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THE SPREAD OF COVID-19 OUTBREAK IN AFRICA: A COMPARATIVE ANALYSIS BETWEEN NIGERIA AND NIGER REPUBLIC

Rufai Iliyasu

Department of Statistics, Binyaminu Usman Polytechnic, Hadejia Jigawa, Nigeria.

Prof. Ilker Etikan

Department of Biostatistics Statistics, Near East University Faculty of Medicine, Nicosia-TRNC, Cyprus

Hassan Adamu

Department of Computer Science, Binyaminu Usman Polytechnic, Hadejia Jigawa, Nigeria.

Z. Ibrahim

Department of Medical Biology and Genetics, Near East University, Nicosia- TRNC, Cyprus

I. Manzo

Department of Statistics, Binyaminu Usman Polytechnic, Hadejia Jigawa, Nigeria.

Auwalu Saleh

Department of Computer Science, Binyaminu Usman Polytechnic, Hadejia Jigawa, Nigeria.

Sabo Muhammad

Department of Computer Science, Binyaminu Usman Polytechnic, Hadejia Jigawa, Nigeria.

Abstract – The severe acute respiratory syndrome coronavirus 2 (SARSCoV2) outbreak has developed a major public health concern, particularly in northern hemisphere countries. The novel COVID-19 pandemic that broke out in 2019 presented obstacles to the scientific community and healthcare providers. The disparities across Africa highlight the value of assessment that go further than a continent- wide case number, which can distort the true situation on the ground. We wanted to look at epidemiology. In this review using data on confirmed cases and deaths, we attempt to assess the COVID-19 situation in Nigeria and Niger. We also contrasted the patterns of disease transmission and death. The main objective of this research is to address: How do the two countries relate in terms of COVID-19 distribution and mortality. The World Health Organization database, which updates data on the global number of confirmed cases and deaths for the Covid-19 pandemic on a regular basis, was used to get the reported numbers of cases and deaths between the two countries. A Descriptive statistics were used to analyze the average daily reported Covid-19 cases and death and annual cumulative cases and death between the two countries under study. Bivariate

correlation analysis was conducted to assess the measure of direction and strength of association that exists between daily new cases and daily new death and also assess the same in terms of annual cumulative cases and death from 1st April, 2020 to 31st March 2021. In Nigeria, the COVID-19 spread pattern was similar to that of Niger. The daily deaths and cases distribution in Niger resembled those of Nigeria, so on daily basis in Niger they record 13.65 covid-19 cases on average while Nigeria on average in daily basis they record 445.62 new cases of Covid-19. Then for the new death in Niger the average death on daily basis stand to be 0.50 compare to Nigeria on average which has 5.63 reported new death on daily basis. So for the bivariate correlation result, the results analyzed show that the correlation of new cases and new death of Niger was found to be moderately positive and statistically significance ($r = .767, P < 0.01$) while the correlation between the new cases and new death for Nigeria is also moderately positive and statistically significance ($r = .472, P < 0.01$), this show an increase in new cases would lead to a higher death in both countries, at both instance the correlation is stronger in Niger than in Nigeria. Covid-19 Monitoring mechanisms must be improved, and the covid-19 prescribed protocols



must be strictly followed. To prevent a third wave of the covid-19 pandemic, to provide medication for active cases, a contingency plan is needed.

Keywords – COVID-19, Nigeria, Niger, Pandemic, Epidemiology, Outbreak, Correlation

I. INTRODUCTION

The severe acute respiratory syndrome coronavirus 2 (SARSCoV2) outbreak has become a major public health concern, particularly in northern hemisphere countries. The novel COVID-19 pandemic that broke out in 2019 presented obstacles to the scientific community and healthcare providers [1].

The COVID-19, novel coronavirus, was first discovered in the beginning of December 2019 [2]. [There have been records of clusters of cases of pneumonia of unknown origin linked to the Huan an Animal wholesale food industry [3]. The Chinese Ministry of health announced a few days later that the disease was caused by a new novel Corona Virus known as 2019nCoV which has 70% similarities to the human- derived SARS-CoV and 88% similarity to the influenza a virus [4].

The African continent's demography, geography, culture, economy, community, politics, language, diseases and social justice patterns are all marked by diversity. These disparities can be seen at the regional, national, and subnational levels, and they apply to areas including health systems, social services and realization of international Health Regulation capacity; these factors influence each country's response to the covid-19 pandemic. The disparities across Africa highlight the value of assessment that go beyond a continent- wide case number, which can distort the true situation on the ground. We wanted to look at epidemiology.

On February 27, 2020, the first case was confirmed in Nigeria [5], and by day (April 9, 2021), the total number of cases had risen to 163581 and 2058 death across the country. In comparison to other African countries and countries with similar population with Nigeria and Niger, the COVID-19 testing rate has been very poor at the beginning of the pandemic this has been due to delays in kit and reagent supplies during the border closures, though the Nigerian Centre for Disease Control (NCDC) claims that strict adherences to COVID-19 protocol and guidance is partly to blame for the low numbers but both countries records a significance improvement later.

However, the number of testing centers has grown, and COVID-19 testing capacity has greatly improved across the world. Nigeria and Niger has a shaky health-care system. As the number of regular cases continued to be detected across the country, the prevention measures put in place to stop COVID-19 from spreading across the country appeared inadequate. Infectious diseases will be difficult to control in heavily populated cities and towns.

COVID-19 is currently establishing a presence in impoverished, war-torn, and least developed countries (LDCs). Niger, West Africa's largest country, is an LDC with a fragile economy, low literacy, poor infrastructure, and limited access to health care. Armed attacks and kidnappings are a major threat to Niger right now, exacerbating the country's health crisis [6].

The first COVID-19 case in Niger was confirmed on March 19, 2020, by a 36 years old Nigerian warehouseman who worked for a passage company and traveled overseas. Following that, the COVID-19 quickly spread across the country. The migratory population boosted cross-national and cross-region transmission even further. Given the social, economic, cultural, and religious realities in Niger, the epidemiological situation of COVID-19 was complicated, and by day (April 9, 2021), the total number of cases had risen to 5052 and 188 death across the country [6].

In November 2020, the second wave of infections started in Niger. Between November and February 8, 3405 cases were reported, accounting for 74% of the total number of cases so far [7]. Following a spike, COVID-19 cases in Niger have decreased in recent months. Cases are currently declining, with cumulative weekly cases dropping from 1.8 cases per 100,000 people to 0.43 cases per 100,000 people.

COVID-19 denial is a problem for Nigeria and Niger, as it is for many countries in the sub-region. As a result, preventive steps aren't followed as closely as they should be. In this study we attempt to assess the COVID-19 situation in Nigeria and Niger using data on reported cases and deaths. We also contrasted the patterns of disease transmission and death. As a result, a research questions were addressed: How do the two countries relate in terms of COVID-19 distribution and mortality.

II. RESEARCH HYPOTHESIS

The Null Hypothesis (H_0): There is no significance association in terms of Covid-19 distribution and mortality.

The Alternative Hypothesis (H_a): There is no significance association in terms of Covid-19 distribution and mortality.

III. MATERIALS AND METHODS

A. Study design and data sources

For our search to be comprehensive, we began our quest by searching the World Health Organization database, which contains research papers on COVID-19, SARS, and related diseases. Reported numbers of cases and death between the two countries were obtained from the World Health Organization database, where data on the global number of confirmed deaths and cases for the COVID-19 pandemic is



updated daily. We used data of two countries (Nigeria and Niger) with a total number of cases exceeding 5052 for Niger and 163281 for Nigeria as of April 9, 2021. Numbers of reported cases and deaths between 01 April 2020 and 31st March 2021 were compared between the two countries.

B. Statistical analysis

A descriptive analysis and bivariate correlation study design involving a retrospective analysis of records of all the covid-19 cases and death in the World Health Organization database was carried out for the period of 1st April, 2020 – 31st May 2021 which is exactly one year. The database had 5002 and 162762 cases and 186 and 2056 death for Niger and Nigeria respectively. For this time frame and all the cases and death were included in the study.

IV. RESULTS AND DISCUSSION

Descriptive statistics were used to analyze the average daily reported Covid-19 cases and death, so on daily basis in Niger they record 13.65 covid-19 cases on average while Nigeria on average in daily basis they record 445.62 new cases of Covid-19 as you can see from table 1. Then for the new death if we analyzed for Niger the average death on daily basis stand to be 0.50 compare to Nigeria which has 5.63 reported new death on daily basis.

Table 1 – Descriptive cross-tabulations table

COUNTRY		Statistics	Std. Error
New_Cases Niger	Mean	13.65	2.398
New_cases Nigeria		445.62	23.284
New_Death Niger	Mean	0.50	.82
New_Death Nigeria		5.63	.318

A. Bivariate Correlation Analysis

Table 2: Show the measure of strength and direction of association that exists between new cases and new death of Niger.

Table 2 – Correlations Table for Niger

		New cases	New deaths
New_cases	Pearson Correlation	1	.767**
	Sig. (2-tailed)		.000
	N	365	365
New_deaths	Pearson Correlation	.767**	1
	Sig. (2-tailed)	.000	
	N	365	365

** . Correlation is significant at the 0.01 level (2-tailed).

a. Country = Niger

Table 3: Show the measure of strength and direction of association that exists between new cases and new death of Nigeria.

Table 3 – Correlations table for Nigeria

		New cases	New deaths
New_cases	Pearson Correlation	1	.472**
	Sig. (2-tailed)		.000
	N	365	365
New_deaths	Pearson Correlation	.472**	1
	Sig. (2-tailed)	.000	
	N	365	365

** . Correlation is significant at the 0.01 level (2-tailed).

a. Country = Nigeria

The result from table 2 and table 3 show the bivariate correlation analysis result of new- cases and new death from reported data of 1st April 2020 to 31st May, 2021 for Niger and Nigeria. The mean average daily cases for Niger stand to be 13.65 the same reported value with an explore table. The results analyzed show that the correlation of new cases and new death of Niger was found to be moderately positive and statistically significance ($r = .767$, $P < 0.01$) this show an increase in new cases would lead to a higher death.

For Nigeria which has the mean average of daily reported new cases of 445.62 also the same with an explore table, the correlation between the new cases and new death for Nigeria is moderately positive and statistically significance ($r = .472$, $P < 0.01$) this is also that, an increase in new cases would lead to a higher death. For both the two countries and at both instance the correlation is stronger in Niger than in Nigeria.

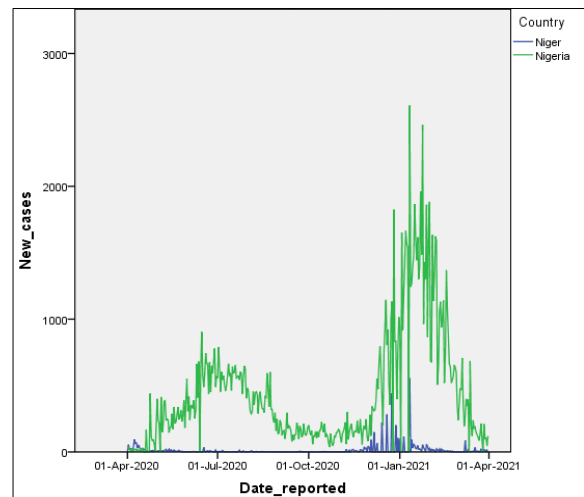


Fig. 1. Comparison of the distribution of Covid-19 new cases between Nigeria and Niger

From the graph Niger is represented by a blue line while Nigeria is represented by a green line. As you can see from the graph the cases for Nigeria are more than that of Niger and the distribution of both countries looks similar in terms of



reported cases. Also by assessing the graph, the time cases increases in Niger it was the same time cases increases in Nigeria. Around 1st June, 2020 cases were increases in both countries coming to October 2020 were the cases are drastically reduce.

The second wave of covid-19 pandemic begins on January, 2021, around this period the cases sore there was a significance increase of cases but coming to February and march the cases was significantly reduce and in April, 2020 the cases also was dropping for both Niger and Nigeria. This show that the cases for the two countries are moderately correlated in terms of cases.

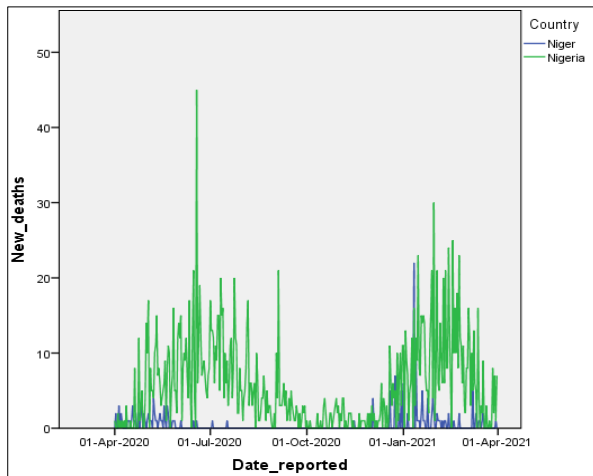


Fig. 2. Comparison of the distribution of Covid-19 new deaths between Nigeria and Niger

From the above graph we can notice that as the death increases in Nigeria equally in some period it also increases in Niger but not in all period. As you can see from the above graph also the new death increases around June 2020 for both the countries, but around July, 2020 Nigeria experience higher increases in reporting new death while Niger experience or reported more new death around August 2020. In January, 2021 the second wave of covid-19 started the two countries reported more number of new death which start to drop around March, 2021. Table 4. Show the Annual cumulative cases and death from 1st April, 2020 to 31st may, 2021

Table 4 – Descriptive cross-tabulations table

COUNTRY		Statistics	Std. Error
Cumulative_Cases Niger	Mean	1986.71	78.844
Cumulative_cases Nigeria		64410.95	2566.144
Cumulative_Death Niger	Mean	86.18	2.442
Cumulative_Death Nigeria		1003.33	29.846

From table 4 the results show that the annual cumulative reported cases with the mean of annual cumulative cases for Niger on average as 1986.71 compare to Nigeria with annual

cumulative mean of cases as 64410.62 on average which is per more than the mean cumulative cases of Niger on average.

Then for the annual cumulative death on average for Niger is 86.18 number of death within the time we are reviewing compare to Nigeria which has the mean cumulative deaths on average of 1003.33. Going by the results of the cumulative death we will notice that there is high discrepancies' when we compared the two results, Nigeria has more death than Niger on average.

Table 5: Show the measure of strength and direction of association that exists between cumulative cases and cumulative death of Niger.

Table 5 – Correlations of cumulative cases and death for Niger

		Cumulative cases	Cumulative deaths
Cumulative cases	Pearson Correlation	1	.970**
	Sig. (2-tailed)		.000
	N	365	365
Cumulative deaths	Pearson Correlation	.970**	1
	Sig. (2-tailed)	.000	
	N	365	365

**. Correlation is significant at the 0.01 level (2-tailed).

a. Country = Niger

Table 5 above show the bivariate correlation analysis results for the average annual cumulative cases and death of Niger Republic for the period under study which is 1st April, 2020 to 31st March, 2021. The results indicate that there is strong positive correlation between the cumulative number of cases and that of death and also the result show that is statistically significance ($r = .970$, $p < 0.01$). This indicate that the cumulative cases has an influence on the cumulative death in Niger.

Table 6: Show the measure of strength and direction of association that exists between cumulative cases and cumulative death of Nigeria.

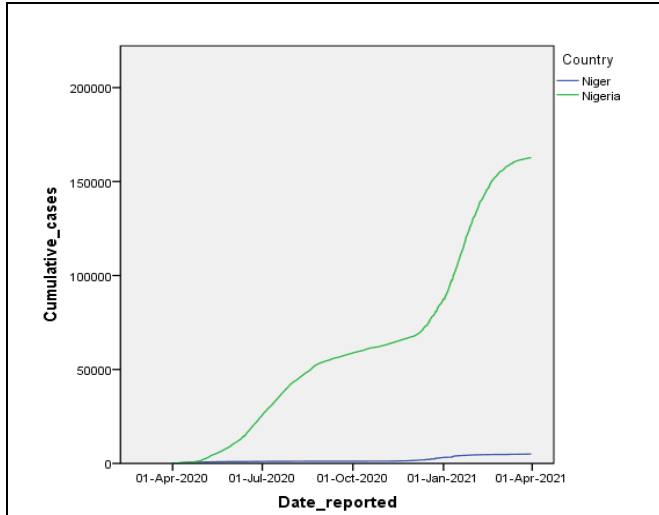
Table 6 – Correlations of cumulative cases and death for Nigeria

		Cumulative cases	Cumulative deaths
Cumulative cases	Pearson Correlation	1	.966**
	Sig. (2-tailed)		.000
	N	365	365
Cumulative deaths	Pearson Correlation	.966**	1
	Sig. (2-tailed)	.000	
	N	365	365

**. Correlation is significant at the 0.01 level (2-tailed).

a. Country = Nigeria

While table 6 above show the bivariate correlation results for the average annual cumulative cases and death for Nigeria. The results indicate that there is strong positive correlation between cases and death from the period under review and is statistically significance ($r = .966$, $P < 0.01$). This is also indicate that the cumulative cases has an influence on the cumulative death in Nigeria.



The above graph show the annual cumulative distribution of cases between the two countries under study that is from 1st April, 2020 to 31st of March, 2021. Around April down to August 2020 there was a steady increase of cases in both Nigeria and Niger, but after a while the distribution of cases was drastically reduce in both countries around October to December 2020. There was a drastic increase in cases from January 2021 upward that is around the time that the second wave resurface but the mortality drop in march, 2021, this show that there is significance association between the number of cases in Nigeria and that of Niger republic and also the pattern of Nigeria's cumulative daily confirmed cases aligned with cumulative daily confirmed cases in Niger.

Fig. 3. Distribution of the annual cumulative cases between Nigeria and Niger

The above graph show the annual cumulative distribution of deaths between the two countries under study that is from 1st April, 2020 to 31st of March, 2021. Around April down to August 2020 there was a steady increase of deaths in both Nigeria and Niger, but after a while the distribution of deaths

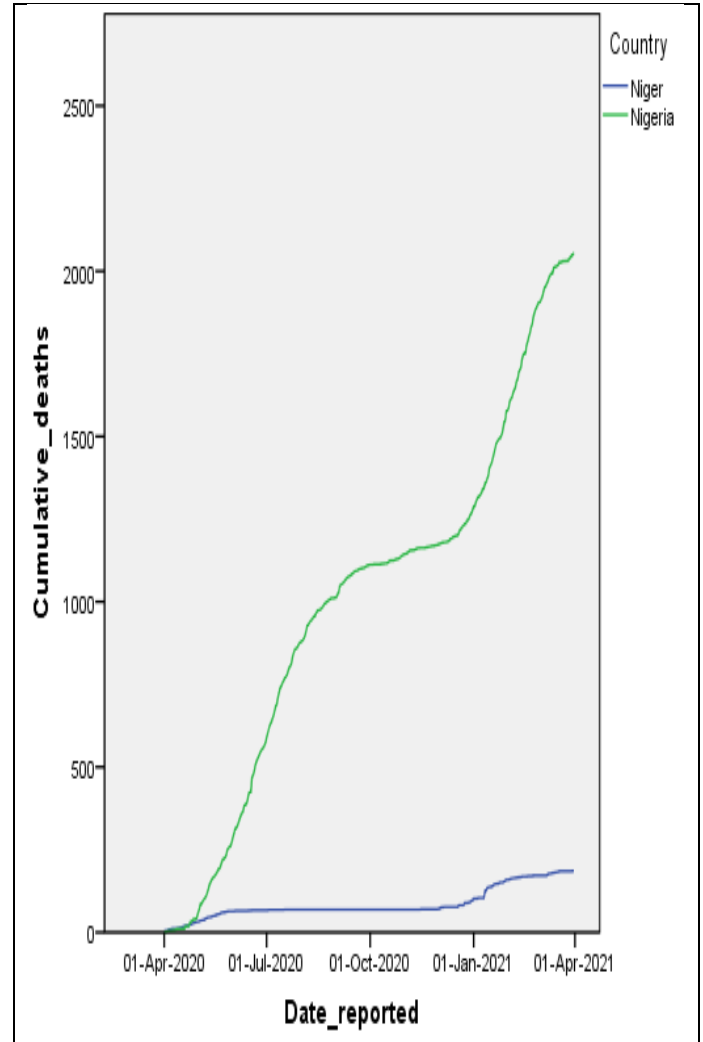


Fig. 4. Distribution of the annual cumulative deaths between Nigeria and Niger

was drastically reduce in both countries around October to December 2020. There was a drastic increase in deaths from January 2021 upward that is around the time that the second wave resurface but the mortality drop in march, 2021, this show that there is significance association between the number of death in Nigeria and that of Niger republic and also the pattern of Nigeria's cumulative daily confirmed deaths aligned with cumulative daily confirmed deaths in Niger.

Table 6 – This table shows the correlation between the two countries

		Niger_New_cases	Niger_New_deaths	Nigeria_New_Cases	Nigeria_New_Death
Niger_New_cases	Pearson Correlation	1	.767**	.289**	.068
	Sig. (2-tailed)		.000	.000	.197
	N	365	365	365	365
Niger_New_deaths	Pearson Correlation	.767**	1	.324**	.176**
	Sig. (2-tailed)	.000		.000	.001
	N	365	365	365	365



Nigeria_New_Cases	Pearson Correlation	.289**	.324**	1	.472**
	Sig. (2-tailed)	.000	.000		.000
	N	365	365	365	365
Nigeria_New_Death	Pearson Correlation	.068	.176**	.472**	1
	Sig. (2-tailed)	.197	.001	.000	
	N	365	365	365	365

** . Correlation is significant at the 0.01 level (2-tailed).

Table 1-6 shows the correlation and distribution of new cases and new death and also cumulative cases and cumulative death but in this table 7 we compare the correlations of two countries in terms of new cases and new death and see whether a new cases for Nigeria will influence a new cases in Niger and the same thing for the new death for Nigeria will have an impact or great influence on new death for Niger.

From the above table we can notice that new cases for Nigeria is correlated with new cases in Niger with correlation value as .289 but this show a weak correlation this means that a cases in Nigeria does not have a great influence in new cases in Niger by looking at the correlation, then for the new cases in Niger and new death in Nigeria they are correlated at .068 but as you can see the correlations is extremely weak, so we can say an increase in cases in Niger does not determine the death cases in Nigeria. Is also reported in the correlation table that new death in Niger is moderately correlated with new cases in Nigeria with correlation value as .324 but an increase in new death in Niger does not have a great impact on new death for Nigeria because the correlation is weak which is .176, in conclusion the measures of association is exists between new cases and new death in Nigeria with the new cases and new death in Niger.

V. CONCLUSIONS

Covid-19 Monitoring mechanisms must be improved, and the covid-19 prescribed protocols must be strictly followed. To prevent a third wave of the covid-19 pandemic, a provision of medication for active cases and contingency plan is needed. The measure of association is exists between new cases and new death in Nigeria and the new cases and new death in Niger while cumulative cases and cumulative death of Nigeria and that of cumulative cases and cumulative death of Niger are all correlated. Lastly the correlations between the two countries in terms of new cases and new death show that a new cases in Nigeria does not have a great influence in new cases in Niger, then for the new cases in Niger and new death in Nigeria they are correlated but the correlations is extremely weak, so we can say an increase in cases in Niger does not determine the death cases in Nigeria, likewise new death in Niger is moderately correlated with new cases in Nigeria but an increase in new death in Niger does not have a great impact on new death for Nigeria because the correlation is weak.

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