

# A Population-Based Cross-Sectional Study of Anxiety and Depression Associated with the COVID-19 Pandemic in Nigeria

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**Abstract:** The COVID-19 pandemic has created mental health challenges among the public. The study objectives were to determine the prevalence of anxiety, depression and associated factors among the general public in Nigeria during the COVID-19 pandemic. The cross-sectional study was conducted between May 2020 and June 2020 using an online questionnaire that captured sociodemographic data, generalized anxiety disorder (GAD-7), depression (PHQ-9), lifestyle practices, self-rated health, and exposure to COVID-19 information through social media. Data were analysed using Statistical Package for Social Science with associations tested at 95% confidence interval. Appropriate institutional ethical board approval was obtained, and informed consent obtained from all participants. 543 adults participated, 101 (18.6%) and 131 (24.1%) respondents were classified as having depressive and anxiety disorders respectively. Females ( $\chi^2=11.06$ ,  $p < 0.01$ ), alcohol use (OR 5.50,  $p < 0.01$ , 95% CI 2.18-13.87) and poor self-rated health (OR 2.97,  $p=0.04$ , 95% CI 1.08-8.22) were significantly associated with GAD. Alcohol consumption (OR 4.27,  $p < 0.01$ , 95% CI 1.56-12.04), currently being on medication (OR 2.96,  $p < 0.01$ , 95% CI 1.31-6.70) and poor self-rated health (OR 4.21  $p < 0.01$ , 95% CI 1.73-10.23) were significantly associated with depression. Increasing frequency of information on Covid-19 through social media was significantly associated with decreased anxiety and depression ( $\chi^2=7.95$ ,  $p=0.02$ ). A considerable proportion of respondents experienced anxiety and depression, especially persons with unhealthy lifestyles and poor health. Interventions to improve mental health should target these at-risk groups.

**Keywords:** Anxiety, COVID-19, Depression, Mental Health

## 1. Introduction

The novel coronavirus disease (COVID-19) was first reported in Wuhan, China in December 2019 as a cluster of 'pneumonia-like symptoms'. [1] Since then, the virus has spread to over 200 countries, with countries in Europe and the Americas suffering high mortality rates. The rapid spread of the disease and its heavy toll on the health systems of countries necessitated the introduction and enforcement of public health control measures to 'flatten the curve' and

control the disease. Countries responded with local and nationwide lockdowns, mandatory use of nose mask, quarantine, and isolation of cases. These measures negatively impact socio-economic activities, academic timetables, and lead to financial losses as well as job losses. Limited levels of social interaction brought on by social distancing measures and growing misinformation on social media led to an increased risk for psychiatric illnesses in the general public [2], including anxiety, sleep deprivation, fear, feelings of separation and grief and depression. [3]

There has been a considerable volume of research during

the COVID-19 pandemic on the mental health status of the general public in the Americas, Europe and Asia, and a high prevalence of anxiety and depression was reported. Prevalence rates for depression and anxiety in China were 48.3% and 22.6% respectively [4], and 19% for depression, 14% for anxiety in Hong Kong. [5] Prevalence rates for depression of 25% and anxiety of 28% were reported in India [6], 17.3% and 20.8% in Italy [3], 20.0% and 22.8% in Ireland [7], and 38.2% and 24.7% in Portugal and Brazil [8]. On the other hand, published data on the psychological effect of the pandemic in Sub-Saharan Africa is scarce, meanwhile, the lower numbers of confirmed cases and lower mortality rate [9] may indeed affect the perception of people towards the pandemic, and their psychological response. Specifically, few studies have been conducted to investigate the mental health challenges of the general public in Nigeria following the introduction of containment measures and restrictions on social and economic activities. Prevalence rates for anxiety and depressive illness ranged from 22% to 51%. [10–12] However, none of these studies explored the relationship of demographic, social, behavioural, physical health status and social media exposure on the experience of anxiety and depression. Such information is essential for streamlining the psychosocial interventions that have been rolled out by the Federal government, and the review of policies and guidelines to protect the mental health of citizens. The study aimed to determine the prevalence and risk factors for anxiety and depression in the study population.

## 2. Methodology

### 2.1. Study Design and Setting

The cross-sectional study was carried out between 20<sup>th</sup> May 2020 and 20<sup>th</sup> June 2020. By the end of May 2020, 10,162 cases of COVID-19 had been diagnosed in the country. The minimum sample size was determined using Leslie's formula for prevalence studies  $n = z^2pq/d^2$  and assuming a prevalence of psychological distress of Covid-19 of 50% (in the absence of previous studies as at the time the project was developed), 95% confidence interval, 5% margin of error, and correcting for 10% non-response rate. The eligibility criteria included a willingness to give consent, age above 18 years of age, and current place of residence as Nigeria. The restrictions on movement and enforcement of physical distance that were in force at the time of the study did not permit face-to-face recruitment of study participants. Instead, an online anonymous questionnaire was distributed widely on the WhatsApp platform. [13] Recipients were encouraged to forward the invitation and link to their WhatsApp contacts and contacts on other social networks.

### 2.2. Data Collection Tools

The online questionnaire was in 5 parts. The first part captured sociodemographic variables including age, religion, marital status, average monthly income, sex, occupation, and current employment status. The second part captured any

family history of mental illness, previous diagnosis of mental illness and lifestyle risk factors including smoking (Yes/No) and alcohol consumption (Yes/No). Perceived health status was assessed by asking "How do you rate your health?" with response options as 'very bad', 'bad', 'neither good nor bad', 'good', and 'very good'. Responses were dichotomized as 'very good/good' and 'neither good nor bad/bad/very bad'. [14]

The third part of the questionnaire was on the frequency of information on COVID-19 received via social media by asking the participants: 'what social media platforms are you on', and 'In the past 7 days, how can you rate the frequency with which you received news and information regarding the pandemic on the platform you visit most?' Social media platforms listed included Facebook, LinkedIn, Periscope, Snapchat, YouTube, Blog, WhatsApp, Instagram, Twitter. Their responses were measured by four-point Likert-scale items, including 'never', 'occasionally', 'often' and 'always'.

The fourth part was on depression and anxiety. Depression was assessed using the Patient Health Questionnaire (PHQ-9) made up of 9 questions with severity calculated by assigning scores of 0, 1, 2, and 3, to the response categories of: Not at all, several days, more than half the days, and nearly every day, respectively. The total ranged from 0 to 27 with scores of 5, 10, 15, and 20 represent cut-off points for mild, moderate, moderately severe, and severe depression, respectively. Higher scores are indicative of higher levels of depression. A cut-off score of  $\geq 10$  was used to identify respondents who met the criteria for depressive disorder. This cut-off gives a sensitivity of 85% and specificity of 89% and is useful to identify depression that may require psychological intervention. [7]

Anxiety was assessed using questions from the Generalized Anxiety Disorder-7 (GAD-7). [15] Responses to the 7-item symptom were presented on a 4-point Likert scale: 0=Not at all, 1=Several days, 2=More than half the days and 3=Nearly every day. Possible scores range from 0 to 21 with higher scores indicative of higher levels of generalized anxiety and associated with functional impairment. Scores of 5-9 represent mild, 10-14 moderate, and 15-21 severe anxiety. A cut-off score of  $\geq 10$  was used to represent anxiety disorder. [7]

The fifth part assessed potential fear-related factors including fear of COVID-19 infection, fear of loss of job, fear of a downturn in business, fear of disruption in education, fear of inability to feed and fear of loss of accommodation. Responses were dichotomized as 'Yes' and 'No'.

### 2.3. Study Variables

Dependent variables were depression and anxiety. Independent variables were sociodemographic characteristics, social media exposure, smoking, alcohol consumption, and self-rated health.

### 2.4. Data Analysis

Data were exported from the Google forms to Microsoft Excel (Microsoft Corporation, Redmond, Washington, USA, 2016) coded, and extracted onto Statistical Package for the Social Sciences (SPSS) version 21 (IBM Corporation, Armonk,

NY, USA). Descriptive analysis of demographic variables was presented as frequencies for dichotomous variables and mean with standard deviation (Standard deviation) for continuous variables. Chi-square ( $\chi^2$ ) tests were used to test the association of exposure variables with anxiety and depression. Binary logistic regression was applied to identify predictors of depression and anxiety that were significant at bivariate analysis. For this, anxiety and depression were dichotomized as depressed='yes' and 'no' and anxious='yes' and 'no'. [16]

### 2.5. Ethical Approval

Approval for the study was obtained from the Ethics Committee of the Irrua Specialist Teaching Hospital. The introduction of the questionnaire explained the purpose of the study to potential participants and was used to obtain consent by the respondent clicking on a button if they agreed to participate. Participation was voluntary and anonymous. Confidentiality was maintained at all times.

## 3. Results

### 3.1. Demographics, Lifestyle Behaviours and Social Media Exposure

Five hundred and forty-three responses were obtained over the survey period. The mean age of respondents was 27.7 (SD 9.38) years. Females were slightly more in number than males, 159 (51.5%) and 150 (48.5%) respectively. Two hundred and nine (67.6%) respondents were single, 269 (49.5%) had secondary school education and the majority, 333 (61.3%) earned an income less than N 25,000.00. The sociodemographic qualities of the respondents are shown in Table 1.

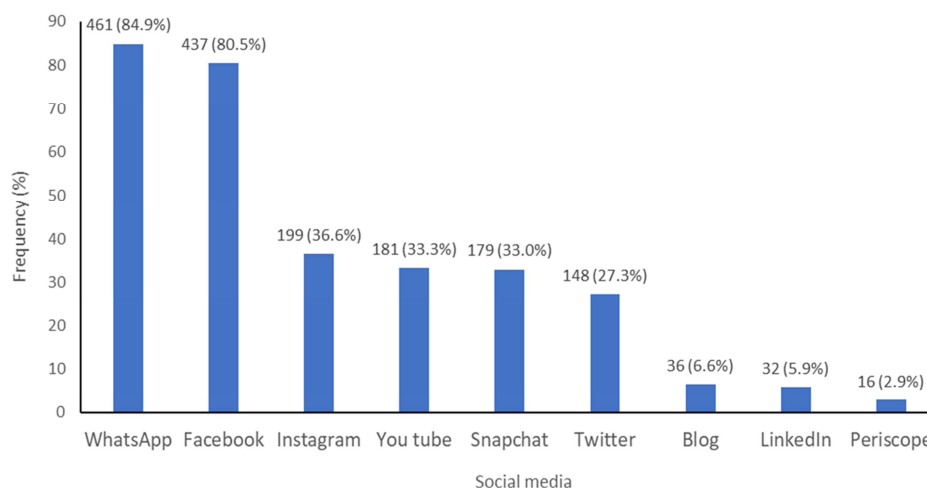
Forty-four (8.1%) respondents reported at least one chronic illness, 20 (3.7%) had a previous diagnosis of mental illness, 32 (5.9%) claimed they had a family history of mental disorder. Four hundred and ninety-nine (91.9%) rated their health status as good/very good and 44 (8.1%) as neither good nor bad/bad/very bad. Ninety-four (17.3%) were currently on medication for a health condition. Twenty-two (4.1%) were current smokers, 41 (7.6%) regularly drank alcohol.

The most popular social media platform for respondents was WhatsApp, 461 (84.9%). Figure 1.

In the preceding 7 days of the study, 142 (26.2%) received news and information on COVID-19 daily, 149 (27.4%) sometimes and 252 (46.4%) occasionally.

**Table 1.** Sociodemographic characteristics of respondents.

Variable	Frequency (%)
Age group (years)	
<24	262 (48.3)
25 -34	185 (34.1)
35-44	63 (11.6)
≥45	33 (6.1)
Mean age (SD) years	27.7 (9.38)
Sex	
Male	256 (47.1)
Female	287 (52.9)
Religion	
Christianity	278 (90.0)
Islam	24 (7.8)
Others	7 (2.3)
Educational attainment	
Primary	10 (1.0)
Secondary	269 (49.5)
Tertiary	264 (48.6)
Marital status	
Married	144 (26.5)
Single	393 (72.4)
Divorced	6 (1.1)
Individual monthly Income N (\$)	
<25,000.00 (<50.0)	333 (61.3)
25,000- 49,999 (52-104)	98 (18.0)
≥50,000 (≥106)	112 (20.6)
Occupational class	
Unskilled	227 (41.8)
Semi-skilled	224 (41.3)
Skilled	92 (16.9)
Current employment status	
Unemployed	191 (35.2)
Self-employed	258 (47.8)
Employed with private	44 (8.1)
Employed with government	50 (9.2)



**Figure 1.** Social media use among respondents.

### 3.2. Analysis of Fear Factors

Two hundred and thirty-nine (44.0%) respondents expressed fear of the effect of the pandemic on either their education or that of a family member's, 232 (42.7%) over household food security, 220 (40.5%) over a downturn in business, 187 (34.4%) about getting infected, 152 (28.0%) about losing a job and 196 (36.1%) about losing their accommodation.

### 3.3. Anxiety, Depression and Sociodemographic Parameters

**Table 2.** Association of demographic qualities with anxiety and depression.

Variable	Anxiety		$\chi^2$	P-value	Depression		$\chi^2$	P-value
	No	Yes			No	Yes		
Age group (years)								
<24	198 (75.6)	64 (24.4)	0.14	0.99	197 (75.2)	65 (24.8)	23.43	0.00*
25 -34	140 (75.7)	45 (24.3)			161 (87.0)	24 (13.0)		
35-44	49 (77.8)	14 (22.2)			61 (96.8)	2 (3.2)		
≥45	25 (75.8)	8 (24.2)			23 (69.7)	10 (30.3)		
Sex								
Male	206 (80.5)	50 (19.5)	5.58	0.02*	218 (85.2)	38 (14.8)	4.51	0.03*
Female	206 (71.8)	81 (28.2)			224 (78.0)	63 (22.0)		
Religion								
Christianity	380 (77.1)	113 (22.9)	4.35	0.11	400 (81.1)	93 (18.9)	2.36	0.31
Islam	26 (65.0)	14 (35.0)			32 (80.0)	8 (20.0)		
Others	6 (60.0)	4 (40.0)			10 (100.0)	0 (0.0)		
Educational attainment								
Primary	8 (80.0)	2 (20.0)	0.79	0.68	10 (100.0)	0 (0.0)	3.11	0.21
Secondary	208 (77.3)	61 (22.7)			222 (82.5)	47 (17.5)		
Tertiary	196 (74.2)	69 (25.8)			210 (79.5)	54 (20.5)		
Marital status								
Single	312 (79.4)	81 (20.6)	9.60	0.01*	321 (81.4)	73 (18.6)	1.44	0.49
Married	96 (66.7)	48 (33.3)			116 (80.6)	28 (19.4)		
Divorced	4 (66.7)	2 (33.3)			6 (100.0)	0 (0.0)		
Individual monthly Income ₦ (\$)								
<25,000.00 (<50.0)	260 (78.1)	73 (21.9)	4.97	0.08	274 (82.3)	59 (17.7)	12.09	0.00*
25,000- 49,999 (52-104)	76 (77.6)	22 (22.4)			88 (89.8)	10 (10.2)		
≥50,000 (≥106)	76 (67.9)	36 (32.1)			80 (71.4)	32 (28.6)		
Occupational class								
Unskilled	174 (76.7)	53 (23.3)	10.8	0.01*	178 (78.4)	49 (21.6)	4.69	0.10
Semi-skilled	180 (80.4)	44 (19.6)			192 (85.7)	32 (14.3)		
Skilled	58 (83.0)	34 (37.0)			72 (78.3)	20 (21.7)		
Current employment status								
Unemployed	148 (77.5)	43 (22.5)	1.82	0.61	148 (77.5)	43 (22.5)	4.19	0.24
Self-employed	190 (73.6)	68 (26.4)			212 (82.2)	46 (17.8)		
Employed with private	36 (81.8)	8 (18.2)			38 (86.4)	6 (13.6)		
Employed with government	38 (76.0)	12 (24.0)			44 (88.0)	6 (12.0)		

Three hundred and ten (57.1%) respondents had minimal or no depression, 132 (24.3%) had mild, 61 (11.2%) moderate, 28 (5.2%) moderately severe and 12 (2.2%) severe depression. Two hundred and sixty (47.9%) had minimal or no anxiety. One hundred and fifty-two (28.0%) had mild, 85 (15.7%) moderate, and 46 (8.5%) severe anxiety.

One hundred and one (18.6%) and 131 (24.1%) respondents were classified as having functional depressive and functional anxiety disorders respectively, and 57 (10.5%) had both anxiety and depressive disorders. In bivariate analysis, being female, those in the age group <24 years and ≥ 45 years and earning a monthly income >N 50,000 were significantly associated with depression ( $\chi^2=4.51$ ,  $P=0.03$ ;  $\chi^2=23.43$ ,  $P < 0.001$  and  $\chi^2=12.09$ ,  $P <$

0.001 respectively). Anxiety was significantly associated with female gender ( $\chi^2=11.06$ ,  $P < 0.01$ ), skilled occupational status ( $\chi^2=10.80$ ,  $p=0.01$ ) and being married or divorced ( $\chi^2=9.60$ ,  $P=0.01$ ). Table 2.

In multivariate analysis, the odds of depression were 2.98 times higher among respondents who earned >N 50,000 monthly compared to lower-income earners ( $P < 0.01$ , 95% CI 1.67- 5.32). Respondents aged 25 – 44 years were 0.07- 0.39 times more likely to have depressive disorder compared to those < 24 years ( $P < 0.01$ , 95% CI 0.02- 0.69).

Anxiety disorder was significantly associated with the female gender compared to the male gender (OR 1.58,  $p=0.03$ , 95% CI 1.04 -2.40) and married respondents compared to singles (OR 2.07,  $P=0.04$ , 95% CI 1.26 – 3.41). Table 3.

**Table 3.** Logistic regression of demographic risk factors associated with anxiety and depression.

Variable	Anxiety			Depression		
	AOR	P value	95% CI	AOR	P value	95% CI
Age group (years)						
<24	-	-	-	1 (Ref)		
25 -34	-	-	-	1.19	0.70	0.50-2.84
35-44	-	-	-	0.47	0.09	0.19-1.14
≥45	-	-	-	0.09	0.00	0.02-0.43
Sex						
Male	1 (Ref)			1 (Ref)		
Female	1.58	0.03*	1.04-2.40	1.59	0.05	1.00-2.54
Marital status						
Single	1 (Ref)			-	-	-
Married	2.07	0.00*	1.26-3.41	-	-	-
Divorced	1.48	0.66	0.25-8.72	-	-	-
Individual monthly Income (\$)						
<25,000.00 (<50.0)	-	-	-	1 (Ref)		
25,000- 49,999 (52-104)	-	-	-	0.82	0.61	0.38-1.76
≥50,000 (≥106)	-	-	-	2.98	0.00	1.67-5.32
Occupational class						
Unskilled	1 (Ref)			-	-	-
Semi-skilled	0.63	0.78	0.37-1.05	-	-	-
Skilled	1.49	0.19	0.83-2.69	-	-	-

### 3.4. Lifestyle Behaviour Risk Factors and Association with Anxiety and Depression

Alcohol consumption ( $P=0.02$ ), family history of mental illness ( $P < 0.01$ ), previous diagnosis of mental ill-health ( $P=0.01$ ), current medication use ( $P < 0.01$ ) and poorly perceived state of health ( $P=0.01$ ) were significantly associated with anxiety. Alcohol consumption ( $P < 0.001$ ), family history

of mental illness ( $P < 0.01$ ), previous diagnosis of mental ill-health ( $P < 0.001$ ), smoking ( $P < 0.001$ ), current medication use ( $P < 0.001$ ) and poorly perceived state of health ( $P < 0.001$ ) were significantly associated with depression. Respondents who occasionally in the past 7 days received information on COVID-19 from social media platforms showed significantly higher levels of depression and anxiety ( $\chi^2=11.64$ ,  $P < 0.001$ ;  $\chi^2=13.40$ ,  $P < 0.001$  respectively) Table 4.

**Table 4.** Association of unhealthy lifestyle behaviours and family risk factors with anxiety and depression.

Variable	Anxiety		$\chi^2$	P-value	Depression		$\chi^2$	P-value
	No	Yes			No	Yes		
Past diagnosis of mental illness								
No	406 (77.6)	117 (22.4)	23.87	0.00*	432 (82.6)	91 (17.4)	13.52	0.00*
Yes	6 (30.0)	14 (70.0)			10 (50.0)	10 (50.0)		
Currently on medication								
No	358 (79.7)	91 (20.3)	21.09	0.00*	386 (86.0)	63 (14.0)	35.76	0.00*
Yes	54 (57.4)	40 (42.6)			56 (59.6)	38 (40.4)		
Family history of mental ill-health								
No	394 (77.1)	117 (22.9)	7.15	0.01*	424 (83.0)	87 (17.0)	14.25	0.00*
Yes	18 (56.2)	14 (43.8)			18 (56.2)	14 (43.8)		
Smoking								
No	398 (76.4)	123 (23.6)	1.88	0.17	430 (82.5)	91 (17.5)	10.92	0.00*
Yes	14 (63.6)	8 (36.4)			12 (54.5)	10 (45.5)		
Alcohol use								
No	387 (77.1)	115 (22.9)	5.38	0.02*	420 (83.7)	82 (16.3)	22.54	0.00*
Yes	25 (61.0)	16 (39.0)			22 (53.7)	19 (46.3)		
Perceived state of health								
Good / very good	386 (77.4)	113 (22.6)	7.37	0.01*	418 (83.8)	81 (16.2)	22.81	0.00*
Bad/neither good nor bad	26 (59.1)	18 (40.9)			22 (53.7)	19 (46.3)		
Frequency of receiving COVID-19 information on most visited social media platform								
Very often/daily	92 (64.8)	50 (35.2)	13.4	0.00*	102 (71.9)	40 (28.2)	11.64	0.00*
Sometimes	116 (77.9)	33 (22.1)			126 (84.6)	23 (15.4)		
Occasionally	204 (81.0)	48 (19.0)			214 (84.9)	38 (15.1)		

In multivariate analysis, respondents who drank alcohol were 5.49 times more likely to be anxious compared to those who did not drink or infrequently drank alcohol ( $P < 0.01$ , 95% CI: 2.18-13.87). Similarly, the odds of having

anxiety were 2.97 times higher among respondents who perceived their health status to be bad/neither good nor bad ( $P=0.04$ , 95% CI: 1.08- 8.22). The odds of depression were significantly higher in respondents who reported current

alcohol consumption (OR 4.27,  $P < 0.01$ , 95% CI 1.51-12.04), current medication use (OR 2.96,  $P < 0.01$ , CI 1.31-6.70) and those who perceived their health status to be bad/neither good nor bad (OR 4.20,  $P < 0.01$ , CI 1.73-10.23). Table 5.

**Table 5.** Logistic regression of lifestyle and family risk factors associated with anxiety and depression.

Variable	Anxiety			Depression		
	AOR	P value	95% CI	AOR	P value	95% CI
Past diagnosis of mental illness						
No	1 (Ref)			1 (Ref)		
Yes	1.16	0.82	0.33- 4.15	1.12	0.86	0.32-3.97
Currently on medication						
No	1 (Ref)			1 (Ref)		
Yes	3.20	0.00*	1.81 -5.63	3.40	0.00*	1.88 – 6.13
Family history of mental ill-health						
No	1 (Ref)			1 (Ref)		
Yes	1.12	0.83	0.40 – 3.10	1.15	0.79	0.41 – 3.19
Smoking						
No	-	-	-	1 (Ref)		
Yes	-	-	-	0.65	0.47	0.21- 2.08
Alcohol use						
No	1 (Ref)			1 (Ref)		
Yes	3.61	0.00*	1.77 -7.36	4.15	0.00*	1.87 – 9.21
Perceived state of health						
Good / very good	1 (Ref)			1 (Ref)		
Bad/neither good nor bad	2.74	0.00*	1.34 – 5.61	2.77	0.00*	1.35 – 5.67

### 3.5. Fear Factors and Anxiety and Depression

Fear of the effect of the pandemic on education was the most mentioned source of psychological stress among respondents, 239 (44.0%). Others included fear of not having enough food to eat, 232 (42.7%), a downturn in business 220 (40.5%), fear of contracting COVID-19 187 (34.4%) and fear

of loss of accommodation 196 (36.1%). The least mentioned was the fear of job loss, 152 (28.0%).

In multivariate analysis only fear of infection remained a significant predictor of anxiety (OR 5.05,  $P < 0.001$ , 95% CI 3.20 – 7.97), and depression (OR 5.29,  $P < 0.001$ , 95% CI 3.44 – 8.14). Table 6.

**Table 6.** Logistic regression analysis of fear factors and anxiety and depression.

Variable	Depression			Anxiety		
	AOR	95% CI	P value	AOR	95% CI	P value
Fear of infection						
No	1 (Ref)			1 (Ref)		
Yes	5.29	3.44 – 8.14	<0.01*	5.05	3.20-7.97	0.00*
Fear of business running down						
No	1 (Ref)			1 (Ref)		
Yes	1.54	1.00 – 2.37	0.05	1.44	0.89-2.35	0.14
Fear of losing a job						
No	-	-	-	1 (Ref)		
Yes	-	-	-	1.08	0.63-1.85	0.77
Fear of impact on education						
No	1 (Ref)			1 (Ref)		
Yes	1.52	0.99- 2.34	0.06	1.52	0.99-2.35	0.06
Fear of inability to feed						
No	-	-	-	1 (Ref)		
Yes	-	-	-	1.13	0.61-2.10	0.69
Fear of loss of accommodation						
No	-	-	-	1 (Ref)		
Yes	-	-	-	0.99	0.53-1.87	0.98

## 4. Discussion

The prevalence of depression, anxiety and a combination of the two were higher than the 5.5%, 3.5% and 1.2% prevalence rates for depression, anxiety and combined depression and anxiety respectively reported in a pre-COVID-19 pandemic mental health survey in Lagos state Nigeria. [17] These rates

were comparable to records of 19% for depression and 14% for anxiety from Hong Kong. [5] Prevalence rates for depression of 25% and anxiety of 28% were reported in India [6], 17.3% and 20.8% in Italy [3], 20.0% and 22.8% in Ireland [7], and 38.2% and 24.7% in Portugal and Brazil. [8] Findings from this study contrast with reports from the Netherlands where no change was observed from the preceding (Pre-COVID-19) year. [18] The differences in rates could be

explained by the timing of the study relative to the stage of the pandemic in the country, as studies carried out early in the pandemic when little was known about the disease may show higher rates of mental health disorders.

Females were found to have higher rates of anxiety, in tandem with other studies [17, 19], but in contrast to a study carried out in India where males had a higher prevalence of depression. [6] The higher risk among females may be due to the fact that women have greater vulnerability to stressful events as well as the interplay of social determinants such as inequity, gender stereotypes and roles, social stigma and inequity, and social autonomy.

Being in the younger and older age groups was associated with depression, compared to an Iranian study where the 21-40 years age group was most affected [19], as well as in Japan where higher levels of anxiety were recorded in persons >65 years in Ireland. [7]

Married respondents had higher risks of anxiety, in contrast with an earlier study. [20] This may be explained by the higher stress married couples may experience with fending for their families during the lockdown, and the increased risk of intimate partner violence found to be higher in prevalence during the pandemic. [21]

Respondents with income  $\geq$  ₦ 50,000 had higher anxiety levels, in tandem with one study [22, 23], and contrasting with others. [24, 25] People who earn more may have more dependents who should be supported because of the economic downturn that came with the lockdown.

Respondents who perceived their health status poorly were more likely to experience anxiety and depression, in tandem with other studies. [25, 26] Alcohol consumption was also associated with anxiety and depression as has been documented [6, 14, 17, 26] Being on medication was associated with depression, as was a history of psychiatric illness, in tandem with other studies. [14, 27] Smoking was not a significant predictor of mental health challenges, in contrast with findings from a study in the United Kingdom. [28]

WhatsApp was the most common social media platform used by respondents, in tandem with other studies in Nigeria [29, 30] The significant association between social media exposure and level of depression or anxiety is in tandem with some studies where frequent use of social media was associated with mental health challenges [4] and contrasts with a study carried out in Calabar where lower rates of anxiety and depression were found among respondents with moderate to severe internet addiction. [31] Similarly, the low rate of depression and anxiety in the Netherlands during the COVID-19 pandemic was attributed to the use of social media and other interactive platforms like WhatsApp, which enabled people to stay connected. [18] The flooding of the internet with misconceptions and false reports about COVID-19 may be responsible for the higher rates of anxiety and depression among frequent social media users. The sharing of negative personal feelings of suffering, fear and aggression due to the increased hardship brought on by the lockdown without concomitant measures by the government to ease the economic burden may also contribute [4]. The Nigeria Centre for Disease

Control and other non-governmental agencies have tried to counter these fears by disseminating correct information on COVID-19. [30, 32] In the analysis of fear factors, fear of infection was significantly a predictor of anxiety and depression, as similarly reported in other studies. [5, 7, 33]

The study has some limitations. The cross-sectional design of the study tests exposure and outcome at the same times, so a direct causal relationship between anxiety or depression and the risk factors cannot be ascertained. More importantly, the convenient sampling method used for participant recruitment may have introduced selection bias as the views and findings from persons who do not have access to the internet were not assessed. This greatly limits the generalizability of the study findings. The content of social media information that may have led to an improvement in the mental health state of respondents is a subject for future research.

## 5. Conclusion

A considerable proportion of respondents experienced generalized anxiety and depressive illness that would require intervention especially persons who either have a family history or have a previous diagnosis of mental ill-health unhealthy lifestyles, poor health status and females. Interventions to improve mental health should target these at-risk groups. The positive use of social media to communicate accurate information on COVID-19 and provide mental health and psychosocial support is encouraged.

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