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STATISTICAL ANALYSIS ON THE RELATIONSHIP OF DEATH CONFIRMED AND DISCHARGED CASES OF CORONA VIRUS IN THE NORTHERN REGION OF NIGERIA

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ABSTRACT

This study investigated the association between the covid-19 dependent variable (death case) and the covid-19 explanatory variable (confirmed and discharged cases) in the three northern Nigerian regions. The analysis employed multiple regression, and at the 5% level of significance, there is a significant correlation between mortality, confirmed, and discharged cases for each of the three regions. The results of the additional significance test for the t-test showed that there is no evidence of a relationship between confirmed cases in the north east and north west regions and discharged cases in the north central region and dependent variable death cases, but there is evidence of a relationship between discharged cases and dependent variable death cases for the north east and north west regions as well as for north central confirmed cases. Additionally, it is advised that

KEYWORDS: covid- 19, dependent variable, explanatory variable, relationship, significance

INTRODUCTION

The World Health Organization termed the 2019 corona virus disease pandemic COVID 19, which is caused by the SARS-CoV-2 virus and was first identified in December 2019 in Wuhan, the capital of Hubei Province, China. In the province of Badu, it first appeared as a type of pneumonia. (2020), Cough, fever, breathing difficulties, and loss of smell are common covid 19 and cold symptoms. The first patient with the COVID 19 system, an Italian, was found by the Nigerian Centers for Disease Control in 2020, and as of Onyeji, the Federal Government of Nigeria has prohibited foreign commercial flights to Nigeria (2020).

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Before quarantine restrictions were extended to non-essential services, educational and religious organizations were the first to place restrictions on them (Onyeji, 2020). Noo(2021) discussed the steps taken to contain the COVID-19 epidemic as well as public adherence to and disregard for those steps. According to the patient's health, there are problems that go beyond the symptoms and cause pneumonia, viral sepsis, acute respiratory distress syndrome, and are thought to get worse with time Sohrabi 2020. The virus spreads through close human contact rather than through the air. Therefore. The best way to prevent the spread of this disease is to keep a safe distance from infected people, wash your hands frequently, and clean any surfaces that could be contaminated. However, identifying an infected person without testing is challenging. Increased travel was a significant contributor to the virus's global spread because travelers spread it due to the modernization of transportation networks; therefore, interstate travel was banned as a suitable containment measure. AbdulAzeez (2020).

Three groups of silent carriers with an increased prevalence were mentioned by Lauer (2020), and they are

• Asymptomatic: Those who have an active infection in their bodies but do not exhibit symptoms.

• Presymptomatic: A person who has been infected with the virus and is going through the incubation phase does not yet exhibit any symptoms.

• Very minor symptoms: people with the COVID-19 infection feel a little queasy after being in close contact with others.

1.1 Aim and Objectives:

The aim of this study is to examine and compare the status of the covid-19 cases across Northern region in Nigeria. The objectives are as follow

i. to check the trend of the confirmed, discharged and fatality cases in the Northern region.
ii. to check if there exist a significant relationship between confirmed discharged and death cases in the region.

This research project is limited to covid-19 cases occurred in year 2021across the six regions of Nigeria and it is aimed to know the status of covid-19 cases across the six geo-political regions of the country

1.2 METHOD OF DATA COLLECTION

The data used in the research work is a secondary data and it was obtained from the Nigeria. Centre for Disease Control (NCDC) COVID-19 Situation Report official page (covid19.ncdc.gov.ng).

2.0 MATERIAL AND METHOD

Multiple regression analysis is a statistical technique that analyzed the relationship between two or more

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independent variables and uses the information to estimate the value of the dependent variable.
General linear model.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots\ldots + \beta_k X_k + U_i$$

Table 1: North-East and North-West COVID-19 data from January to December, 2021

week	NORTH EAST			NORTH-WEST		
	Confirmed	Discharged	Fatality	Confirmed	Discharged	Fatality
1	540	206	2	789	1155	10
2	188	349	7	719	677	6
3	240	246	2	1446	1056	4
4	279	245	5	747	1049	10
5	481	280	1	570	889	13
6	413	442	5	578	582	4
7	268	200	3	449	566	11
8	187	303	2	318	471	5
9	352	381	3	348	282	14
10	228	122	0	193	325	6
11	65	72	1	124	264	5
12	169	268	1	77	105	4
13	37	1	0	83	76	0
14	48	39	0	52	74	0
15	0	0	0	45	39	0
16	97	134	0	36	63	0
17	60	24	0	29	24	0
18	40	832	2	14	36	0
19	33	16	0	3	20	0
20	8	0	0	25	28	0
26	28	32	0	13	10	0
27	17	13	0	7	22	0
28	13	23	0	2	0	0
29	2	8	0	17	3	0
32	63	55	0	4	32	0
33	43	12	0	18	7	0

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34	9	40	0	40	64	0
35	43	5	0	173	73	1
36	90	48	0	113	89	1
37	75	119	1	88	129	4
38	59	35	1	194	186	2
39	58	41	3	126	53	2
40	90	45	1	181	185	3
41	49	59	5	149	194	4
42	160	147	7	176	140	1
43	83	94	3	81	94	1
44	181	179	4	183	151	4
45	15	30	1	150	94	3
46	51	45	2	71	106	1
47	25	48	0	84	76	1
48	35	15	0	16	21	1
49	9	41	0	28	79	0
50	50	0	0	167	109	0
51	228	29	0	306	87	5
52	97	252	7	280	197	1

Table 2: North Central COVID-19 data from January to December, 2021

NORTH-CENTRAL		
Confirmed	Discharged	Fatality
2545	926	11
2536	4028	14
2517	985	14
2100	814	12
1980	1180	7
1822	687	12
974	711	4
519	556	8
280	432	8
261	3821	5
212	470	1
68	1209	1

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94	1041	8
120	1522	0
42	19	1
23	6	1
32	258	0
27	8	0
37	21	0
13	2	0
13	347	0
22	0	0
25	167	0
21	22	0
181	70	3
303	95	3
354	168	3
366	328	7
369	86	2
437	690	6
708	254	3
545	234	9
640	287	16
675	270	5
387	84	12
356	207	5
184	316	2
166	1330	1
94	446	2
115	505	1
94	49	1
262	49	0
1176	194	0
2273	270	8
799	903	3

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2.1 North-East

Hypothesis Statement

H_0: There exists no significant relationship between the death, confirmed and discharged cases in the north-east region of the country

H_1: There exists a significant relationship between the death, confirmed and discharged cases in the north-east region of the country

Level of significance, $\alpha = 0.05$

Table 3: Analysis of Variance for North-East Region

Source	SS	DF	MS	Prob > F
Model	54.0778	2	27.0389	0.0011
Residual	141.1221	42	3.3601	
Total	195.1999	44		

Decision rule: Reject H_0 if P-value $\leq$ α-value otherwise, we do not reject H_0

Conclusion**:** since the p-value 0.0011 < α-value 0.05, H_0 is rejected and concluded that there exists a significant relationship between the death, confirmed and discharged cases in the north-east region of the country at 5% level of significant.

2.2 Test of Significance for Individual Regression

Since it is concluded that there exist relationship between death, confirmed and discharged cases, therefore a t test for significance of each slope parameter β is important to know whether the prefer variable has explanatory power with respect to dependent variable and conducted by using p-value with respect to level of significance to take decision.

Table 4: Test of Significance for Individual Regression North-East Region

Death	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]		R-squared	Adj R-squared
Confirmed	.0030159	.0024668	1.22	0.228	-.0019623	.0079942	0.2770	0.2426
Discharged	.0053713	.0020201	2.66	0.011	.0012945	.009448		

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_cons	.5122833	.3840262	1.33	0.189	-.2627129	1.28728

Model: $Y = 0.5122833 + 0.0030159X_1 + 0.0053713X_2$

Hypothesis

$H_0 : \beta_1 = 0$ versus $H_1 : \beta_1 \pm 0$

$H_0 : \beta_2 = 0$ versus $H_1 : \beta_2 \pm 0$

Level of significance = 0.05

Since p value (P>|t|) for confirmed cases is 0.228 greater than Level of significance $\alpha = 0.05$, therefore there is no reason to reject the null hypothesis of $\beta_1 = 0$, it means it is not significant and for discharged cases p value =0.011is less than Level of significance $\alpha = 0.05$, therefore null hypothesis of $\beta_2 = 0$ is rejected and concluded that it is significant

2.3 North-West

Hypothesis Statement

H_0: There exists no significant relationship between the death, confirmed and discharged cases in the north-west region of the country

H_1: There exists a significant relationship between the death, confirmed and discharged cases in the north-west region of the country.

Level of significance, $\alpha = 0.05$

Table 5: Analysis of Variance for North-West Region

Source	SS	Df	MS	Prob > F
Model	350.4356	2	175.2178	0.0001
Residual	254.1424	42	6.0510	
Total	604.5780	44		

Decision rule: Reject H_0 if P-value $\leq \alpha$-value otherwise, we do not reject H_0

Conclusion: since the p-value 0. 0.0001 < α-value 0.05, H_0 is rejected and conclude that there exists a significant relationship between the death, confirmed and discharged cases in the north-west region of the

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country at 5% level of significant

Table 6: Test of Significance for Individual Regression North-West Region

Death	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]		R-squared	Adj R-squared
confirmed	-.0055153	.0033069	-1.67	0.103	-.012189	.0011584	0.5796	0.5596
discharged	.0137899	.0030725	4.49	0.0001	.0075893	.0199904		
_cons	.9046217	.4601254	1.97	0.056	-.0239488	1.833192		

Model: $Y = 0.9046217 - 0.0055153X_1 + 0.0137899X_2$

Hypothesis

H_0: $\beta_1 = 0$ versus H_1: $\beta_1 \pm 0$

H_0: $\beta_2 = 0$ versus H_1: $\beta_2 \pm 0$

Level of significance = 0.05

Since p value (P>|t|) for confirmed cases is 0.103 greater than Level of significance $\alpha = 0.05$, therefore there is no reason to reject the null hypothesis of $\beta_1 = 0$, it means it is not significant and for discharged cases p value =0.0001is less than Level of significance $\alpha = 0.05$, therefore null hypothesis of $\beta_2 = 0$ is rejected and concluded that it is significant

2.4 North Central

Hypothesis Statement

H_0: There exists no significant relationship between the death, confirmed and discharged cases in the north central region of the country

H_1: There exists a significant relationship between the death, confirmed and discharged cases in the north central region of the country.

Level of significance, $\alpha = 0.05$

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Table 7: Analysis of Variance for North-Central Region

Source	SS	DF	MS	Prob > F
Model	472.7839	2	236.3920	0.0001
Residual	474.1939	42	11.2903	
Total	946.9778	44		

Decision rule: Reject H_0 if P-value ≤ α-value otherwise, we do not reject H_0
Conclusion: since the p-value < α-value i.e. (0.00001 < 0.05), we hereby reject H_0 and conclude that there exists a significant relationship between the death, confirmed and discharged cases in the north central region of the country at 5% level of significant

Table 8: Test of Significance for Individual Regression North- Central Region

Death	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]		R-squared	Adj R-squared
confirmed	.0040015	.0007058	5.67	0.0001	.0025771	.005426	0.4993	0.4754
discharged	.0004936	.0006559	0.75	0.456	-.0008301	.0018173		
_cons	1.756079	.6717491	2.61	0.012	.4004342	3.111723		

Model: $Y = 1.756079 + 0.0040015X_1 + 0.0004936X_2$
Hypothesis
$H_0 : \beta_1 = 0$ versus $H_1 : \beta_1 \pm 0$
$H_0 : \beta_2 = 0$ versus $H_1 : \beta_2 \pm 0$
Level of significance = 0.05

Since p value (P>|t|) for confirmed cases is 0.0001 less than Level of significance α = 0.05, therefore the null hypothesis $\beta_1 = 0$ is rejected and it is significant, for discharged cases p value =0.456 is greater than Level of significance α = 0.05, therefore there is no reason to reject null hypothesis of $\beta_2 = 0$ and concluded that it is not significant

3.0 DISCUSSION AND RESULT

According to the results above, there is a substantial significant relationship between discharged cases and

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confirmed cases, the two explanatory variables, and death cases, the dependent variable, for each of the three regions. Further testing for significance was done, and it was discovered that confirmed cases and discharged cases for the north east and north west regions showed significant and not significant results, respectively, while confirmed cases and discharged cases for the north central region showed significant and not significant results, respectively.

4.0 CONCLUSION

According to the results above, it is concluded that confirmed cases in the north east and northwest have no evidence of relationship with death cases, whereas they do in the north central region. Additionally, the confirmed case has proof that it is related to the deaths that occurred in the north east and northwest but not in the north central region. Therefore, explanatory variables discharged cases and confirmed cases shouldn't be included in the regression equations for the north east and northwest regions or the north central region, respectively.

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