to [21]), exchange rate regime in Nigeria has over the years been a managed float with official rates determined by the apex monetary authority rather than allowed to be determined by market forces of demand and supply. One main characteristic feature of the Nigerian foreign exchange market is the prominent existence of the

parallel market (often referred to as the noisy five percent), which however dominates the official rates thereby reducing the control of the apex monetary authority in the determination of market rates. In this light, while there usually exists an official rate (often fixed at a value over a long period of time), the parallel market rates are prominently used by many foreign exchange dealers and their customers alike. The latter is usually driven by speculations, which could also include statements made about the official rate by the CBN.

However, most business-inclined persons would prefer to patronize parallel market dealers, in a bid to avoid the large paper works that characterizes the formal banking practice [22]. Consequently, the co-movement of the parallel market determined exchange rate and COVID-19 confirmed cases. It appears that exchange rate depreciates as the number of confirmed COVID-19 cases increases, with more erratic fluctuations as the number of confirmed cases increases further. This may be occasioned by the alternate surplus and deficit of the dollar cum speculations about the market.

Furthermore, [23] argued that as the pandemic lingers, the naira value is likely to depreciate, causing the CBN to either maintain status quo by allowing the official rate to remain or attempt to close the premium gained by parallel market dealers. The former would require the CBN to pump in more dollars into the market, a move that may be quite overbearing given that the country's source of foreign earnings – crude oil, already suffers a setback of crash in prices.

On the other hand, closing the premium would entail further devaluing the naira. While maintaining the status quo could be expensive and possibly unaffordable during the pandemic, devaluation would be more likely, and may lead to increase in general price levels [24].

The CBN however chose the latter, devaluing the naira from N306.5 to N360.5 and thus contributing to the rise in general price level, with the inflation rate moving from 10.81% in December 2019 to 12.13% in January, 12.2% in February and 12.26% in March, 2020 (NBS CPI Report - March, 2020). Exchange rate is a direct channel through which foreign inflation could be imported into Nigeria. An immediate effect of depreciation would be reduced purchasing power of the domestic currency as the naira value of imports will increase since the inflation rate of the country's trade partners will migrate into the country, and subsequently lead to higher domestic prices of imported goods. Consequently, the pandemic may create some form of inflationary pressure.

b) COVID-19 Cases and Crude Oil Price

The consideration of the global oil prices is hinged on two key points: first, Nigeria is globally ranked 11th largest crude oil producer, 5th largest crude oil exporter and the largest in Africa, as at January 2020; second, her over dependence on oil is worrisome, with oil revenue accounting for above 90% of the country's foreign exchange earnings). Consequently, shocks to global oil prices are likely to have significant impacts on the country's revenue, and trivially, her economic activities [25].

These shocks may be directly related with events that could alter the level of oil production globally one of such events is the 2014-2015 global oil crash that ensued as a result of the shale oil revolution, bringing crude oil prices below 100 USD/barrel. Global oil prices remained within the range of 26.19 and 77.41 USD/barrel in the last four years, preceding the COVID-19 pandemic. Oil price movement vis-a-viz the COVID-19 confirmed cases. Global oil prices generally declined upon the announcement of COVID-19 as a pandemic by WHO, given the alarming increase in the number of confirmed COVID-19 cases and the rate of spread across countries that subsequently crumbled economic activities (partially or totally) in affected countries. Given that most countries of the world, including oil producing countries, are already ravaged by the pandemic, trade has been adversely affected as there is an excess supply of global crude oil without a commensurate demand for it, as well as lack of storage capacity. The crash has reached an unprecedented all time low, with some global crude oil entering negative values.

Global oil prices, which is highly volatile, significantly affect Nigeria's general price level, foreign exchange earnings and gross domestic product (GDP) given its dependence on crude oil exports[22]. Higher volatility is however expected during a pandemic. Since crude oil accounts for a significant proportion of the nation's foreign earnings as well as federal government revenue, economic productivity may be undermined by the oil price shock (in this case, the announcement of the COVID-19 as a pandemic) that led to the crash in global oil prices. Consequently, the rise in COVID-19 cases are likely to impact economic growth negatively through oil price and government revenues. This is also coupled with the fact that several economic activities have been put on hold. On the general price level, there could be some form of imported inflation from bilateral partners given that Nigeria is a small and open economy as well as being highly import dependent [7]. While there are speculations that the pandemic may plunge the country into recession in the nearest future, general price levels are also not unaffected.

c) COVID-19 Cases and Inflation

Nigeria's inflation rate rises to 12.34% as COVID effects bite harder. Data from the National Bureau of Statistics (NBS) reveal that Nigeria's inflation rate increased by 12.34% (year-on-year) in April 2020. This is 0.08% higher than the rate of 12.26% recorded in March 2020 and

the highest rise since April 2018. As the country battles with the economic downturn that came with the COVID-19 pandemic, Nigeria's inflation rate hits it's highest in 24 months. According to the latest CPI report released by the National Bureau of Statistics (NBS), inflation rate increased by 12.34% (year-on-year) in April 2020 from 12.26% recorded in March 2020. On a month-on-month basis, the index increased by 1.02% in April 2020, a 0.18% rate higher than 0.84% recorded in the previous month.

Food inflation

The composite food index increased by 15.03% in April 2020 0.03 points higher, compared to 14.98% recorded in March 2020. On a month-on-month basis, the closely watched component of the inflation index increased by 1.18% in April 2020, up by 0.24% points compared to 0.94% recorded in March 2020. According to the report, the rise in the food index was caused by increases in prices of Potatoes, yam and other tubers, Fish, Oils and fats, Meat, Fruits, Bread and cereals, and Vegetables.

Core Inflation

As submitted by Adenomon and Maijamaa, (2020) Core inflation (All items less farm produce) which excludes the prices of volatile agricultural produce stood at 9.98% in April 2020, a 0.25% increase when compared to 9.73% recorded in March 2020. On a month-on-month basis, the core sub-index increased by 0.93% in April 2020, up by 0.13% when compared with 0.8% recorded in the previous month. The highest increases according to the report, were recorded in prices of Bicycle, passenger transport by road, passenger transport by sea and inland waterways, paramedical services, Hospital services, pharmaceutical products, Medical services, Motorcycles, and Major household appliances whether electronic or not.

Worst Hit States

According Ohia, Bakarey and Ahmad (2020), Bauchi state recorded the highest year-on-year inflation rate of 14.44% followed by Rivers state with 14.16% and Sokoto state, which recorded a 13.99% inflation rate. Meanwhile the states with the lowest rise in inflation rate were Kwara (8.98%), Abuja (10.8%), and Edo state with 10.87%. Sokoto state also recorded the highest year-on-year food inflation rate, followed by Abuja with 17.65% and Akwa Ibom, which recorded 17.55%. On the other hand, Enugu state recorded the slowest rise in food inflation, having recorded a 12.89% increase, followed by Edo state with 12.9% and Ebonyi state with 13.04%.

The latest inflation report implies a fast rise in the prices of overall goods and services in the economy, caused by the lockdown procedure in response to COVID-19 pandemic and the continual global oil crisis (Adegboye, Adekunle & Gayawan, 2020). It should be noted that the latest increase in the inflation rate means that the purchasing power of

consumers to buy goods and services deteriorated. That is, the ability of consumers to buy the same quantity of goods with a fixed income level has worsened within the period, despite investment yields being low and economic activity practically kept on hold.

C. COVID-19 and 2020 Budget

According to Dingl and Neiman (2020), it entails that the 2020 budget assumptions and budget estimates before the COVID-19 pandemic, as well as the adjustments that were made by the Federal Government to reflect the prevailing economic stance. This is to ascertain the level of distortions of budget assumptions and budget estimates that might have resulted from the COVID-19 pandemic. The COVID-19 pandemic has affected the budget negatively, as the key macroeconomic fundamentals that are considered in the budgeting process are observed to have been clearly overstated.

Although the Federal government, in coming to terms with reality, adjusted the budget assumptions downwards (Okechukwu, 2020) the statistics during the COVID-19 pandemic, in the first quarter of 2020, is observed to be much lower. Oil production and oil price dropped by approximately 8.26% and 78.95%, respectively; exchange rate depreciated by approximately 18.03%; inflation rate rose to approximately 12.2%; while GDP grew by 2.55%, slightly lower than was originally envisaged.

The immediate consequence of the overstated key factors, especially with respect to oil production, oil price and exchange rate, is a 40% shortage in the estimated revenue, resulting from the 90% estimated drop in oil revenue, and approximately 138% increase in budget deficit from N2.175 trillion to N5.18 trillion. Imperatively, about 50.44% of the estimated budget would have to be funded by borrowing, thus compounding the already existing debt burden of the country.

Also, with oil production possibly being put on hold, given that the global market is already overwhelmed by an unmatched demand for the excess crude oil, the crash in the oil price is likely to linger for a while, pending the end of the COVID-19 pandemic and subsequent return to normalcy. According to [26], this would bear its consequence not only on the country's foreign reserve as her foreign earnings are majorly from crude oil earnings, but also on the purchasing power of her local currency as there are likely tendencies of further devaluations, whenever the apex monetary authority is not able to maintain the exchange rate at the current level.

Therefore, further external borrowing seems inevitable given the move by the Nigerian government to borrow about $7 billion from multilateral agencies such as the International Monetary Fund (IMF), the World Bank and African Development Bank (AFDB), while also maintaining the

concession agreement with these agencies and the Islamic Development Bank Nigeria - ISDB [2]; and the [5]. Already, IMF has approved US$3.4 billion in emergency financial assistance under the Rapid Financing Instrument (RFI) to support the authorities' efforts in addressing the severe economic impact of the COVID-19 shock and the sharp fall in oil prices. Additional financial support of US$2.5 billion loan form World Bank, US$1 billion from AFDB and an undisclosed amount from the Islamic Development Bank are still being negotiated. Following this budgetary uncertainty, the next section attempts to provide the economic growth outlook of the Nigerian economy for 2020.

D. Structural Factors that Worsen the Economic Crisis

The structural factors deal with the economic, social and organizational environment that support the growth and development of an economy. These structural factors include health infrastructure, digital economy and welfare programs.

a) Poor Public Health Infrastructure

According to a 2020 BMI report as captured by [7], Nigeria had an estimated 33,303 general hospitals in 2019, of which 3,950 were in the public sector. There were around 9,000 private health facilities, and an estimated 234,000 hospital beds in 2019, equal to 0.8 per thousand populations which is below the rate for the African region. The public health sector in Nigeria has poor infrastructure such as poor emergency services, few ambulance services, ineffective national health insurance systems, insufficient primary health care facilities, and these problems in the public health sector have often been linked to the high maternal and infant mortality rates in the country [20].

Similarly, [25] opined that, Nigeria operates a two-tiered healthcare system with a large public healthcare sector and a smaller private healthcare sector. Compared to developed countries, the private healthcare sector in Nigeria is very small and fragmented because of the limited funding for private health insurance. Also, the majority of Nigeria's healthcare spending is still dominated by out-of-pocket expenditure which account for 70% of total health expenditure, which suggest that most Nigerians either do not rely or trust the health insurance system in the country or they are unaware of the availability of health insurance. Despite the introduction of the National Health Insurance Scheme (NHIS) in 2004, the population covered by health insurance in 2019 was only 5% of the total population.

The Nigerian pharmaceutical industry also has its own problems. The Nigerian pharmaceutical industry is one of the largest in West Africa [25] and accounts for about 60% of the market share in West Africa. But most of the active pharmaceutical ingredients (API) used in Nigeria are imported from China, and only 10% of the drugs used in Nigeria are manufactured locally in the country. The industry is facing many problems such as poor infrastructural and unreliable utilities, scarcity of skilled workers, poor access to finance, lack of appropriate government incentives, policy incoherence by the government, poor demand due to robust competition from Asian companies particularly China, high cost of doing business as a result of imported and expensive production inputs, regulatory problems, among others.

Nigeria has a drug market that is almost unregulated because the health agencies have difficulty in preventing the importation of illegal drugs and difficulty in tracking informal drug sellers that operate without a registered license [27]. it is estimated that informal drug sellers in the country account for more than 70% of the pharmaceutical market, and these informal agents import substandard and falsified drugs through informal channels. Research shows that 78% of low-quality medications came from private facilities compared to public facilities, and most of these private facilities are unregulated. The unregulated drug market in Nigeria is the major factor responsible for the circulation of low-quality medicines in the country [28].

According to [20], it is argued that the failure in Nigeria's public health sector made it difficult for Nigeria to cope with the fast spreading COVID-19 disease during the outbreak. Local drug manufacturers could not manufacture drugs that could temporarily suppress coronavirus in infected patients because the APIs used to manufacture suppressant drugs could no longer be imported because China had shut down its factories and closed its borders to control the coronavirus pandemic that was ravaging China at the time. Also, there were insufficient isolation centers in many states including in Abuja and Lagos. The number of infected patients in Lagos grew worse to the extent that a stadium had to be converted to an isolation center. In the end, the COVID-19 outbreak overwhelmed the poor public health infrastructure in Nigeria.

b) Weak and Undeveloped Digital Economy

To provide adequate evidence on the weak status and undeveloped nature of the Nigerian economy, [29] maintained that before the COVID-19 outbreak began, Nigeria already had a weak and underdeveloped digital economy. Currently, Nigeria has eight (8) operational telecom service providers, namely, MTN Nigeria, Globacom, Airtel, 9Mobile, M-Tel, Telkom, Econet Wireless and Vodacom.

According to the Nigerian Communications Commission (NCC), the number of mobile phone subscribers in Nigeria decreased by 49,060 in April to 173.38 million from 173.43 million in March. Also, MTN, the largest telecom provider, had 64.73 million users in April which is a drop of 302,448 from 65.03 million in March. Also, Statistic reports that there are 96 million internet users in Nigeria. Yet, during the COVID-19 pandemic, there were hardly any university or school that offered a full educational curriculum online from

start to finish. Many businesses operated using the traditional 'come-to-the office-to-work' model as opposed to the 'working-from-home' model.

According to [4] the outbreak of the novel coronavirus brought challenges to the business environment in Nigeria and it affected industries and markets in the short term. The operations of these markets and industries would have been minimally affected if they had a large digital infrastructure. The only services that were offered through the existing digital infrastructure during the COVID-19 outbreak were telecommunication services, digital bank transfers and internet services.

According to [12], online delivery and businesses can use virtual assistants to help ensure that goods purchased from online grocery stores are delivered when customers need them. Businesses that don't want their workers to travel or whose employees are uncomfortable taking trips can stay connected with team members, clients and prospective clients around the world using online video conferencing technologies. All these are possible when there is a robust and well-functioning digital economy.

Also, [18] maintained that digital economy would have played a major role in driving recovery from the economic crisis if Nigeria's digital economy was robust and well-developed. For instance, in Nigerian schools, universities and educators can put coursework online so that students quarantined at home don't have to miss out on key aspects of their education while school is closed or when students can't get to school. E-commerce apps that enable online buying and selling can allow buyers and sellers to make purchases and sales while staying in their homes. Also, tele-health apps for health and wellness checks can allow individuals in all affected areas to take extra precautions to monitor their vital signs and learn how to reduce their risk of infection. Also, family members can visually check on their parents, grandparents and siblings without physically visiting them which provides a level of comfort that would be impossible over the phone.

Moreover, [23] maintained that outside Nigeria, digital technology helped many businesses in developed countries survive the effect of the COVID-19 outbreak, and it created an opportunity to enhance the country's digital economy. In the future, a well-developed digital economy in Nigeria, achieved through intense digital technology penetration, will play a greater role in reducing the effect of recessions in the country, and will also help in supporting economic activities, social activities and the development of good health care systems

c) Lack of Social Welfare Programme
This is also a significant component of economic growth and sustainable development. However, [16] argued that

before the COVID-19 outbreak, there were major social welfare problems in Nigeria which include child abandonment, armed robbery, kidnapping, farmer-header crisis, homelessness, mental health problems, divorce, and problems of single parenting. These social welfare problems can only be addressed with serious social welfare policy and programs. But, currently, social welfare activities in Nigeria is under developed, poorly funded and is unavailable to majority of those who need them [16]. For instance, the Nigerian government created the 'N-Power' social welfare program to address poverty among unemployed youth in Nigeria. The purpose of the N-Power programmes was to provide job training and skills to young (and educated) Nigerians, as well as a monthly stipend of 30,000 Nigerian naira (USD \$83.33).

The problem with the N-Power programmes in Nigeria was that its isolated uneducated people, needy children and older adults that need to be empowered as well [10]. This is just one example of how Nigeria's social programs did not provide a social welfare safety net for all citizens in need of social welfare. In fact, Nigeria does not have a national social welfare program that offers assistance to all individuals and families in need of health care assistance, food stamps, unemployment compensation, disaster relief and educational assistance.

The consequence of not having a national social welfare program became evident during the coronavirus outbreak of 2020. During the outbreak, people had little to rely on, many poor citizens did not have welfare relief that could help them cope with the economic hardship at the time. There were no housing subsidies, no energy and utilities subsidies to individuals that were most affected by the coronavirus outbreak. In the literature, there are debates on the benefit of using social welfare programs to alleviate poverty and to help citizens cope with disasters ([21], [23], [16]) and social welfare theories provide different perspectives on how social welfare can be designed to meet the basic needs of the people ([4], [8],). So far, the provision of social welfare services to vulnerable citizens in the population is the most proven way to protect them from economic hardship in bad times [12]. In Nigeria, the lack of such welfare services for vulnerable people, households and poor individuals during the coronavirus outbreak caused severe pain and economic hardship to households and poor individuals. The implication of this is that social welfare has not been a policy priority by policy makers in Nigeria.

E. Mitigating the Spread of the COVID-19 Pandemic
The government has taken various measures to curb the effect of covid-19 pandemic in the country. Some of the measure taken are:

a) Closure of Schools and Institutions of Higher Learning

According to [7], the federal government decided that all private and public nursery, primary and secondary schools including tertiary institutions to close for a period of one month from 23 March to 20 April 2020. This directive is to prevent community spread of the disease in the schools. Even after the expiration of the one month, the schools and institutions have remained closed as the situation has not improved in the states as some of them are still under lockdown and the ban on interstate travel is still enforced as at 8 June 2020. Some academic in the state tertiary institutions have criticized this move to close schools and institutions as it has sent some students to areas where the infections of the virus are present particularly students from Abuja and Lagos.

b) Directive to People not to Gather in Large Numbers and Closure of Interstate Borders

This directive to people not to gather in large numbers was issued so that people will not gather in large number up to 200 persons at a place such as at naming and wedding ceremonies [7]. Consequently, no Friday prayers or church services held for more than one month in Nigeria (Ahmed and Ali, 2020). Another directive issued by the government was the total closure of its borders with other neighboring states in order to halt the movement of people from other areas that were already infected by the coronavirus.

c) Directives to Large Business Owners

According to [22], business owners were issued directives to adopt preventive measures to control the spread of the disease. These businesses are places where large numbers of people gather on daily basis and they include shopping malls, commercial banks, popular workshops, handset selling Formation of Taskforce. The government has formed a special taskforce on enlightenment and sensitization to enlighten and sensitize the public on the symptoms, preventive measures and effects of the disease.

F. Empirical Review

According to [22], the research analyses the COVID-19 situation in Nigeria, its effect on the economy and the structural causes that worsen the coronavirus (COVID-19) crisis. The findings reveal that the economic downturn in Nigeria was triggered by a combination of declining oil price and spillovers from the COVID-19 outbreak, which not only led to a fall in the demand for oil products but also stopped economic activities from taking place when social distancing policies were enforced. The government responded to the crisis by providing financial assistance to businesses and a small number of households that were affected by the coronavirus (COVID-19) outbreak. The monetary authority adopted accommodative monetary policies and offered a targeted ₦3.5trillion loan support to some sectors. These efforts should have prevented the economic crisis from occurring but it didn't. Economic agents could not freely engage in economic activities for fear of contracting the COVID-19 disease that was spreading very fast at the time.

According to Kwaw, et al (2020) estimating the Cost of COVID-19 in Nigeria. The researchers analyze the economic impacts of the COVID-19 pandemic and the policies adopted to curtail the spread of the disease in Nigeria. The researchers carry out simulations using a multiplier model based on the 2018 Social Accounting Matrix (SAM) for Nigeria, which includes supply-use tables for 284 goods and services. The pandemic's global reach and impact on the global economy combined with the response policies in Nigeria represent a large, sudden shock to the country's economy. The SAM multiplier model is well-suited for measuring the short-term direct and indirect results of this type of shock because the SAM represents both the structure of the economy and the interactions among economic actors via commodity and factor markets. Our analysis focuses on the five-week lockdown implemented by the federal government across the Federal Capital Territory of Abuja and Lagos and Ogun states from late March to early May 2020, the federal lockdown for Kano from mid-April, and the state-level lockdowns that were implemented from mid-April for around seven weeks in Akwa Ibom, Borno, Ekiti, Kwara, Osun, Rivers, and Taraba states.

Kwaw, et al (2020) argued that during the lockdown periods Nigeria's GDP suffered a 34.1 percent loss due to COVID-19, amounting to USD 16 billion, with two-thirds of the losses coming from the services sector. The agriculture sector, which serves as the primary means of livelihood for most Nigerians, suffered a 13.1 percent loss in output (USD 1.2 billion). Although primary agricultural activities were excluded from the direct restrictions on economic activities imposed in the lockdown zones, the broader agri-food system was affected indirectly because of its linkages with the rest of the economy. We estimate that households lost on average 33 percent of their incomes during the period, with the heaviest losses occurring for rural non-farm and for urban households. The economic impacts of COVID-19 include a 14-percentage point temporary increase in the poverty headcount rate for Nigeria, implying that 27 million additional people fell below the poverty line during lockdown. Lastly, we consider economic recovery scenarios as the COVID-19 policies are being relaxed during the latter part of 2020. Our findings have implications for understanding the direct and indirect impacts of COVID-19, for policy design during the recovery period, and for planning future disease prevention measures while protecting livelihoods and maintaining economic growth.

However, [24] maintained that the aim of the study was to describe the current situation of the outbreak in Nigeria and argued the need for effective engagement of community health workers for an appropriate response to COVID-19. The researchers reviewed published articles on COVID-19

and daily epidemiological reports from the website of the Nigeria Centre for Disease Control (NCDC) from 27 February 2020 till 3 May 2020 (Epidemiology week 7 – 17) to describe the outbreak. We also reviewed ongoing responses by the government and other relevant agencies. Our findings revealed possible evidence of ongoing and increasing community transmission of COVID-19 infections, inadequate testing capacity and overwhelming of health resources. Our review also revealed infection of several health workers in the face of existing critical skilled health workforce shortage. With surging of new COVID-19 cases and a huge number of contacts to be traced, we recommended that the government needs to promptly bring community health workers on board, deploy rapid epidemic intelligence and scale up the use of mobile Apps for contact tracing. This will result in an effective and coordinated response to the ongoing outbreak, sustain routine health services especially at the community level, reduce morbidity and mortality, and preserve health indices gains already made in the health system.

Finally, from the empirical review the researcher discovered that the impact of COVID-19 pandemic is inconsistence with economic growth in Nigeria. In view of these the researcher intends to explore the effect of covid-19 pandemic on selected macroeconomic variables.

III. DATA SOURCE AND METHODOLOGY

Data for this study is collected from multiple sources, namely; the Central Bank of Nigeria, the World Bank, and the National Bureau of Statistics. Furthermore, the study employs the Johansen-Juselius multivariate cointegration techniques to estimate the relationship between exchange rate, crude oil price and inflation in Nigeria.

The functional form on which the econometric model is based is given as:

$$Y = f(X_1, X_2, X_3) \qquad (1)$$

The model express economic growth as the function of exchange rate (EXR); Crude Oil Price (COP) and Inflation (INF).

This can be specifically stated as follows:

$$RGDP = f(EXR, COP, INF) \qquad (2)$$

The aforementioned model is specified linearly in the form of an equation as follows:

$$RGDP = \beta_0 + \beta_1 EXR_t + \beta_2 COP_t + \beta_3 INF_t + U_t \qquad (3)$$

Equation (3) is transformed into an econometric log linear form thus:

$$lnRGDP_t = \beta_0 + \beta_1 lnEXR_t + \beta_2 lnCOP_t + \beta_3 lnINF_t + U_t \quad (4)$$

Where:
InRGDPt = log of real gross domestic product;

InEXRt = log of Exchange Rate.
lnCOPt = log of Crude Oil Price.
lnINF = log of inflation.
U = Error or disturbance term
β_0 = Constant and
β_1, β_2 and β_3 are the Coefficients.

IV. RESULTS AND DISCUSSION

This study employs the Augmented Dickey Fuller (ADF) unit root test, Johansen-Juselius multivariate cointegration techniques to estimate the relationship between coronavirus pandemic and selected macroeconomic variables in Nigeria. The test included an intercept but not a linear trend. The ADF unit root test results are presented in table 4.1 as follows:

Table 4.1 Unit Root Test Result

VARIABLE	ADF TEST STATISTIC	ORDER OF INTEGRATION
D(LOGEXR)	-4.457334	
1%	-3.670170	I(1)
5%	-2.963972	
LOGGDP	9.525660	
	-3.653730	
1%	-2.957110	I(1)
5%		
D(LOGCOP)	-4.841437	
1%	-3.661661	
5%	-2.960411	I(1)
D(LOGINF)	-6.359051	
1%	-3.661661	
5%	-2.960411	I(1)

Source: Computed from Eviews 9.0

The ADF test results indicate that the GDP variable was stationary at level while the EXR, COP and INF variables were stationary at first difference I (1) at a maximum lag of 1. In each case, the test statistic exceeded the critical value at the 5 percent significance level. That is, the model follows an integrating I (01) and I (1) process.

a) Regression result

To examine the effect of each independent variable (exchange rate, crude oil price, inflation) on the dependent variable (GDP) in the specified model, an ordinary least square estimation technique is employed and the results are presented as follows:

Table 4.2 Regression results

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-3.560380	15.49036	-0.229843	0.8202
LOGGDP(-1)	1.039482	0.051343	20.24602	0.0000
LOGEXR(-1)	-0.009608	0.014546	-0.660564	0.5152
LOGCOP(-)	0.192784	0.222288	0.867271	0.3944
LOGINF(-1)	-0.198351	0.296501	-0.668975	0.5099
R-squared	0.997742	Mean dependent var		454.8156
Adjusted R-squared	0.997083	S.D. dependent var		204.4275
S.E. of regression	11.04035	Akaike info criterion		7.853308
Sum squarbed resid	2925.344	Schwarz criterion		8.219742
Log likelihood	-117.6529	Hannan-Quinn criterion		7.974771
F-statistic	2.026434	Durbin-Watson stat		1.511412
Pro (F-statistic)	0.000000			

Source: Computed from Eviews 9.0

The result obtained from equation estimation regression shall be analysed and interpreted on the basis of 5% significance level. The result as shown in Table 4.2 above reveals that exchange rate (EXR) with a coefficient of (-0.009608) has a negative and insignificant (0.5152) impact on gross domestic product (GDP), the negative sign is in disagreement with a priori expectation. Total Price of Crude Oil (COP) with a coefficient of (-0.192784) has a negative and insignificant (0.3944) impact on GDP which is in conformity with a priori expectation. On the other hand, rate of inflation (INL) has a negative (-0.198351) coefficient and insignificant (0.5099) relationship with GDP all in the short run. The insignificant relationship could be attributed to the relatively low government expenditure on the health sector which is in agreement with the assessment of the World Health Organization (WHO) in its National Health Accounts. The R^2 is otherwise known as the coefficient of determination, shows the percentage of the total variation of our dependent variable (Y) that can be explained by the independent variable(s) (X1, X2, X3) and the lower of R2 shows the percentages of the total variation of our dependent variable that can't be explained by our independent variables. Therefore, the R2 is expressed as a percentage, and that part of the variation of the dependent variable (i.e. 100-R2) which is not explained by the regression line is attributed to the existence of the disturbance or error term (U). The R2 gives 0.997742 or 99.7% meaning that the model is good i.e. the variations in the dependent variable (GDP) is 99.7% attributable to the changes in the independent variables, Exchange Rate (EXR), total Crude Oil price (COP) and Rate of Inflation (INF). This result is also supported by the high value of the adjusted R-Square (0.997083). The F-statistic of (1514.934) with a probability of 0.000000 is significant at 5% and this implies that the independent variables are important determinants of economic growth proxied by (GDP). The Durbin-Watson (DW) at 1.511412 is below the bench mark of 2 indicating that there is the possibility of positive auto or serial correlation.

b) Cointegration Test

Following the ADF test, if all variables are I (0) or I (1), the cointegration test is usually undertaken. The existence of co-integration implies that the variables share mutual stochastic trend and are linked in a common long run equilibrium relationship. In this study we utilized the Johansen and Juselius approach of testing the number of co-integrating vectors. More specifically, the study performed the cointegration procedure with unrestricted intercepts and unrestricted trends in the vector auto-regression. The Johansen test employs two different likelihood ratio tests of significance of the correlations and thus the reduced rank of the Π matrix. These are the trace and the maximum eigenvalue tests. The trace test analyzes the null hypothesis of τ cointegrating vectors against the alternative of n cointegrating vectors whereas the maximum eigenvalue, tests the null hypothesis of τ cointegrating vectors against the alternative hypothesis of τ + 1 cointegrating vectors.

Table 4.3 Johansen Multivariate Cointegrating Result

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.864982	93.69150	47.85613	0.0000
At most 1 *	0.469732	31.61876	29.79707	0.0035
At most 2	0.076300	9.094618	15.49471	0.1592
At most 3	0.102801	3.362815	3.841466	0.0667

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.864982	62.07274	27.58434	0.0000
At most 1 *	0.469732	19.66553	21.13162	0.0791
At most 2	0.242029	8.590416	14.26460	0.3218
At most 3	0.102801	3.362815	3.841466	0.0667

Max eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
*denote rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Source: Computed from Eviews 9.0

The study estimates equation (3) to determine the cointegrating rank of the system of variables. The lag length is automatically selected and the constant is restricted to allow for an intercept but no trend in the cointegrating equation. Table 4.3 above shows the results from the cointegration test. Both the trace test and the maximum eigenvalue test reject the null hypothesis of no cointegrating vectors at the 5% level, but they indicate at most one cointegrating equation. Trace test also indicates at most one cointegrating equation. Based on this evidence, the study posits that there exists a long run equilibrium relationship between gross domestic product, exchange rate, price of crude oil and inflation rate in Nigeria.

Table 4.4 Long run relationship between GDP, EXR, COP and INF

1 Cointegrating Equation(s):		Log likelihood	-556.4626
Normalized cointegrating coefficients (standard error in parentheses)			
LOGGDP	LOGEXR	LOGCOP	LOGINF
1.000000	-0.529831	-12.27081	-30.48656
	(0.05549)	(1.78420)	(3.20484)

Source: Computed from Eviews 9.0

Table 4.4 depicts the long run cointegrating equation showing the nature and magnitude of the observed long run relationships. The equation is normalized for LOGGDP – the dependent variable. The normalized beta coefficient representing the long run relative statistical relationship between the LOGGDP and LOGEXR is shown to be -0.529831 and Standard error of (0.05549), suggesting a t-statistic of 9.55. This is significant at 5% level. By implication, there exist a statistically significant relationship between the LOGGDP and LOGEXR variable. The sign implication suggests a negative relationship which disagrees with a priori expectation. On the other hand, the normalized beta coefficient representing the long run relative statistical relationship between the LOGGDP and LOGCOP is calculated to be -12.27081 with a standard error of 1.78420 (t-statistic = 6.88). The computed t-statistic is significant at 5%. Thus, the long run relationship between LOGGDP and

LOGCOP is negative contrary to a priori expectation; it is statistically significant at the conventional 5% level.

The normalized beta coefficient representing the long run relative statistical relationship between the LOGGDP and LOGINF is shown to be -30.48656 and Standard error of (3.204849), suggesting a t-statistic of 9.51. This is significant at 5% level. By implication, there exist a statistically significant relationship between the LOGGDP and LOGINF variable. The sign implication suggests a negative relationship which goes against the priori expectation.

V. CONCLUSION AND RECOMMENDATIONS
This study investigated the trend and impact of novel coronavirus on selected macroeconomic variables in Nigeria using Johansen multivariate cointegration. In a bid to make projections for Nigeria's economic growth. Specifically, three main objectives are targeted the behavioral patterns of selected macroeconomic fundamentals vis-a-viz COVID-19 pandemic globally confirmed cases are assessed to ascertain

the relationship between each macroeconomic fundamental and COVID-19 confirmed cases. The findings show a negative relationship between coronavirus prevalence and economic growth which is in conformity with a priori expectation in the long run but negative in the short run. On the other hand, price of crude oil has a negative relationship with GDP in both the short and long run. This is in disagreement with a priori expectation. Inflation rate has a negative relationship with GDP in the long run but a positive relationship in the short run. Nevertheless, improved public health care outcomes alone are not sufficient for sustained economic growth. Education, strong macroeconomic policies and efficient institutional set-ups are equally significant. In order for it to be effective, greater emphasis on public health sector improvement is required at the local, state and national levels. Results also indicate that price of crude oil has the greatest impact on economic growth in Nigeria.

However, the study recommended the needs to build appropriate digital infrastructure to facilitate the transition from 'face-to-face' business activities to a 'digital or online' business activities, which can help to grow the digital economy. This is evidenced to the electronic learning system adopted by many private tertiary institutions in Nigeria to conduct classes online despite the fact that all universities in Nigeria are on lockdown. In addition, policy makers should use legislation to create a robust social welfare safety net for all citizens particularly for unemployed citizens and poor households. Also, there is need for government in Nigeria to invest in healthcare infrastructure to improve the ability of the national health system to withstand the outbreak of contagious diseases.

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