Relationship Between the Standard of Living, Economic Situation, and Security Situation of Nigerians During The Covid-19 Pandemic. A Non-Parametric Analysis Approach

A. F. Adedotun, O. P. Ogundile, G. O. Odekina and I. V. Okafor*

Department of Mathematics, Covenant University, Ota, Ogun state, Nigeria

Abstract: The Covid-19 pandemic has crippled the economic activities of so many nations across the globe since its outbreak in 2019. This study is focused on the resultant effect of the covid-19 pandemic in terms of standard of living, perception of economic and security situation of Nigerians. This study used a non-parametric approach involving Spearman rank correlation and Mann-Whitney U to analyze primary data acquired from NoiPolls' online administration of questionnaires during the Covid-19.

The result obtained from this study depicts that there is a significant relationship between the security situation and perception of the country's economic situation. The standard of living of Nigerians was studied alongside their perception of the economic situation and we observed that there is a significant relationship between these two.

This was also examined based on gender, the Mann-Whitney U test was used to check if there exists any form of difference between males and females based on the security situation, economic perception, and standard of living. The test result showed that there is no significant difference in the standard of living of both males and females but significant differences were observed in the economic perception and security situations.

A bar chart was further used to visually assess these differences where it is seen that females feel more secure compared to males and females feel less satisfied with the country's economic situation compared to the males.

Keywords: Statistics,Non-parametric analysis, Security, Nigeria and COVID-19

1 Introduction

One of the infectious diseases that has challenged global leaders is Coronavirus Disease 2019 (COVID-19). The COVID-19 pandemic has affected economies, individuals, and societies of the world in every respect. The upsurge in numbers of cases and deaths continued lockdowns, restrictions on public social life, and an economic downturn of all sorts, are likely to affect the personal well-being and mental health of all individuals negatively.

COVID-19 has a multifaceted impact on the lives and livelihood of the people. The first known case of the virus in Nigeria was documented on the 27th of February 2020 and since then the number of confirmed cases has been on the increase [1,2]. The epidemiological pattern of the COVID-19 virus suggested an incubation period of five to fourteen days [3,4], with a recent report suggesting a twenty-four days incubation period [5].

An infected Italian citizen brought the coronavirus to Nigeria and he came in contact with a Nigerian citizen who was then infected with the virus. The virus then spread to other citizens/non-citizens of the country in Lagos and other parts of the country at large. As of 10th July 2020, the number of reported cases in Nigeria soared to 31,323 confirmed cases of COVID-19 and 709 related deaths [6]. A study by [7] examined the Covid-19 incidence rate in Nigeria with the Vector Autoregressive model where it was posited that there will be a constant rise in the number of infections and deaths across

* Corresponding author e-mail: adedayo.adedotun@covenantuniversity.edu.ng

the country based on the forecast made. An extension of this study was made in [8] which focused on the third wave of Covid-19 incidence rate in Nigeria where an increasing trend in the number of deaths was observed but with a slight decrease in the number of infections.

This study offers a new suggestion by mapping the determinants of the self-reported level of satisfaction/ dissatisfaction in terms of standard of living, economic situation (perceived), and security situation in Nigeria during the COVID-19 pandemic from January 2020 and April 2021.

Using data from a web survey by NoiPolls, this research aims at studying the relationship between the standard of living, economic situation, and security situation of Nigerians during the covid-19 pandemic using a non-parametric analysis approach based on gender.

The study of standard of living and personal economic situation based on the perspective of the general populace will enable us to know how well Nigerians lived in terms of their living standard considering the economic situation during the early stage of the pandemic. This study also examined the gender perspective to enable us to know if a particular gender group was at the receiving end during the pandemic. In addition to the above, the personal economic, and security perspectives of Nigerians during the pandemic will be examined simultaneously based on gender. A nonparametric approach was adopted due to the nature of the data used for the study; the data used for the study are ordinal and nominal which violates the assumptions of the parametric analysis.

This will enable us to know if the economic situation during the pandemic has any significant impact on the security situation in the country. The result obtained from this research will be of immense importance to policymakers and the government in general because it will enable them to know areas that require urgent attention to their tax incentive types.

Fig. 1: Theoretical Framework

2 Materials and MethodS

2.1 Data source

The data used for this study is primary data obtained through the administration of questionnaires online by NoiPolls. The methodology used for this paper is given below;

2.2 Spearman Rank Correlation

The spearman rank correlation coefficient which is a non-parametric statistic involves the ranking of the bivariate data set and in cases where there are ties, the average of the rank is taken. Spearman rank correlation coefficient takes values from

-1 to +1. The Spearman rank correlation coefficient enables us to assess the degree of relationship between two variables. The spearman rank correlation coefficient denoted r is defined as;

$$r = 1 - \frac{6\Sigma d^2}{n(n^2 - 1)} \tag{2.1}$$

Where d is the difference between the pair of ranks and n is the sample size

2.3 Mann-Whitney U

This is a non-parametric alternative to t-test. The Mann-Whitney U test is used to test if there is a difference between two independent groups. The test involves combining all sample values in an array from the smallest to the largest, the assigning ranks to them. If there are ties, the average of the ranks will be assigned. After this has been done, the sum of the ranks are obtained The test statistic for the Mann-Whitney U usually denoted U is given as;

$$U = N_1 N_2 + \frac{N_1 N_2}{2} - R_i \tag{2.2}$$

corresponding to sample I. The sampling distribution of U is symmetrical with a mean and variance are given respectively by

$$\mu U = \frac{N_1 N_2}{2} \tag{2.3}$$

$$\mu U^2 = \frac{N_1 N_2 (N_1 + N_2 + 1)}{2} \tag{2.4}$$

Where N_1 is the total is number of observations in the first sample and N_2 is the total observations in the second sample.

3 Data Analysis and Interpretation

3.1 Correlation coefficient

Table 1 below gives the correlation coefficients of the standard of living and economic situation, security situation, and economic situation which are our variables of interest.

Table 1: Spearman Correlation Coefficient

			Economic situation
Spearman's rho	Standard of living	Correlation Coefficient	.490**
		Sig. (2-tailed)	.000
		N	1079
	Security situation	Correlation Coefficient	.261**
		Sig. (2-tailed)	.000
		N	1079

From the table, it is seen that standard of living has a significant relationship with the economic situation at a 0.05 level of significance with a correlation coefficient of 0.490. Though this value is fairly weak, it depicts that the economic situation has an impact on the standard of living of Nigerians.
The relationship between security situation and economic situation was also observed to be significant at a 0.05 level of significance with a correlation coefficient of 0.261.
This is also a weak positive relationship but it doesn't over-rule the fact that the economic situation of Nigeria influences her security situation. The asterisks on the correlation coefficients indicate that the relationship is significant.

A comparative study of these results based on gender was further examined. The results obtained are presented in table 2. From table 2, it can be observed that males have a significant relationship between standard of living and

Table 2: Spearman Correlation Coefficient

		Gender		Economic situation
Spearman's rho	Male	Standard of living	Correlation Coefficient	.472**
			Sig. (2-tailed)	.000
			N	566
		Security situation	Correlation Coefficient	.225**
			Sig. (2-tailed)	.000
			N	566
	Female	Standard of living	Correlation Coefficient	.512**
			Sig. (2-tailed)	.000
			N	513
		Security situation	Correlation Coefficient	.315**
			Sig. (2-tailed)	.000
			N	513

economic situation at 0.05 level of significance with a correlation coefficient of 0.472 and also a significant relationship between the security situation of the country and economic situation with a correlation coefficient of 0.225.

The results obtained are similar to that of the females. Though the females depict a more linear relationship between standard of living and economic situation with a correlation coefficient of 0.512. The asterisks on the correlation coefficients indicate that the relationship is significant.

4 Mann-Whitney U

Table 3: Rank

	Gender	N	Mean Rank	Sum of Ranks
Standard of living	Male	566	538.12	304576.00
	Female	513	542.07	278084.00
	Total	1079		
Security situation	Male	566	520.05	294348.00
	Female	513	562.01	288312.00
	Total	1079		
Economic situation	Male	566	557.66	315638.00
	Female	513	520.51	267022.00
	Total	1079		

Table 3 below shows the average ranks obtained for each gender category under three different conditions which are security situation, the standard of living, and economic situation.

Table 4: Test Statistics

	Standard of living	Security situation	Economic situation
Mann-Whitney U	144115.000	133887.000	135181.000
Asymp. Sig. (2-tailed)	.833	.026	.047

Grouping variable: Gender

Table 4 above gives the Mann-Whitney U test which enables us to assess if there exists any significant difference between the male and female standard of living, security situation, and economic situation. The result shows that there is no significant difference between the male and female standard of living, however, there is a significant difference between the security situation and economic situation of males and females at 0.05 level of significance.

This result is further supported by the charts. The standard of living bar chart indicates not much difference between males

and females, but there are differences in the perception of Nigeria's economic situation and security situation of males and females.
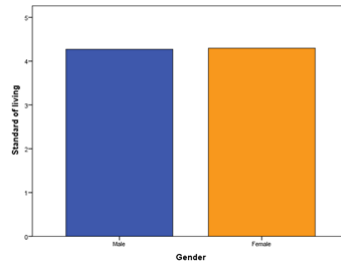

Fig. 2: Standard of living chart

Figure 2 above depicts not much difference in the standard of living of males and females. This is also evident in the test statistics given in table 4
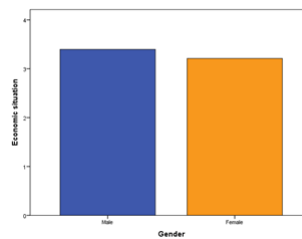

Fig. 3: Economic perception Chart

Figure 3 above shows some degree of difference in the economic perception of males and females. This is also evident in the test statistics presented in table 4
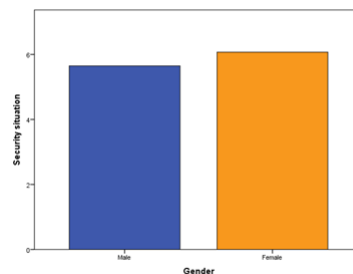

Fig. 4: Security situation chart

Figure 4 above also shows some level difference in the perception of the country's security situation of males and females. This is also evident in the test statistics given in table 4

5 Conclusion and Recommendation

The result obtained from this study depicts that there is a significant relationship between the security situation and perception of the country's economic situation. The standard of living of Nigerians was studied alongside their perception of the economic situation and we observed that there is a significant relationship between these two. This was also examined based on gender, the Mann-Whitney U test was used to check if there exists any form of difference between males and females based on the security situation, economic perception, and standard of living.
The test result showed that there is no significant difference in the standard of living of both males and females. Though significant differences are observed in the economic perception and security situation. A bar chart was further used to visually assess these differences where it is seen that females feel more secure compared to males and females feel less satisfied with the country's economic situation compared to the males.

From the results obtained, it can be concluded that the economic situation of Nigeria has a great influence on Nigerians' standard of living and security situation. From these observations, we make the following recommendations; (1) efforts should be made by the government towards improving the economic situation of the country as this can lead to an improved standard of living for Nigerians. (2) Effort should also be made by the government towards improving the security situation in the country as improvement in the country's economic situation has a direct impact on the security situation. (3) Since the men are more at the receiving end of insecurity based on the result obtained, the government should create a proper awareness program on insecurity and self-defense.

Acknowledgement

6 References

[1] J.O. Bamidele and O. J. Daniel, Epidemiology of Coronavirus Disease (COVID-19) in Nigeria. Annals of Health Research, 6 (2), 125-132, 2020.

[2] A. I. Taiwo, A. F. Adedotun, and T.O. Olatayo. Nigerian COVID-19 Incidence Modeling and Forecasting with Univariate Time Series Model. International Series in Operations Research & Management Science book series (ISOR),320, 137-150, 2022.

[3] C. Del Rio and P.N. Malani. COVID-19-new insights on a rapidly changing epidemic. JAMA, 323(14): 1339-1340,2020.

[4] Q. Li, X. Guan, P. Wu, X. Wang, L. Zhou and Y Tong. Early transmission dynamics in Wuhan, China, of novel coronavirus infected pneumonia. N Engl J Med, 382(13), 1199-12072020.

[5] Y. Bai, L. Yao,T. Wei,F. Tian , D.Y. Jin and L. Chen. Presumed asymptomatic carrier transmission of COVID-19. JAMA,323(14):1406-1407,2020.

[6] Nigeria Center for Disease Control. COVID-19 Nigeria. 2020. Available at: https://ncdc.gov.ng/diseases/sitreps/?cat=14 & update of COVID-19 outbreak in Nigeria. Accessed April 10 – July 12, 2020.

[7] G. O. Odekina, A. F. Adedotun and O. A. Odusanya. International Journal of Design, Nature and Ecodynamics.Vol 16, 665-669,2021.

[8] G.O. Odekina, A.F.Adedotun and O. F.Imaga. Modelling and Forecasting the third wave of Covid-19 Incidence Rate in Nigeria Using Vector Autoregressive Model Approach. Journal of the Nigerian Society of Physical Sciences, 4, 117–122, 2022.