ANALYSIS OF COVID-19 PREVALENCE AND ITS IMPACT ON PUBLIC SERVANTS' EFFICIENCY IN NIGERIA

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Abstract
The study aimed to examine COVID-19 prevalence in Nigeria and how it affects the efficiency of public servants. The data used for this study is mainly secondary and extracted from the website of the Nigeria Centre for Diseases Control (NCDC). Descriptive statistics and thematic mapping techniques were adopted for this study with results presented in Tables and Maps. Results show that Lagos, Oyo, Edo, Rivers, Kano, Delta, Kaduna, Ogun, Plateau states and the Federal Capital Territory (FCT), Abuja were severely hit by COVID-19 in terms of the total number of both confirmed and deaths cases respectively as at Thursday 13th of August, 2020. Findings also revealed that Lagos, Oyo, Ogun, Ondo, Edo, Delta, Rivers, Kaduna, Kano, Plateau states and Abuja (FCT) were classified as very high-risk states to the pandemic. The findings showed that COVID-19 has affected both the productivity and engagement of civil servants in the high-risk States. Based on these, the study recommends that government should improve their knowledge of understanding, predicting and quickly switching to change when the need arises to enhance survival during a pandemic.
Keywords: COVID-19, Prevalence, Public Servants, Efficiency, Nigeria

Introduction
The COVID-19 pandemic has presented a significant health challenge to the world, comparable to that faced during World War II. It has led to a general decrease in Gross Domestic Product (GDP) worldwide, with some sectors that require more social interaction being hit particularly hard (Chen et al., 2020; Wang et al., 2020; Liu et al., 2020; Emmanuel & Bebaa, 2021). In response to the pandemic, there has been a reorganization of production processes, both immediate and long-term. In Nigeria, the spread of COVID-19 and the measures taken to contain it have affected the productivity and efficiency of public servants. The World Health Organization (WHO) has classified the pandemic as a novel deadly disease, while the International Monetary Fund (IMF) has forecasted a global growth decline of 0.5% by 2020. In the first half of 2020, the global economy entered a recession due to the direct and indirect effects of the crisis, including supply and demand shocks, commodities slumps, and a decrease in tourism.

In February 2020, Nigeria saw the first confirmed case of COVID-19 in the subcontinent. The virus quickly spread throughout Lagos, Ogun State, and the Federal Capital Authority (FCT) area of Abuja, prompting a range of policy responses. These included public health and education campaigns, fiscal and monetary measures, restrictions on significant segments of the economy, and compensatory measures in the form of social support for those most in need (Onyekwena and Amara Mma, 2020).

While the sudden arrival of the pandemic and subsequent policy responses had significant economic costs for Nigeria's population, the impact on productivity and the engagement of civil servants remains unclear. However, it's important to note that civil servants are the machinery of government responsible for formulating and implementing public policies that benefit citizens.

Unfortunately, the COVID-19 pandemic has had a serious setback on Nigeria's economy, resulting in lost productivity and services. This pandemic has strained almost all key growth-enhancing sectors of the economy, ultimately affecting overall income. To maintain productivity in Nigeria, healthy manpower and other stimulating factors such as robust capital formation, real investment, technical progress, and discipline are required. However, with the presence of COVID-19, productivity tends to be suppressed, below the levels of actual potential economic growth in Nigeria (Anyanwu, 2020).

To combat the impact of the pandemic, the government and organizations have implemented measures to ensure productivity isn't affected while also reducing the spread of the virus. The study's main objective was to investigate how COVID-19 affects the efficiency of public servants in Nigeria.

Conceptual Review

The Concept of Productivity

In the world of business, productivity is an essential factor in achieving success. Over the years, scholars have defined productivity in various ways. For instance, Okereke and Daniel (2010) describe productivity as the ability to accomplish predetermined objectives within a specific timeframe, at a fixed cost, and with acceptable quality standards.

Contemporary management scholars offer other definitions of productivity. Ferreira and Du Plessis (2009) define it as "the time spent by an employee in executing their job duties to achieve expected outcomes based on the job description." Similarly, Mathis and Jackson (2000) define productivity as "the quality and quantity of work accomplished by an employee while considering the resources utilized to achieve that work." Therefore, improving employee productivity should be the primary goal of organizations and management teams. As highlighted by Brown (2012) and Hanaysha (2016), increasing employee output leads to higher organizational performance.

Kien (2012) also concluded that "enhancing employee productivity can lead to favourable outcomes such as competitive advantage, maintaining strategic and financial results, achieving organizational goals, and meeting stakeholders' needs." Thus, productivity is a crucial concern for most organizations and managers. It's a growing concept in management literature and one of the most significant challenges faced by organizations (Hanaysha, 2016). The increasing interest in this concept can be ascribed to the fact that organizational success depends heavily on workforce productivity (Kawara, 2014). Therefore, it's necessary to prioritize productivity in every organization as it's the key to achieving success.

The Concept of Engagement

Zinger (2014) defines employee engagement as the passion and dedication an employee has for their job and the organisation, and a desire to exceed organizational goals. According to Zinger, employee engagement is associated with emotions, behaviour, and connections. Engaged employees take pride in their work and the company they work for.

Right Management (2009) identified four elements of engagement, which include dedication to the organization and job, pride in the organization and job, desire to promote the organization and job's benefits

and advantages, and job and organization satisfaction. Right Management concluded that employee engagement is a measure of the alignment between an employee and the organization.

Engagement, as described by Rothbard (2001), is a psychological presence that involves two key mechanisms: attention and absorption. Attention is a cognitive ability that refers to the amount of time spent thinking about a role, while absorption is being engrossed in a role and refers to the intensity of one's focus on a role.

Employee engagement, as defined by Robinson (2004), is a positive attitude an employee has towards the organization and its ideals. An engaged employee understands the company context and collaborates with coworkers to improve performance.

Similarly, Kahn (1990) describes engagement as "the harnessing of organization members to their work roles." Engaged employees express themselves physically, cognitively, and emotionally during role performances.

Theoretical Clarification

The work is based on the linkage theory developed by Feld, W. J. in 1968, which assumes that the behaviour or action in one system triggers a response in another system (Rosenau, 1969). According to Crump (2009), the theory seeks to explain how one event determines the process or outcome of another. In various applications of this theory, such as in negotiations and national-international events, the term "linkage theory" conveys a chain of events in which an event in one system leads to a reaction in another system. It is commonly used in economics and international political economy to analyze the cause-and-effect relationships among states (Crump, 2005). The theory became necessary as scholars sought to identify the contexts of occurrences in both international and domestic arenas. Before the application of the linkage theory, scholars considered national and international economies separately and isolated them, but Rosenau aimed to prove otherwise. In his work, Rosenau examined the impact of external variables on internal variables (Kitschelt & Wilkinson, 2007).

The theory stands on certain assumptions, including the existence of linkages between domestic and international systems. This assumption is central to the linkage theory, as it posits that events in one system can cause reactions in another. Additionally, the theory explains the relationship pattern between the international system and the domestic arena, suggesting a linkage between different levels of the international system.

Importantly, the linkage theory has relevance in understanding the impact of the COVID-19 global pandemic. According to the theory, it is difficult to isolate one sector of the economy from another, as events in one sector can affect activities in another. Therefore, the dynamics of the pandemic directly or indirectly influence productivity and the engagement of public servants in Nigeria.

Empirical Review

Research on the impact of COVID-19 on civil servants' productivity and engagement is limited due to the novelty of the disease and its global spread. To start, it's worth examining the economic effects of previous pandemics, such as the Spanish influenza of 1918-1919, to understand the macroeconomic effects of the COVID-19 pandemic.

The economic repercussions of previous pandemics, regardless of the implementation of strict containment measures, have been substantial. Historical global pandemics, such as the 1918 influenza, led to significant financial burdens on the service sector due to factors such as decreased sales, shifts in customer sentiment, and the necessity of implementing precautions like facemasks and social distancing. Researchers have extensively documented the strain on economic activities caused by these events (Boissay and Rungcharoenkitkul, 2020; Barro, Ursua and Weng, 2020). Research has also examined the impact of viruses such as HIV/AIDS (1993), SARS (2003), Avian influenza (2003-19), and Ebola (2014) on the productivity and engagement of civil servants. For instance, the HIV/AIDS virus has been found to have significant

Citation:

direct and indirect economic consequences on civil servants, individual households, firms, and governments. This has led to disruptions in livelihoods, reduced labour supply, decreased labour productivity and output, and increased the need for social security, among other effects. Before the development of antiretroviral therapies, which reduced the vulnerabilities of carriers and increased their lifespans, various countries had to bear the economic costs of this virus (Cuddington, 1993a, 1993b; Mckibbin and Fernando, 2020). According to Lee and McKibbin (2004), the global economic costs of SARS were estimated to have caused a 0.1% decrease in global GDP. Additionally, Hai, Wang, and Hou (2004) found that SARS had a short-term impact on the Chinese economy, resulting in a 1-2 percent decrease in GDP growth.

In addition, Burns et al. (2006) conducted a study on the economic impact of avian influenza and found that it resulted in a 0.1 percent and 4 percent loss in global GDP and Asian GDP, respectively. The World Bank Report (2014) focused on the economic consequences of the Ebola epidemic, which primarily affected the West African region. The report's estimates from a computer general equilibrium (CGE) model showed that the Ebola virus decreased the GDP in Guinea, Liberia, and Sierra Leone by approximately 2.1 percent, 3.4 percent, and 3.3 percent, respectively, within the first year of the pandemic. Dingl and Neiman (2020) analyzed the employment impact of COVID-19 on the U.S. labour force, attributed to social distancing and the shift to remote work during the pandemic. Their findings revealed that only about 34% of jobs in the U.S. can plausibly be performed at home, accounting for approximately 44% of all wages. The study concluded that the inability to work from home has contributed to the increase in applications for unemployment benefits in the country. Therefore, identifying which jobs cannot be performed remotely is crucial for policymakers to target social insurance payments to those in need.

In 2020, KPMG conducted a study on the economic impact of COVID-19 in Nigeria, focusing on business activities. The results revealed a dual shock on Nigeria's oil-dependent economy, stemming from global and domestic factors as well as an oil price shock. The study indicated that these twin shocks are anticipated to impact the economy through the supply, demand, and financial channels. Furthermore, the study concluded that, unlike previous virus threats such as Ebola, Zika, and SARS, the socio-economic impact of the pandemic may persist long after the virus has been brought under control.

Methodology

Nigeria is situated between longitude 3^0 and 14^0 East of the Greenwich meridian and latitude 4^0 and 14^0 North of the Equator. It is bordered by the Republic of Benin to the west, the Republic of Cameroon to the east, and the Niger and Chad Republics to the north, with the Gulf of Guinea and the Atlantic Ocean to the south (see Figure 1). With a land area of 909,890sqkm and a water area of 13,879sq km, Nigeria is the third largest country in West Africa. It has a population of over 200 million people and is home to more than 350 ethno-linguistic groups. Nigeria is made up of 36 states and a Federal Capital Territory (Abuja), organized into six Geopolitical zones. It also has 774 Local Government Areas, each with its administrative headquarters. (Ademiluyi, 2020).

The largest sector of the economy is agriculture, employing approximately 70% of the labour force and contributing to over one-third of the GDP. Nigeria also has commercial quantities of more than forty-four (44) minerals, located in over 500 locations across the country, many of which remain untapped**.**
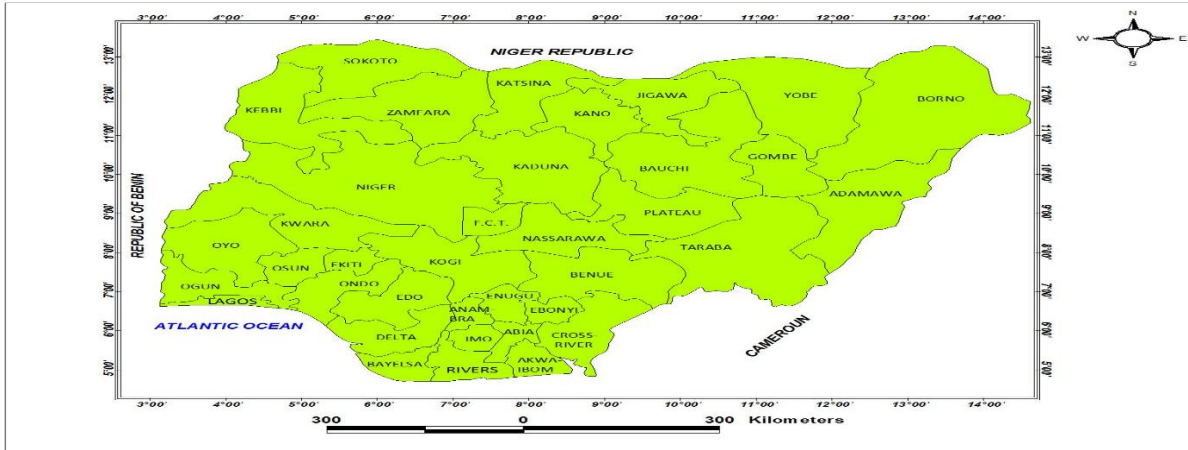
Figure 1: Map of the Study Area (Nigeria)
Source: Federal Ministry of Works, Housing and Power, Ibadan (2016).

Data Source and Types
The study utilized data from two primary sources: (1) daily COVID-19 case reports in Nigeria from February 29th to August 13th, 2020, obtained from the Nigeria Centre for Disease Control (NCDC) 2020; and (2) a physical map of Nigeria acquired from the Federal Ministry of Works, Housing and Power, Abuja (2016).

Method of Analysis
For this study, we utilized descriptive statistics and thematic mapping techniques in ArcGIS 10.0. The descriptive statistics method involved the use of percentages and graphs, and the GIS software used was ArcGIS 10.0.

The map of Nigeria was digitized and processed using Corel Draw 12 in a GIS environment, with geo-referencing done using the tie-points method. The existing hard copy of the map was digitized to create spatial data using ArcGIS 10.0 through on-screen digitization. State boundaries were digitized as polygon features. Additionally, Microsoft Excel was utilized to compile daily reports on COVID-19 cases in Nigeria from February 29th to August 13th, 2020, sourced from the Nigeria Centre for Disease Control. These reports were then exported into the GIS environment using the spatial analyst tool of ArcGIS 10.0. The analysis results are presented in tables (Tables 1, 2, 3, & 4) and maps (Figures 2, 3, 4, 5, 6, 7, 8, & 9).

Results and Discussion
This section presents and discusses the results of the research. The discussion is divided into three parts: (1) mapping the distribution pattern of COVID-19 cases in Nigeria, (2) identifying COVID-19 pandemic risk zones in Nigeria, and (3) discussing the implications of the findings.

Analysis of the COVID-19 Pandemic Distribution Pattern in Nigeria between February 29th and August 13th, 2020.

Table 1
COVID-19 Cases Distribution Pattern according to States as of 29th February and 31st March, 2020

State	As at February 29th,2020(Total Cases)				As at March 31st,2020(Total Cases)			
	Confirmed Cases	Discharged Cases	Deaths Cases	Active Cases	Confirmed Cases	Discharged Cases	Deaths Cases	Active Cases
Lagos	0	0	0	0	81	6	0	75

|								
FCT	**0**	**0**	**0**	**0**	**25**	**0**	**2**	**23**
Oyo	**0**	**0**	**0**	**0**	**8**	**0**	**0**	**8**
Edo	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**2**
Delta	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Rivers	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**
Kano	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Ogun	**1**	**0**	**0**	**0**	**3**	**2**	**0**	**1**
Kaduna	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**3**
Ondo	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Brono	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Gombe	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Bauchi	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**2**
Ebonyi	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Plateau	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Enugu	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**2**
Abia	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Imo	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Jigawa	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Kwara	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Bayelsa	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Nasarawa	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Osun	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**2**
Sokoto	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Niger	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Akwa-Ibom	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Benue	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**
Adamawa	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Anambra	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Kebbi	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Zamfara	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Yobe	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Ekiti	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**
Taraba	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Cross-river	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Kogi	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total	**1**	**0**	**0**	**0**	**131**	**121**	**8**	**2**

Source: Nigeria Centre for Disease Control (NCDC), 2020.

Tables 1-4 and figures 2-9 showcase the spatial distribution of the COVID-19 pandemic in Nigeria. As of 31st March, 2020, the pandemic had spread from one state to nine, with Lagos recording the highest number of confirmed cases (81), followed by FCT, Abuja (25) and Oyo state (8). By the end of April 2020, the pandemic had spread to thirty-four states, with Cross River and Kogi states being the only ones with zero

Citation:

cases. As of 31st May, 2020, the virus was still present in 34 states and the FCT, with Lagos remaining the epicentre of the pandemic.

The GIS analysis in Figures 6 and 7 illustrates the prevalence of COVID-19 in Nigeria as of 30th June and 31st July, 2020. Figure 6 indicates that the virus had spread to 35 states and the FCT, Abuja, except for Cross River, which had zero cases as of 30th June, 2020. High numbers of confirmed cases were recorded in Lagos, Kano, Oyo, Edo, Delta, Kaduna, Rivers, Ogun, and the FCT, Abuja. By 31st July, 2020, the pandemic had reached all 36 states and the FCT, Abuja, with significant numbers of infected individuals in Lagos, Ogun, Oyo, Edo, Delta, Rivers, Kano, Kaduna, Ondo, Plateau, and the FCT, Abuja (see Figure 7).

Figure 8 presents a geographic visualization of the distribution of confirmed COVID-19 cases across the states in Nigeria as of 13th August, 2020. The data indicates that Lagos, Oyo, Edo, Delta, Rivers, Kano, Kaduna, and the FCT, Abuja had the highest number of confirmed cases, while Kogi state had the least
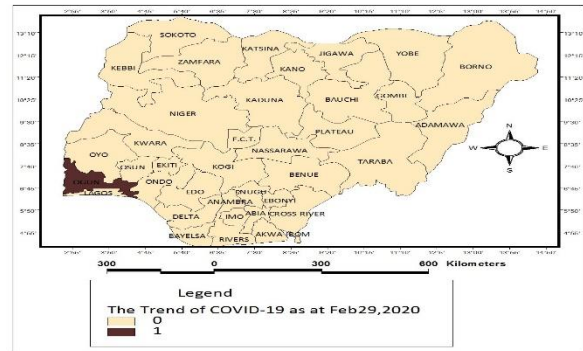
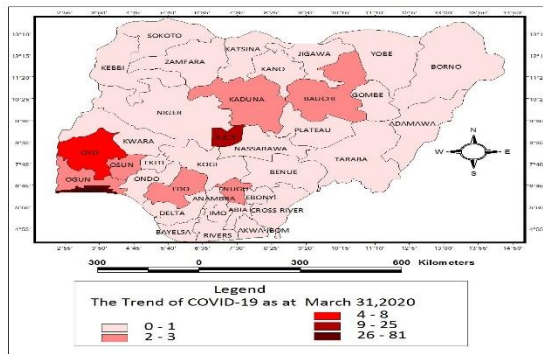

with   only   5   cases.

Figure 2&3: Spatial Pattern of COVID-19 Cases in Nigeria as at February 29 and March 31st,2020

Table 2
COVID-19 Cases Distribution Pattern according to States as of 30th of April and 31st of May, 2020

State	As at April 30th,2020(Total Cases)				As at May 31st,2020(Total Cases)			
	Confirme d Cases	Discharge d Cases	Death s Cases	Activ e Cases	Confirme d Cases	Discharge d Cases	Death s Cases	Activ e Cases

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Lagos	976	199	21	756	4943	825	54	4064
FCT	178	36	3	139	660	182	19	459
Oyo	23	9	2	12	292	97	6	189
Edo	44	10	3	31	284	69	13	202
Delta	9	4	2	3	83	17	8	58
Rivers	13	2	2	9	206	59	14	133
Kano	219	0	3	216	954	240	45	669
Ogun	56	8	1	47	278	149	9	120
Kaduna	35	6	1	28	258	157	8	93
Ondo	9	3	0	6	25	20	2	3
Borno	66	0	6	60	271	167	26	78
Gombe	76	0	0	76	364	122	6	189
Bauchi	38	6	0	32	238	220	8	10
Ebonyi	2	0	0	2	40	8	0	32
Plateau	1	0	0	1	105	53	2	50
Enugu	3	2	0	1	18	12	0	6
Abia	2	0	0	2	10	3	0	7
Imo	1	0	0	1	36	14	0	22
Jigawa	7	0	1	6	270	135	5	130
Kwara	11	2	0	9	88	37	1	50
Bayelsa	5	0	0	5	21	7	1	13
Nasarawa	3	0	0	3	62	18	2	42
Osun	34	18	3	13	45	35	4	6
Sokoto	36	1	4	31	116	96	14	6
Niger	2	0	0	2	32	9	1	22
Akwa-Ibom	16	10	2	4	45	14	2	29
Benue	1	0	0	1	7	1	0	6
Adamawa	2	0	0	2	38	20	4	14
Anambra	1	1	0	0	11	3	1	7
Kebbi	2	0	0	2	33	29	4	0
Zamfara	4	0	1	3	76	71	5	0
Yobe	1	0	0	1	52	24	7	21
Ekiti	8	2	1	5	20	16	2	2
Taraba	8	0	0	8	18	10	0	8
Cross-river	0	0	0	0	0	0	0	0
Kogi	0	0	0	0	0	0	0	0
Total	**1,932**	**319**	**58**	**1,555**	**10,162**	**3,007**	**287**	**6868**

Source: Nigeria Centre for Disease Control (NCDC), 2020.
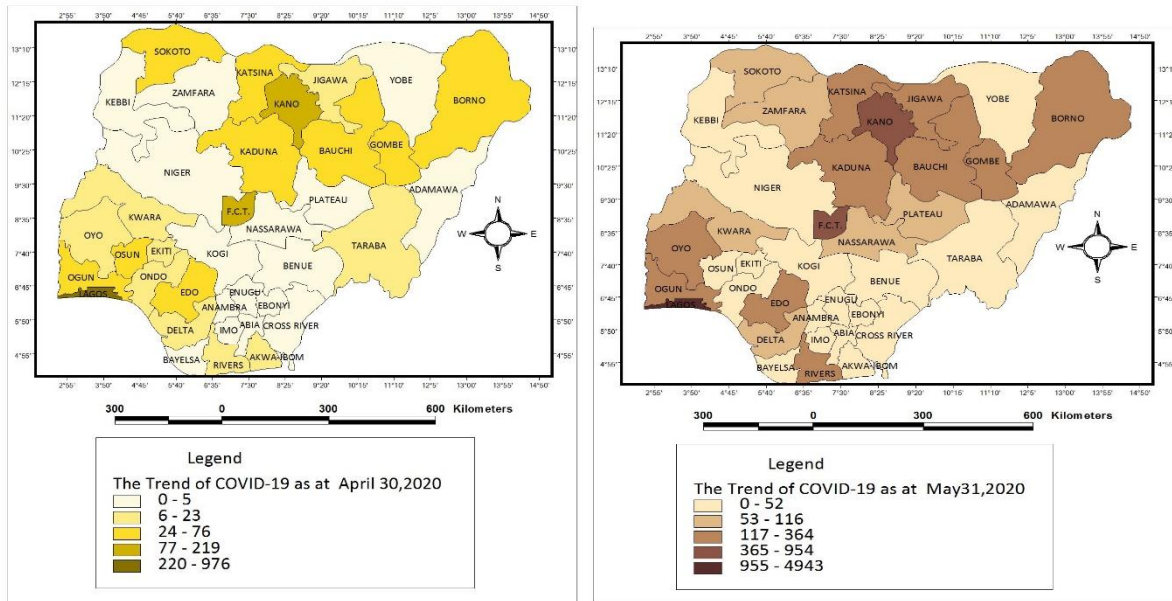
Figure 4&5: Spatial Pattern of COVID-19 Cases in Nigeria as at April 30th and May 31st,2020

Table 3

COVID-19 Cases Distribution Pattern according to States as of 30th of June and 31st of July, 2020

State	As at 30th of June ,2020(Total Cases)				As at July 31st ,2020(Total Cases)			
	Confirmed Cases	Discharged Cases	Deaths Cases	Active Cases	Confirmed Cases	Discharged Cases	Deaths Cases	Active Cases
Lagos	10510	1603	128	8779	15121	2148	192	12781
FCT	1870	570	33	1267	3803	1122	42	2639
Oyo	1380	696	12	672	2760	1286	27	1447
Edo	1105	288	39	778	2292	1800	82	410
Delta	965	190	23	752	1510	1359	43	108
Rivers	1056	622	38	396	1791	1438	52	301
Kano	1216	931	52	233	1597	1258	53	286
Ogun	826	571	19	236	1394	1095	23	276
Kaduna	766	532	12	222	1457	1176	12	269
Ondo	292	102	19	171	1155	548	24	583
Borno	493	422	32	39	613	569	35	9
Gombe	503	352	19	132	607	524	23	60
Bauchi	503	449	12	34	560	520	13	27
Ebonyi	438	357	3	78	785	596	24	165
Plateau	382	197	10	175	1188	519	19	650
Enugu	261	73	6	182	807	425	18	364

Citation:

Abia	310	207	3	100	545	426	5	114
Imo	332	40	6	286	468	119	9	340
Jigawa	318	307	6	5	322	308	11	3
Kwara	217	131	6	80	753	213	19	521
Bayelsa	205	100	14	91	328	279	21	28
Nasarawa	213	113	8	92	317	223	8	86
Osun	127	48	5	74	524	266	12	121
Sokoto	151	119	15	17	154	137	16	1
Niger	116	37	7	72	223	133	12	78
Akwa-Ibom	86	54	2	30	221	121	7	93
Benue	59	30	1	28	346	58	6	282
Adamawa	84	47	6	31	163	85	9	69
Anambra	73	57	9	7	135	75	12	48
Kebbi	79	58	7	14	90	79	7	4
Zamfara	76	71	5	0	77	71	5	1
Yobe	59	48	8	3	67	54	8	5
Ekiti	43	29	2	12	132	55	2	75
Taraba	19	10	0	9	54	11	0	43
Cross-river	0	0	0	0	45	9	3	33
Kogi	4	0	0	4	5	3	2	0
Total	25,694	9746	590	15,358	43,151	19,565	879	22,707

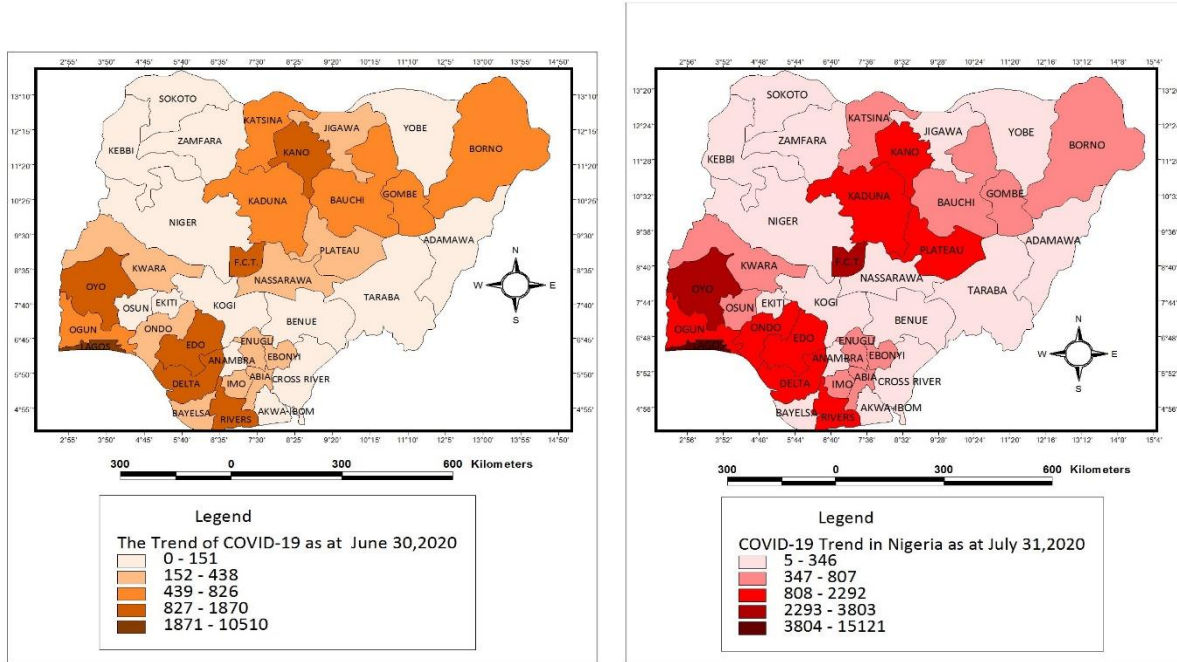Source: Nigeria Centre for Disease Control (NCDC), 2020.

Figure 6&7: Spatial Pattern of COVID-19 Cases in Nigeria as at June 30th and July 31st ,2020

Table 4

COVID-19 Cases Distribution Pattern according to States as of 13th August, 2020

State	As at August 13th ,2020(Total Cases)			
	Confirmed Cases	**Discharged Cases**	**Death Cases**	**Active Cases**
Lagos	16256	13132	201	2923
FCT	4632	1325	46	3261
Oyo	2935	1504	31	1400
Edo	2399	2121	100	178
Delta	1665	736	24	905
Rivers	1991	1775	56	160
Kano	1706	1493	12	201
Ogun	1626	1430	44	152
Kaduna	1661	1320	54	287
Ondo	1373	770	28	575
Borno	719	341	13	365
Gombe	698	576	36	86
Bauchi	677	546	5	126
Ebonyi	908	852	26	30
Plateau	1521	1288	24	209
Enugu	976	650	19	307
Abia	647	576	23	48
Imo	494	168	10	316

Citation:

Jigawa	346	316	21	9
Kwara	888	591	23	274
Bayelsa	372	233	8	141
Nasarawa	322	308	11	3
Osun	580	533	14	33
Sokoto	185	104	12	69
Niger	241	207	8	26
Akwa-Ibom	228	168	12	48
Benue	430	139	9	282
Adamawa	194	81	3	110
Anambra	156	131	18	7
Kebbi	90	82	8	0
Zamfara	78	55	4	19
Yobe	77	71	5	1
Ekiti	154	138	16	0
Taraba	73	42	8	23
Cross-river	67	57	8	2
Kogi	5	3	2	0
Total	**48,116**	**34,309**	**966**	**12,841**

Source: Nigeria Centre for Disease Control (NCDC), 2020.
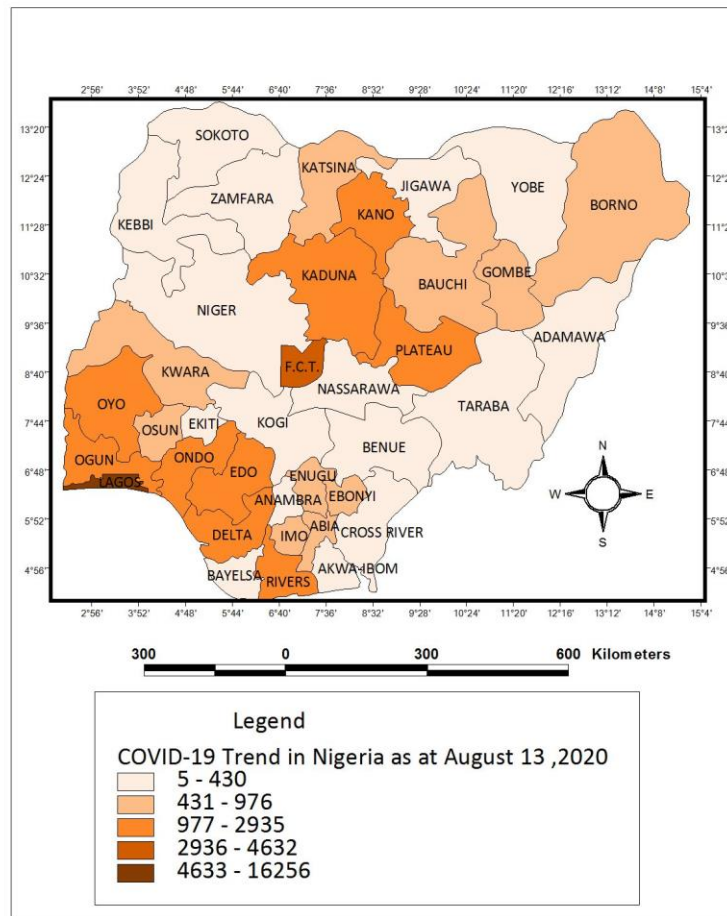
Figure 8: Spatial Pattern of COVID-19 Cases in Nigeria as at August 13th,2020

Mapping COVID-19 Pandemic Risk Zones in Nigeria between 29th February and August 13th August, 2020.

Risk analysis using GIS (UNISDR, 2013a; Whanda et al., 2015) in Figure 9 shows that as of 13th August, 2020, Lagos state is at very high risk for the spread of the COVID-19 pandemic in Nigeria. The results also showed that the following states: Oyo, Ogun, Edo, Delta, Rivers, Kano and Abuja, the Federal Capital Territory (FCT) are high-risk zones. The states at moderate risk of the pandemic include; Ondo, Enugu, Ebonyi, Abia, Imo, Kaduna, Katsina, Bauchi, Gombe, Plateau and Borno. The risk analysis presented in Figure 9 shows that the following states are at marginal risk of a pandemic. These states are; Osun, Ekiti, Bayelsa, Anambra, Cross-river, Akwa-Ibom, Benue, Kogi, Kwara, Niger, Nassarawa, Taraba, Adamawa, Kebbi, Zamfara, Sokoto, Jigawa and Yobe.

If each state in Nigeria is at some level of pandemic risk, it indicates that the entire country is at high risk, with Lagos being the epicentre of the pandemic. Without proper care, rapid community transmission is inevitable.

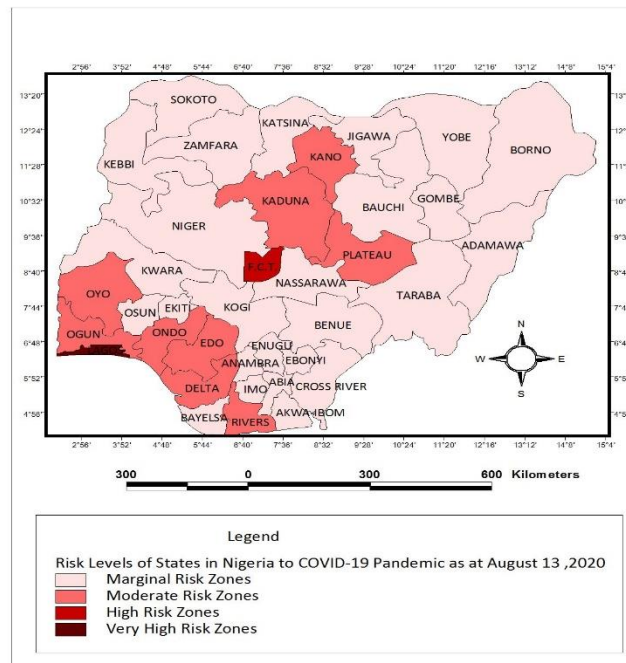Figure 9: States Risk Level to COVID-19 Pandemic as of 13th August,2020.

Implications of Findings

The COVID-19 pandemic has significantly affected Nigeria's economy, particularly in terms of productivity and engagement of civil servants, especially in high-risk states (Emmanuel & Bebaa, 2021). To mitigate the spread of the virus, Nigeria has implemented various measures, including travel bans, shutdowns of government ministries and parastatals, commercial activities, closure of schools, and general shutdowns of major cities and towns. Consequently, public servants from level 1 to level 12 have been instructed to close their offices and work from home when possible (Anyanwu, 2020).

The widespread shutdowns had a notable impact on productivity, as evidenced by the challenges faced by parents and caregivers who are juggling multiple responsibilities. An individual's productivity is influenced by these factors, while the overall productivity of an organization is contingent on the extent to which their employees' productivity has been affected. (Wren-Lewis, 2020; Berube & Bateman, 2020; Baldwin & Weder di Mauro, 2020; Hill, 2008).

The visually presented maps in this study can be utilized by stakeholders to swiftly make decisions about the virus's spread. This includes implementing movement restrictions in hotspot areas, determining the need for full or partial lockdowns, and effectively planning medical resources and palliative measures. Additionally, these maps can act as early warning signs for future occurrences.

These maps can also be utilized to monitor and manage the spread of diseases within communities and neighbourhoods in Nigeria and around the world. The analysis of health events through Geo-visualization with Geographic Information System techniques can store, analyze, and present data in a simple graphic format for easy comprehension and interpretation.

Conclusion and Recommendations

This study utilized thematic mapping techniques to visually represent the risk and spatial distribution of COVID-19 across the 36 states in Nigeria, including the Federal Capital Territory (FCT), Abuja. It also

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demonstrated the potential of geo-visualization analysis in explaining public health phenomena for rapid decision-making and intervention. The study identified Lagos, Oyo, Ogun, Edo, Delta, Rivers, Kano, and Kaduna states, along with Abuja, as the areas most severely impacted by the virus based on the number of confirmed cases and deaths. The entire country was deemed to be at very high risk of the pandemic. Furthermore, the study showcased how maps generated in this manner can be utilized to monitor and control the spread of diseases across different regions.

The study also addressed the impact of COVID-19 on the effectiveness of Public Servants in Nigeria. It concludes by recommending the proactive use of geo-visualization analysis and other methods for explaining public health issues to facilitate quick planning, preparedness, and responses by relevant stakeholders.

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