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# Are the northern and southern regions equally affected by the COVID-19 pandemic? An empirical evidence from Nigeria

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## 1. Introduction

### 1.1 Background

The name "coronavirus" is derived from the Latin word known as *corona*, meaning 'crown' or 'wreath' in the Greek language [1,2]. It was first discovered in chickens in 1931 in North Dakota as an acute respiratory infection caused by the infectious bronchitis virus [3]. Coronaviruses are large and mostly spherical, sometimes pleomorphic, particles with bulbous surface projections [4]. They have a scientific name known as *Orthocoronavirinae* or *Coronavirinae* [5–7]. Being currently the most dangerous and contagious disease among humans, the level of its wideness has cut across many countries of the world.

By simple definition, coronaviruses are a group of related RNA viruses that cause diseases in mammals and birds. In humans, these viruses cause respiratory tract infections ranging from mild to severe. While the mild symptoms include common cold and fever in humans, the lethal ones could cause tiredness, dry cough, aches, and pains, among others [8]. Symptoms of coronavirus infection in other species vary; in chickens, upper respiratory tract disease is observed, while in cows and pigs, diarrhea is the symptom [9].

In the literature, human coronaviruses were discovered in 1960s [10]. There are six species of coronaviruses, with one species subdivided into two different strains, making a total of seven strains of human coronaviruses in the world [11]. Out of the seven strains, four generally produce mild symptoms, and they are *Human coronavirus OC43* (HCoV-OC43), *Human coronavirus HKU1* (HCoV-HKU1), *Human coronavirus 229E*

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(HCoV-229E), and *Human coronavirus NL63* (HCoV-NL63) [12]. These four mild coronavirus strains have a seasonal incidence occurring in the winter months in temperate climate [13,14].

However, the remaining three strains, namely, Middle East respiratory syndrome coronavirus (MERS-CoV), severe acute respiratory syndrome coronavirus (SARS-CoV), and SARS-CoV-2, which is also known as coronavirus disease 2019 (COVID-19), are potentially severe and could kill humans as fast as possible [15–18].

COVID-19, which is the central focus of this research, is an infectious disease caused by the newly discovered coronavirus. When the outbreak was first detected in Wuhan city, China, on December 31, 2019, it was unknown, but not until a tentative name was given by the World Health Organization (WHO) as COVID-19 and it was later declared as a pandemic disease [8,19–22]. It has been reported that the new coronavirus belongs to the family of Betacoronavirus, with approximately 70% similarity with SARS-CoV [23]. Because it has about 96% similarity with the bat coronavirus, it is suspected to have originated from bats [24,25].

The coronavirus pandemic has impacted human life in many ways. Although caused by a respiratory virus, its infection involves virtually every organ system in the body. The endocrine system has a bidirectional relationship with COVID-19 [26]. Some researchers, however, have confirmed that diabetes is one of the most important risk factors associated with mortality caused by COVID-19 [27]. Diabetes is known to be characterized by impaired immunity, which may lead to an increased susceptibility to COVID-19, especially in those with uncontrolled glucose levels [28]. Some studies report that cardiovascular disease, which is a common comorbidity of endocrine disease including diabetes, is a significant contributor to COVID-19 morbidity [27].

Expectedly in Nigeria, the first case of the new coronavirus disease was reported on February 27, 2020 in the south-western part of the country in a 44-year-old Italian citizen, who was later tracked, retained, treated, and discharged. Since then, it has been spreading rapidly through many contacts he had met within the shortest period of his stay in Nigeria. Today, COVID-19 has affected many, both male and female, including the rich and the poor. Nigeria is currently recording over 2000 confirmed cases of COVID-19 [29]. The disease has no respect for anyone, regardless of tribe, gender, age, and other demographic variables. As of today, no vaccine (or antiviral drugs) has been approved yet, except those on trials. In Nigeria, 68 deaths have been recorded so far with 1751 active cases [29] as at the time of preparing this text.

In terms of its geographic distribution, Nigeria, being one of the giant African countries, has six geopolitical zones, with three each in the southern and northern parts. Thus North Central (NC), North East (NE), and North West (NW) form the northern part, while South East (SE), South South (SS), and South West (SW) form the southern part [30]. Each zone has at least five states (see Table 32.2). Progressively, continuous data for this study are obtained on a weekly basis, starting from the first day when coronavirus was spotted. This study, however, aims at determining which part of Nigeria is more affected by COVID-19, as this would assist the national government and other international nongovernmental

agencies to plan on the concentration patterns as to which region would require more helping hands in terms of the fight against the pandemic disease.

The chapter is composed of the following sections and subsections: Section 1 includes the background of the coronavirus and situational report on COVID-19 in Nigeria; Section 2 covers the data structure and coverage, data graphics, statistical analyses including procedures for testing normality, variance equality, and the application of *t*-test; Section 3 contains descriptive analyses and discussion on results for normality, variance homogeneity, and *t*—tests; and Section 4 is the last section of the chapter and is subdivided into two Sections 4.1 and 4.2.

## 1.2 Situational report on COVID-19 in Nigeria

The new COVID-19 is a potentially life-threatening disease for people with suppressed or deficient immune systems in terms of hypertension, diabetes, obesity, and most importantly respiratory diseases. These, as presumed, are aggravating factors for the new coronavirus. Majorly, the virus has been a serious threat to the Nigerian government. It has affected almost all the sectors including economy, education, security, human psychologic well-being, governance, and sporting activities, to mention but a few. Coronavirus infection, being a current global fearful pandemic disease among humans, has spread all over hundreds of countries around the world. Although Africa has the least percentage of death rates across the continents [8], it could be a result of weather conditions and some other scientific immunity enjoyed in African lands. Interestingly, this could be buttressed from the fact that the said virus finds its way in cold-weathered environment.

In Nigeria, a Presidential Task Force (PTF) on COVID-19 was recently inaugurated by President Muhammadu Buhari with a view to anchor all matters relating to the menace of the disease. Several efforts have been put in place to curb the spread of the virus among humans. Some of these efforts include the introduction of total lockdown of specified high-burden areas, travel ban within and outside Nigeria, nationwide curfew, as well as advisories aimed at escalating infection and prevention and control strategies while excepting some essential workers like healthcare service providers, security officers, and the likes.

Although some of these measures were later reviewed and moderated, the number of infections keeps increasing on a daily basis despite all the measures put in place. Some governments at the state levels also followed suit. While maintaining total lockdown, the economy starts crumbling and many associated factors begin to decay in value and worth, thereby leading to serious hardship on the part of Nigerians. This situation, in turn, calls for easing the total lockdown in a way that allows some parts of the economy to start functioning averagely from 06:00 a.m. to 06:00 p.m. Days after, partial lockdown surfaces in place of total lockdown.

During the periods of total lockdown, many things stand still; no one was allowed to move out of the residence. Schools as well as institutions have been closed down to disallow multitude gathering; religious centers such as mosques, churches, and traditional shrines were not left out. Also, ministries, departments, and agencies (MDA) of the

government as well as sport centers have been, till now, closed down to allow curtailing the COVID-19 pandemic. It is imperative to categorically say that no one is oblivious of the coronavirus disease among almost 140 million citizens of Nigeria, as the name of this pandemic disease has gone even beyond viral, thereby reaching those in the rural areas most especially the illiterates and the aged.

Although some do not believe it is real, the name coronavirus still sounds remarkably fearful in their hearing. Consequent upon the imposition of a series of bans on the citizens especially from moving out in search of what to eat, the frequency of armed robberies keeps increasing everyday; many homes were attacked in the midnights. Some gangs of armed robbery even move along with POS machines to transfer money from the victims' accounts to theirs. Incidentally, some female occupants of some of the attacked households were forced to sleep with, while their fathers/husbands became helpless.

The psychologic well-being of every human could be positively improved, provided humans are financially buoyant. During the lockdown, many homes were broken because the head of the household could not afford to provide food on the table again. Hunger is a serious issue and the only solution is food. While some husbands cease to have control over their wives, some children start disregarding their fathers as a result of inability to make available only what to eat. All these and many more problems are attributed to the outbreak of COVID-19 pandemic in our generation.

Though many well-blessed and financially buoyant Nigerians donate monies in millions of naira, food items (in packaged forms), medical materials, and pharmaceutical equipment, as well as other relief materials for both governments and citizens, these could only, to the best of all we experienced during the periods of total lockdown, take care of at most 25% needs of citizenry, especially the poor and even those in the middle class. You can only eat what you see, that is if you are even lucky to be included in the list of beneficiaries of these donations, not to talk of wanting to eat what you prefer. Whatever that comes to your table is what you would eat at that point in time.

Well, in recognition of both national and global impacts of COVID-19 on economies and the need to stimulate and positively turn around the economy, the Federal Government of Nigeria has been implementing various stimulus packages offered to businesses and state governments through the Central Bank of Nigeria (CBN). These include

- reduction of interest rates from 9% to 5% for all CBN intervention facilities,
- restructuring loans to longer tenors for all companies whose businesses are adversely impacted by COVID-19,
- 50 billion naira (N50 billion) facilities to household and businesses adversely impacted by COVID-19 through NIRSAL National Micro Finance Bank,
- 100 billion naira (N100 billion) facility to pharmaceutical and health sector companies to retool their businesses,
- 1 trillion naira (N1 trillion) facility to agricultural and manufacturing companies to expand and set up new factories,
- suspension of repayment of all state government loans for 1 year to give states ample financing room to pay salaries.

Within the period of 4 weeks of total lockdown, the following accomplishments were also recorded by the Nigerian central government:

- increase in the number of laboratories for the COVID-19 network from 15 to 26;
- additional 15,558 tests were conducted in the country (with a cumulative total of 35,098 tests) and the number of tests per million increasing from 50 to 154;
- increase in the number of trained personnel to 11409 health workers, thereby boosting capacity for case management;
- procurement and distribution of additional personal protective equipment (PPE) and ventilators across the country;
- the doubling time of the virus has slowed down from 7 to 11 days;
- the number of beds available for isolation and case management was increased from 3500 to 5000 nationwide;
- the efficiency of the identification, testing, evacuation, and isolation process for confirmed cases has increased drastically;
- progressive improvement in the capacity of the health system to respond to the outbreak.

So far, there is no iota of racially discriminatory action from the Nigerian government to any other nationals, as all are being equally treated in case there exists any evidence of COVID-19. Therefore the following recommendations were provided by the PTF with a view to curtail the spread of the virus among Nigerians and other nationals:

- intensifying efforts to 'tell (communicate), trace (identify), and treat (manage)" cases;
- elevating the level of community ownership of nonpharmaceutical interventions;
- maintaining the existing partial lockdown order in high-risk areas;
- imposition of precision lockdown in states, or in metropolitan/high-burden local government areas, that are reporting a rapidly increasing number of cases, when the need arises, and this would be complemented with the provision of palliatives and continued re-evaluation of the impact of the interventions;
- aggressive scale up of efforts to ensure that communities are informed, engaged, and participating in the response with enhanced public awareness in high-risk states.

In summary, the present situation of the effect of COVID-19 in Nigeria remains under the umbrella of partial lockdown, where we are allowed only to come out in search of daily bread from 06:00 in the morning and return home by 06:00 in the evening spanning through Mondays to Thursdays of every week, while the total lockdown rule remains in force from Fridays to Sundays. Based on all these rules, some new techniques have been introduced into our daily activities. In Nigeria today, e-governance has taken over to replace workers' attendance in the offices, and e-class (electronic learning technique) has been in use in some internet-inclined schools and institutions, while some schools remain closed, especially in the rural areas. There is no replacement yet for sport

activities, agriculture, and transport activities, especially public transport except private ownership of cars. Although some businesses require physical contacts, still more than 70% of the financial transactions are already completed before physical contacts could be demanded. This is done through the use of e-commerce. Until vaccines are made available for curing the virus, the fear of COVID-19 remains in the heart of everyone in the world.

# 2. Materials and methods

## 2.1 Data structure and coverage

Though the data used for this study were secondary sourced from the Nigeria Centre for Disease Control [29] and reported on a daily basis, careful collation is done manually with a view to ensure that the datasets are completely free from error. The datasets are re-presented on a weekly basis according to regional zones (see Table 32.1). The number of confirmed cases of COVID-19 keeps increasing on a daily/weekly basis. However, it is important to reiterate that only the affected states are included in the research. At the first 3 weeks, no case was reported in the northern part of Nigeria while two cases have already been recorded in the south. It was at the fourth week that the figure picked up in both regions with 3 cases from Nigeria's capital city (north) and with 19, 2, and 1 from Lagos, Ogun, and Ekiti states, respectively (south).

The datasets were structured to accommodate only two regions: south and north. We consider 'south' as $x_1$ and 'north' as $x_2$. We tailored all computations toward assuming paired observations. The datasets used for this study covered 34 affected states, including the country's capital city (approximately 95%). The application of $t$-test was introduced because of the way datasets were structured so as to achieve the main objective behind the study.

**Table 32.1** Progression of confirmed cases of COVID-19 in Nigeria (February 29, 2020 to May 1, 2020).

| S/N | Recording dates on a weekly basis | Southern region | Northern region |
|---|---|---|---|
| 1. | 1st Week: February 29, 2020 | 01 | 0 |
| 2. | 2nd Week: March 1 to March 7, 2020 | 01 | 0 |
| 3. | 3rd Week: March 8 to March 14, 2020 | 02 | 0 |
| 4. | 4th Week: March 15 to March 21, 2020 | 22 | 03 |
| 5. | 5th Week: March 22 to March 28, 2020 | 77 | 20 |
| 6. | 6th Week: March 29 to April 4, 2020 | 160 | 54 |
| 7. | 7th Week: April 5 to April 11, 2020 | 241 | 77 |
| 8. | 8th Week: April 12 to April 18, 2020 | 391 | 151 |
| 9. | 9th Week: April 19 to April 25, 2020 | 834 | 348 |
| 10. | 10th Week: April 26 to May 1, 2020 | 1260 | 910 |

Based on Nigeria Centre for Disease Control (NCDC), COVID-19 Outbreak in Nigeria: Situation Reports Between 29th February and 1st May, 2020. www.ncdc.gov.ng.

**Table 32.2** List of states in Nigeria according to geopolitical zones.

| | List of states in the north | | | List of states in the south | | |
|---|---|---|---|---|---|---|
| **S/N** | **North Central** | **North East** | **North West** | **South East** | **South South** | **South West** |
| 1. | Niger | Gombe | Jigawa | Abia | Akwa-Ibom | Ekiti |
| 2. | Benue | Bauchi | Kano | Imo | Cross-River | Ondo |
| 3. | Nassarawa | Yobe | Kastina | Ebonyi | Bayelsa | Osun |
| 4. | Plateau | Borno | Kaduna | Enugu | Rivers | Oyo |
| 5. | Kogi | Adamawa | Kebbi | Anambra | Delta | Ogun |
| 6. | Kwara | Taraba | Zamfara | | Edo | Lagos |
| 7. | | | Sokoto | | | |
| Total number of states in the north = 19 | | | | Total number of states in the south = 17 | | |

Constitution of the Federal Republic of Nigeria, 1999. As amended.

## 2.2 Data graphics

The preliminary examination of most data is facilitated by the use of diagrams [31]. Thus diagrams prove nothing but bring outstanding features readily available to the eyes [31]. Several methods of data graphics are available in the literature but only two of them are employed here. The first one is box plot, which is an excellent tool for conveying information on the location and variation of datasets, particularly for detecting and illustrating location and variational changes between different groups of data [32]. The second one is bar chart, which is a graphical display used to present the datasets in rectangular forms of different heights. It is used to descriptively analyze the progression of the number of confirmed cases of COVID-19 as obtained.

## 2.3 Statistical analyses

### *2.3.1 Procedure employed for normality assumption*

Before the application of any parametric test on any dataset, especially before the use of *t*-test, such dataset needs to satisfy the assumption that it comes from normal distribution. However, in real life practice, no data can be perfectly normal, and we just have to pass through this rudiment with a view to ensure that the assumption is not 100% violated. In the literature, there are so many procedures for detecting departure from normality assumption, but the Shapiro-Wilk statistic is used because of its ability to sustain its power in parametric situations. In addition, this statistic could be used to test for departure from exponential distribution [32]. The test statistic is stated as follows:

$$W = \frac{n}{n-1}\left\{\frac{\left[\overline{x} - x_{(1)}\right]^2}{\sum_{i=1}^{n}\left[x_{(i)} - \overline{x}\right]^2}\right\}, \tag{32.1}$$

where $x_{(1)} \leq x_{(2)} \leq \ldots \leq x_{(n)}$ are the ordered sample values [32]. Therefore the *R* package is used to relieve the computational stress. From this electronic computation,

the probability value is obtained. Thus if the probability value is less than the chosen value of the type I error, then it is reasonably evident to reject the null hypothesis of the absence of normality within the dataset.

### 2.3.2 Procedure employed for variance homogeneity assumption

Several statistical tests are available for testing equality of population variances but one of the popular test procedures for detecting homogeneity of population variances is the Bartlett's test [33]. The null hypothesis is such that all variances are the same for the factor being studied. Therefore values of Bartlett's statistic can be computed using the following formula:

$$K^2 = \frac{1}{C}\left[df_T \log_e MSE - \sum_{i=1}^{k} df_i \log_e S_i^2\right] \sim X^2_{k-1;\,\alpha}, \tag{32.2}$$

where

$$MSE = \frac{1}{df_T}\left[\sum_{i=1}^{k} df_i S_i^2\right] \tag{32.3}$$

and

$$C = 1 + \frac{1}{3(k-1)}\left\{\sum_{i=1}^{k}\frac{1}{df_i} - \frac{1}{df_T}\right\} \tag{32.4}$$

Decision rule: Reject $H_0$ if $K^2$ is greater than chi-squared calculated. Otherwise do not reject $H_0$. To achieve this in the study, computations are done through the use of Ref. [34], where $P$-value was obtained. Alternatively, we may decide that the null hypothesis be rejected if the $P$-value is $\leq$5%; this is the alternative decision rule.

### 2.3.3 Procedural steps for t-test

A $t$-test is a hypothesis testing tool and inferential statistic used to determine whether there is a significant difference between any two given samples when the conditions of normality and homogeneity of variances hold. As we assume the observations are taken dependently, that is, occurrence of COVID-19 in one state is actively dependent of occurrence of the same disease in another state (paired observations), the procedures for the application of $t$-test are stated in the following:

**Step I:** Set up the appropriate hypotheses.

Null hypothesis, $H_0$: $\mu_D = 0$

Alternative hypothesis, $H_1$: $\mu_D \neq 0$ and $\mu_1 > \mu_2$.

**Step II:** Obtain the test statistic.

$$t_{\text{cal}} = \frac{\overline{x}_D}{S_D/\sqrt{n}} \tag{32.5}$$

where $\overline{x}_D$ is the sample mean difference, $S_D$ is the sample standard deviation of difference, and $\sqrt{n}$ is the square root of the number of difference or number of pairs.

**Step III:** Obtain the critical value.

$$t_{\text{tab}} = t_{(n_D-);\alpha/2} \tag{32.6}$$

**Step IV:** Make appropriate decision and conclusion.

In a situation whereby the null hypothesis is rejected, we proceed to determine which region has the higher cases of the pandemic by making use of little modifications to Eq. (32.6) as follows:

$$t_{\text{tab}} = t_{(n_D-1);\alpha} \tag{32.7}$$

# 3. Results and discussion

## 3.1 Descriptive analyses

From Table 32.3, it can be deduced that the average rate of infection of COVID-19 is approximately 299 in the south and 156 in the north. It is boldly evident from these statistics that the rates at which both regions are affected are unequal; the results show that approximately 66% of infected patients are southerners, while the remaining 44% come from the north as at the time this chapter was written.

However, the box plot shows that at least one case in each region is an outlier, meaning that the occurrence of COVID-19 in Nigeria would be gradually going out of control if further and proper precautions are not taken (see Fig. 32.1). Also, descriptive display of the number of occurrences of the pandemic disease is figured in a bar plot (see Fig. 32.2). The figure is self-explanatory as the number of confirmed cases keeps increasing on a weekly basis.

## 3.2 Discussion on results for normality test

The Shapiro-Wilk statistical tests were conducted using Ref. [34] for separate data obtained for each regional zone. With the absence of normality as our null hypothesis, the results for both regions show that the datasets actually emanated from normal

**Table 32.3** Some descriptive statistics.

| S/N | Descriptive tool | Southern region | Northern region |
|---|---|---|---|
| 1. | Minimum | 1 | 0 |
| 2. | Maximum | 1260 | 910 |
| 3. | Range | 1259 | 910 |
| 4. | Arithmetic mean (average) | 298.9 | 156.3 |
| 5. | Mean absolute deviation | 174.206 | 54.856 |
| 6. | Variance | 181,413.9 | 81,884.68 |

Author's computation, 2020.

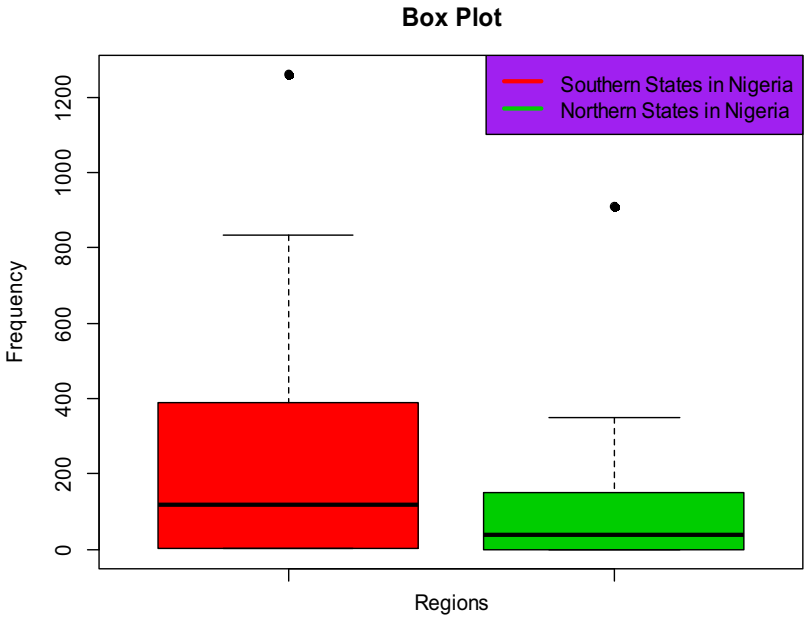
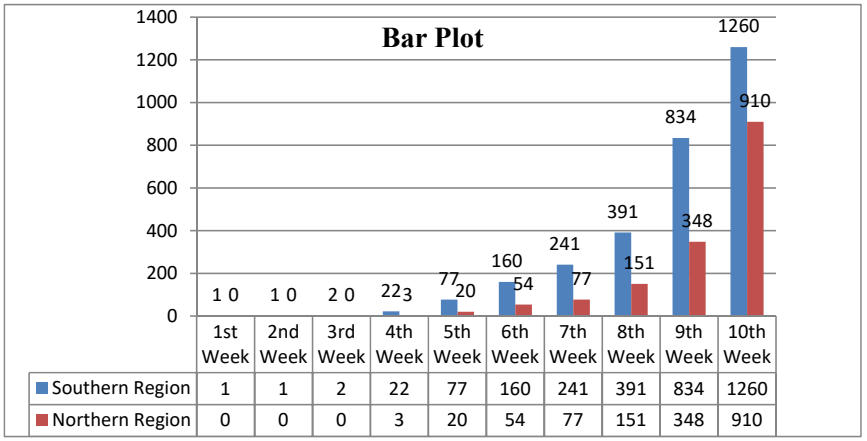



**FIGURE 32.1** Box plot of the progression of occurrence of COVID-19 in Nigeria (February 29 to May 1, 2020).




| | 1st Week | 2nd Week | 3rd Week | 4th Week | 5th Week | 6th Week | 7th Week | 8th Week | 9th Week | 10th Week |
|---|---|---|---|---|---|---|---|---|---|---|
| Southern Region | 1 | 1 | 2 | 22 | 77 | 160 | 241 | 391 | 834 | 1260 |
| Northern Region | 0 | 0 | 0 | 3 | 20 | 54 | 77 | 151 | 348 | 910 |

**FIGURE 32.2** Bar chart of the progression of occurrence of COVID-19 in Nigeria (February 29 to May 1, 2020).

distribution, meaning that the figures are the real instances of occurrence of COVID-19 in Nigeria between February 29 and May 1, 2020 (Table 32.4).

Confirmative statistical investigation shows that extremely less probability values (.0041 and .0001) obtained from the application of Shapiro-Wilk test statistic as compared with 5% level of significance is an indication that the assumption of normality is not violated.

**Table 32.4** Normality statistics.

| Region | Test statistic | *P*-value | Decision |
|---|---|---|---|
| Southern region | 0.7546 | .0041 | We reject the null hypothesis because the *P*-value is <5% |
| Northern region | 0.6263 | .0001 | We reject the null hypothesis because the *P*-value is <5% |

Null hypothesis ($H_0$): No normality exists versus alternative hypothesis ($H_1$): normality exists

Author's computation, 2020.

## 3.3 Discussion on results for homogenous variance

As the *probability value* (=.2516) is extremely greater than the *chosen value of alpha* (0.05), it is evident to conclude that the assumption of equal variance is not violated. Therefore this guarantees the use of *t*-test to conduct statistical test of difference on the rate at which COVID-19 pandemic affects Nigerians on a regional basis (Table 32.5).

## 3.4 Discussion on results for *t*-test

Results obtained in Table 32.6 show that for two-tailed test, the null hypothesis of equality in the occurrence of COVID-19 pandemic in both regions is rejected. This therefore calls for further investigation to determine which region has the higher rate of occurrence. From the same table, we could deduce that for one-tailed test, the null

**Table 32.5** Variance homogeneity statistics.

| Bartlett's statistic | *df* | *P*-value | Decision |
|---|---|---|---|
| $\chi^2_{cal}$ | 1 | .2516 | We do not reject the null hypothesis because the *P*-value is >5% |

Null hypothesis ($H_0$): Homogeneity exists versus alternative hypothesis ($H_1$): no homogeneity exists

Author's computation, 2020.

**Table 32.6** Statistical test of significance.

| S/N | Southern region | Northern region | Difference (D) | Relevant statistics |
|---|---|---|---|---|
| 1. | 01 | 0 | 1 | $x_D = 142.6$ |
| 2. | 01 | 0 | 1 | |
| 3. | 02 | 0 | 2 | $s_D = 168.2248$ |
| 4. | 22 | 03 | 19 | |
| 5. | 77 | 20 | 57 | $t_{cal} = 2.6806$ |
| 6. | 160 | 54 | 106 | |
| 7. | 241 | 77 | 164 | $t_{tab} = t_{9,\,0.9750} = 2.262$ |
| 8. | 391 | 151 | 240 | |
| 9. | 834 | 348 | 486 | $t_{tab} = t_{9,\,0.9500} = 1.833$ |
| 10. | 1260 | 910 | 350 | |

Author's computations, 2020.

hypothesis is also rejected, indicating that the frequency of occurrence in the south is greater than that of the north.

Therefore it is statistically reliable and evident to say that the rate at which COVID-19 affects the people of the southern part of Nigeria is higher than the rate at which northerners are affected.

# 4. Conclusion and recommendation

## 4.1 Concluding remarks

The government's efforts in mobilizing all sectors and communities to take individual and collective responsibility in the fight against the pandemic across the nation is never a waste of time, as most of the private sectors, public spirited Nigerians, corporate organizations, nongovernmental organizations, the armed forces, intelligence and security community, and the media, as well as the international community, are greatly appreciated for their unquantifiable support in the ongoing battle against COVID-19.

The study is geared toward determining which part of Nigeria is greatly affected by the new pandemic disease. A number of data on this disease have been provided by the Nigeria Centre for Disease Control [29] on a daily basis in respect to the number of confirmed cases, deaths, discharged cases, and even active cases in each state. These numbers were sourced, classified, and stratified according to southern and northern regions.

However, through thorough statistical investigations, we are able to deduce that apart from the graphical display, Nigerian citizens in the south, most especially in Lagos, are severely affected as compared with the northern region. This conclusion suggests that government at the national level as well as other nongovernmental agencies should focus more attention on the fight against the pandemic disease in the southern states of Nigeria than the northern states of Nigeria.

## 4.2 Recommendations

Without mincing words, it is recommended that the highest level of hygiene is expected of every Nigerian in a bid to curtail the spread of this dangerous disease. This pandemic has thrown the whole world into fear of death as more than 2 million people in the world are dead as a result of this pandemic [8]. For everyone to survive this pandemic, serious precautions as recommended by the World Health Organization should be strictly adhered to. Some of these precautions are itemized in the following:

- clean your hands frequently and thoroughly with soap;
- avoid touching your eyes, mouth, and nose;
- cover your cough with a bent elbow or tissue, and if tissue is used discard it immediately and wash your hands;
- wear nose mask appropriately;
- maintain a distance of at least 1 m (3 feet) from others (physical distancing).

While considering these precautions as significant as possible, Nigerians, especially those in the north, still need to be informed that the virus has no vaccines yet. People should be educated more on controlling the use of orthodox medicine (African herbs) as an alternative to antiviral drugs.

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