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FACTORS ASSOCIATED WITH PSYCHOLOGICAL IMPACT OF CORONAVIRUS DISEASE 2019 (COVID-19) OUTBREAK IN NIGERIA: REGRESSION-BASED APPROACH

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Abstract: Background and Purpose: There is growing evidence of mental health amongst Nigerians is currently neglected. A pilot study evaluating variables linked with mental health during pandemic was conducted to add to the expanding body of knowledge in this area and establish the framework for future research.

Methods: Data were collected using an online self-administered questionnaire, a cross-sectional study of 1075 respondents. Mental health status was assessed using Generalized Anxiety Disorder – 2 (GAD-2) and Patient Health Questionnaire-2 (PHQ-2). Logistic regression was used to investigate the factors associated with mental health status.

Results: Multivariate logistic regression analyses were performed to identify the main factors associated with mental health outcomes. Of the 1075 respondents, 678 (63.9%) had anxiety disorder (i.e., GAD $\geq$ 3) and 670 (62.3%) had depression (PHQ $\geq$ 3). The median age were 30 years, respectively. Multivariate logistic regression shows that sex (Standardize Beta = - 0.84, $p < 0.01$), degree (Standardize Beta = 0.45, $p = 0.006$), income level (Standardize Beta = 0.98, $p < 0.01$) and the region (Standardize Beta = 0.78, $p < 0.01$) are all significant predictors.

Conclusions: This study provides supportive evidence for mental health education and psychological counselling services. Current household income, level of education, region and gender are the significant predictors of mental health status amongst Nigerians.

Keywords: Coronavirus; mental health; anxiety symptoms; depressive symptoms.

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1. INTRODUCTION

The Coronavirus Disease 2019 (COVID-19) outbreak was declared a global health emergency by the World Health Organization (WHO) [1] due to the rapid spread of the disease globally on March, 2020. This virus has become the central concern of people around the world as it can be transmitted between persons through respiratory droplets and contact routes Al Omari et al., [2]. As of December, 2020, more than 99.8 million confirmed cases have been reported with over 2.4 million deaths worldwide, according to John Hopkins [3] Coronavirus Resources centre. Countries instigated different series of measures to reduce the rate of infection and control of this pandemic, including local and international travel bans, bans on large gatherings, closure of schools and of business, social distancing, stay-at-home orders, and curfews (Khatatbeh [4]; Baunez et al., [5]; Demirbilek et al., [6]). These restrictions and the uncertain trend of the disease has significantly affect mental wellbeing globally Bozkurt et al., [7].

In Nigeria, the rapid increase in the COVID-19 pandemic has affected individuals and societies due to these series of restrictions. Currently, Nigeria is facing a global human emergency in mental health with approximately 80% of individual can not access the care (Suleiman [8]; Abdulmalik et al., [9]; Onyemelukwe [10]). This may lead to inevitable long-term socio-economic implications with a significant impact on the emotional and psychological well-being of Nigerians. In general, people are afraid, angry, anxious and stressed out. Evidence-based findings and knowledge of the factors associated with its occurrence among the Nigeria citizens will enhance the management of probable cases of psychological problems during and after COVID-19 crisis. This study addresses these important gaps by examining the prevalence, important risk factors associated with anxiety disorder and depression among Nigerians during the COVID-19 pandemic crisis.

2. METHODS

2.1 Study design

Data for this study were collected through questionnaire distributed via social media, a cross-sectional study that investigate the mental health tendencies such as anxiety disorder and depression as a result of the COVID-19 outbreak. The cohort consisted of 1075 participants between age 18 to 65 and above between 1 October to 15 December, 2020. Participants also needed to be able to communicate and read in English fluently. Data collected were on socio-demographic factors and mental health outcomes such as age, gender, education, marital status, income,

employment status, region and household size. In addition, to this data items, the following participant-reported data were collected

2.2 Generalized Anxiety Disorder 2-item (GAD-2)

Anxiety was measured using the Generalized Anxiety Disorder-2 scale (GAD-2), which is a short version of the Generalized Anxiety Disorder-7 tool for screening initial symptoms of generalized anxiety and panic disorder Kroenke et al., [11]. The GAD-2 is a two-item form asking how frequently they have been bothered by the following; often over the last two weeks if they were bothered by (1) feeling nervous, anxious, or on edge and (2) not being able to stop or control worrying. Each item is scored on a 4-point Likert scale (0 = not at all, 1 = several days, 2 = more than half the days. 3 = nearly every day) and scores range from 0 to 6 Kroenke et al., [11]. The GAD-2 is moderately good at screening other common affective disorders such as post-traumatic stress disorder (PTSD), social anxiety and panic disorder with a proposed cut-off score of ≥ 3 Skapinakis [12]. The GAD-2 has been proven to be effective in African populations and primary care environments Sibrava et al., [13].

2.3 Patient Health Questionnaire 2-item (PHQ-2)

Participants were screened for depression symptoms using the Patient Health Questionnaire-2(PHQ-2), which comprises of the first two items of the PHQ-9 Sibrava et al., [13]. The PHQ-2 is a 2-item patient-reported measure of initial symptoms of depression such as low mood and anhedonia and each response Plummer et al., [14]. PHQ-2 scores range between 0 and 6; a cut-off score of ≥ 3 indicates the presence of depressive symptoms Plummer et al., [14]. The PHQ-2 depression screening tool has demonstrated excellent psychometric properties with a sensitivity of 83% and a specificity of 92% for major depressive disorder Kroenke, Spitzer and Williams [15]. The PHQ-2 has been validated in African countries populations Gelaye et al., [16].

According to local legislation and institutional standards, no ethical review or permission was necessary for the study on human. Written informed consent was obtained from the participants before commencing the survey

2.4 Statistical analysis

Descriptive statistics were used to describe all the demographic characteristics of the participants. Similarly, descriptive analysis of respondents characteristics on the prevalence of anxiety disorder and depression. (i.e., PHQ ≥ 3 versus PHQ < 3) and (i.e., GAD ≥ 3 versus GAD < 3) respectively were assessed. Bivariate analysis was performed to compare the association of different

psychometric scores for GAD-2 and PHQ-2 using Mann-Whitney *U* test and Kruskal-Wallis test. Multivariable logistic regression analysis was conducted to assess potential modifiers and confounding variables for mental health outcomes in participants. Multi-collinearity was evaluated using the variance inflation factor (VIF); VIF > 10 indicates of no multi collinearity García et al., [17]. Statistical significance was evaluated at $\alpha = 0.05$. All the analyses were conducted using R software version 3.6.1 Fox and Leanage [18].

3. MAIN RESULTS

Table 1 describes the demographic characteristics in the study. Of the 1075 participants in the study, the gender distribution respectively are; 63.8% male and 36.2% female in south-west, 94.0% male and 6.0% female in south-south, 92.7% male and 7.3% female in south east, 79.2% male and 20.8% female in north-west, 75.5% male and 24.5% female in north-east and 72.0% male and 28.0% female in north central with overall gender distribution of 72.7% male and 27.3% female participants. 569 (52.93%) responses from south west, 116 (10.79%) from south-south, 111 (10.30%) from south east, 24 (2.23%) from north-west, 98 (9.11%) from north-east, and 157 (14.60%) from north-central.

Table 2 describes the association between GAD and participants demographic characteristics in the study. Of the 1075 participants in the study without missing data, 687 (63.9%) reported anxiety-realted tendecies. Participants with anxiety status were likely to be older respondents with a median age of 30 years ($p < 0.01$). 450 (65.5%) respondents were single with ($p = 0.15$), with higher number of household of 4 ($p < 0.01$), with level of income between N200, 000 – N500, 000 ($p = <0.01$), high prevalence of level of education ($p < 0.01$) than participants without anxiety. Table 3 describes the association between PHQ and participants demographic characteristics in the study. Of the 1075 respondents in the study, 670 (62.3%) had a depression-related tendency. Participant with depression status were likely to be older respondents with a median age of 30 years ($p < 0.01$). 434 (64.7%) respondents were single with ($p = 0.03$), with higher number of household of 4 ($p < 0.01$), with level of income between N200, 000 – N500, 000 ($p = <0.01$), high prevalence of level of education ($p < 0.01$) than respondents without depression.

Table 4 describes the regression results of factors associated with anxiety disorder using multivariable logistic regression. These shows that age (Standardize Beta = - 0.22, $p = 0.01$), sex (Standardize Beta = - 0.86, $p < 0.01$), degree (Standardize Beta = 0.47, $p = 0.002$), employment

status (Standardize Beta = - 0.61, $p < 0.01$), effect on the income level (Standardize Beta = 0.37, $p < 0.01$) and the region (Standardize Beta = 0.71, $p < 0.01$) are all significant predictors to anxiety disorder. Similar pattern were observed for depression status with the exception of employment status (See Table 5). On the other hand, variance inflation factor amongst the predictors range between (1.26 to 1.76), which indicates there was no multi collinearity between the predictors and the mental health outcomes.

Figure 1 describes the relative importance of the predictor variables for the prediction of mental health outcomes using logistic regression models in the survey data. The region, gender, and income were ranked as the three most important predictors of mental health outcomes.

4. DISCUSSION

This study examined the risk factors associated with the prevalence of mental health outcome in Nigeria during the pandemic. Consequently, our study revaled that there was no significant difference was found among marital status classes on depression and anxiety in Nigeria during the COVID-19. In detail our study revealed that sex, level of education, employment status and income level were the important predictors associated with anxiety disorder and depression. Our findings buttress current evidence from other published studies (Wang et al., [19]; Lee, Jobe and Mathis [20]; Rodríguez-Rey, Garrido-Hernansaiz and Collado [21]; Cai et al., [22]; Boyraz and Legros [23]; Pieh, Budimir and Probst [24]; Ni et al., [25]) that already showed that occupation status and gender are risk factors that were associated with depression and anxiety disorder in similar settings. A recently published systematic review found that demographic risk factors were associated with mental health outcomes in empirical studies in Xiong et al., [26]. Agberotimi et al., [27] also explored mental health status among the general population in Nigeria and concluded that income status was associated with depression. These studies, while similar to ours relied on a relatively smaller sample size than ours (N < 1000). However, there has been a discrepancy in the class of those who have been most affected.

The important reason for our finding might be explained by the fact that Nigeria's normal (middle) income socioeconomic class in the urban areas are educated and live above poverty line (Anyanwu [28]; Oshinubi, Rachdi and Demongeot [29-30]; Abioye et al., [31]). These individuals are primarily small company owners (SMBs) and high-wage earners in private and public sector organisations; hence, they are the worst effected by business closures and lockdowns in the country.

As a result this, it is expected that severe psychological discomfort would cause probable economic catastrophe in the urban region. The SARS pandemic in 2003, however, provided evidence that the socioeconomic position of the population was associated with the result of their mental health (Yip et al., [32]; Tsang, Scudds and Chan [33]; Nickell et al., [34]). These are legitimate explanations for why this group may have observed a greater frequency of depression in those who are working in metropolitan areas.

On the other hand, our evaluation of the relative importance of the variables based on logistic regression revealed that income, sex, and region were the most important predictors that are common between the mental health outcomes. Taken together, these results indicate that Nigerians citizens should design and implement post-COVID-19 mental health such as the establishment of online mental health education using social media platforms, free online 24 hours psychological counselling services provided by mental health professionals (e.g., cognitive behavioural therapy), and online self-help psychological tools, in response to the COVID-19 outbreak. The implementation of appropriate interventions could eventually mitigate the long-term impact of psychological morbidity due to the pandemic and improve effective emergency interventions in Nigeria.

A unique strength of this study is the extensive geographic coverage in Nigeria. Our key findings provide helpful information for policymaking, recognitions of high-risk populations and design for region-specific psychological crisis management. Despite these strengths, this study is not without its limitations, which might have influenced our study conclusions. First, the status of mental health symptoms was based on respondents self-reports rather than clinical diagnosis. Second, this was a cross-sectional study. Therefore, our study cannot be considered casual relationships. Third, the sample size is relatively small compared to the population of Nigeria. It is possible that the low response rate is attributable to the hectic schedules, and as well as the stressful nature of their daily activities. However, responses were received from all the six geopolitical regions in Nigeria and this makes it a representative coverage to a greater extent.

In conclusion, this study identified factors that are associated with mental health status among Nigerian. Regression analysis results show that factors such as current household income, level of education, region and gender are the significant predictors of mental health status among Nigerians. We recommend that more attention should be paid to the mental health of this vulnerable population during an infectious disease outbreak.

CONFLICT OF INTERESTS

The author(s) declare that there is no conflict of interests.

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Appendix

Table 1: Demographic Characteristics of the study participants in the Cohort

				Location			
Characteristics	Total	North-Central	North-East	North-West	South-East	South-South	South-West
Overall	1075	157	98	24	111	116	569
Sex							
Men	781(72.7)	113(72)	74(75.5)	19(79.2)	103(92.7)	109(94)	363(63.8)
Women	294(27.3)	44(28)	24(24.5)	5(20.8)	8(7.3)	7(6)	206(36.2)
Age							
18-24	463	60(38.2)	36(36.7)	6(25)	85(76.6)	65(57)	211(37.1)
25-34	409	76(48.4)	51(52.1)	13(54.2)	21(18.9)	44(37.9)	204(35.9)
35-44	155	18(11.5)	10(10.2)	4(16.7)	3(2.7)	4(3.4)	116(20.4)
45-54	35	3(1.9)	1(1)	1(4.1)	2(1.8)	2(1.7)	26(4.5)
55-64	10	-	-	-	-	-	10(1.7)
>=65	3	-	-	-	-	-	3(0.4)

Marital							
Single	721	103(65.6)	76(77.5)	15(62.5)	95(85.6)	92(79.3)	340(59.8)
Married	348	54(34.4)	22(22.5)	9(37.5)	15(13.5)	23(19.9)	225(39.5)
Widowed	2	-	-	-	-	1(0.8)	1(0.2)
Divorced	4	-	-	-	-	-	4(0.5)
Education level							
Primary	3	-	-	-	-	1(0.88)	2(0.4)
Secondary	45	6(3.8)	-	-	-	2(1.72)	37(6.5)
Bachelors/Diploma	764	86(54.8)	30(30.6)	10(41.7)	100(90.1)	97(83.6)	441(77.5)
Graduate (MSc/PhD)	260	63(40.1)	68(69.4)	14(58.3)	10(9)	16(13.8)	89(15.6)
Other(OND/HND)	3	2(1.3)	-	-	1(0.09)	-	-
Income							
Less than N30000	147	11(7.1)	3(3.1)	-	15(13.6)	8(6.9)	110(19.3)
N30K to N84,999	55	5(3.1)	1(1.0)	-	4(3.6)	6(5.2)	39(6.9)
N85K to N199999	201	44(28)	14(14.3)	3(12.5)	10(9.0)	28(24.1)	102(17.9)
N200K to N499999	545	89(56.8)	74(75.5)	15(62.5)	52(46.8)	47(40.5)	268(47.1)
Over N500K	127	8(5.09)	6(6.1)	6(25.0)	30(27.0)	27(23.3)	50(8.8)
Household size							
Zero	41	2(1.3)	-	-	7(6.3)	6(5.1)	26(4.5)
One	179	25(15.9)	16(16.3)	-	37(33.3)	56(48.3)	45(7.9)
Two	322	83(52.8)	65(66.3)	15(62.5)	11(9.9)	42(36.2)	106(18.6)
Three	123	27(17.2)	11(11.2)	2(8.3)	3(2.7)	2(1.8)	78(13.8)
Four or more	410	20(12.8)	6(6.1)	7(29.2)	53(47.8)	10(8.6)	314(55.2)
Employed							
Student	116	11(7)	2(2)	-	12(10.8)	4(3.5)	87(15.3)
Employed	889	144(91.7)	96(98)	24(100)	98(88.3)	108(93.1)	419(73.6)
Not employed	56	2(1.3)	-	-	1(0.9)	3(2.6)	50(8.8)
Retired	14	-	-	-	-	1(0.8)	13(2.3)
Region of HH							
Rural	22	1(0.6)	4(4.1)	-	-	1(0.8)	16(2.8)
Sub-Urban	500	86(54.8)	77(78.5)	18(75.0)	20(18.0)	50(43.2)	249(43.8)
Urban	553	70(44.6)	17(17.4)	6(25)	91(82.0)	65(56.0)	304(53.4)

Table 2: Association Between GAD and Participant's Demographic Characteristics

Participants' Characteristics	GAD ≥ 3 (N_1=687)	GAD < 3(N_2= 388)	P-value
Age(median, IQR)	30(21-30)	21(21-30)	<0.01
Sex(n, %Male)	471 (68.6%)	310 (79.9%)	<0.01
Marital status(n, %Single)	450 (65.5%)	271 (69.9%)	0.15
Degree (n, %Bachelors)	473 (68.9%)	291 (75%)	0.96
Employment status (n, %Employed)	603 (87.8%)	286 (73.7%)	0.35
Income level (n, %N200,000 – N500,000)	400 (58.2%)	145 (37.4%)	<0.01
Number of household (n, % 4)	222 (35.8%)	100 (25.8%)	<0.01
Location (n, %South-west)	332 (48.3%)	237 (61.1%)	<0.01
Region (n, %Urban)	294 (42.7%)	259 (66.8%)	0.38

NB; GAD = Generalized Anxiety Disorder

Table 3: Association Between PHQ and Participant Demographic Characteristics

Participants' Characteristics	PHQ ≥ 3(N_1=670)	PHQ <3(N_2= 405)	P-value
Age (median, IQR)	30 (21-30)	21 (2-30)	<0.01
Sex(n, %Male)	452 (67.5%)	329 (81.2%)	<0.01
Marital status(n, %Single)	434 (64.7%)	287 (70.9%)	0.03
Degree (n, %Bachelors)	454 (67.8%)	310 (76.5%)	<0.001
Employment status (n, %Employed)	584 (87.2%)	305 (75.3%)	0.41
Income level (n, %N200,000 – N500,000)	381 (56.9%)	164 (40.5%)	<0.001
Number of household (n, % 4)	240 (35.8%)	170 (41.9%)	<0.001
Location (n, %South-west)	332 (49.6%)	237 (58.5%)	<0.001
Region (n, %Urban)	282 (42.1%)	271 (66.9%)	0.89

NB: PHQ = Patient Health Questionnaire;

Table 4: Regression results for factors associated with anxiety status in Nigeria

Participants' Characteristics	Regression coefficients (B)	Standardize regression coefficient (β)	P-value
Age	-0.22	-0.41	0.01
Sex	-0.86	-0.80	<0.01
Degree	0.47	0.50	0.002
Employment status	-0.61	-0.65	<0.01
Income level	0.37	0.92	<0.01
Region	0.71	0.79	<0.01

Table 5: Regression results for factors associated with depression status in Nigeria.

Participants' Characteristics	Regression coefficients (B)	Standardize regression coefficient (β)	P-value
Sex	-0.86	-0.79	<0.01
Degree	0.47	0.49	0.001
Income level	0.32	0.79	<0.01
Region	0.83	0.92	<0.01

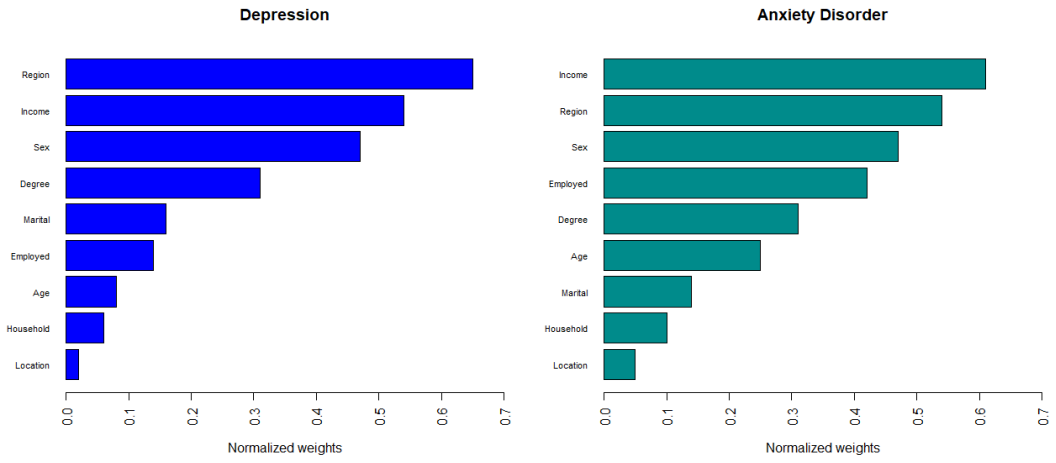

Figure 1: Rank Ordering of Regression Model Predictors in the Cohor