Knowledge and Attitudes towards COVID-19 Infection and Anxiety Levels of Nigerian Youths Regarding the COVID-19 Pandemic

Batholomew Chibuike James, MPH, Ed.D, DrPH,[1] Aroh Chinazaekpere Mary, RN/RM, RPHN, BNSc,[2] Anyiam Felix Emeka, MSc,[3] Sunday Stephen Ede, MSc,[4] Kanokwan Chullapant, MD,[5] Nwankwo Chidimma, BSPT[4] and Uhuo Ikechuwu Michael, BSPharm, MPH[1]

[1]*Public Health Program, School of Professional Studies, Angeles University Foundation, Angeles City, Pampanga, Philippines*
[2]*Royal Berkshire NHS, Reading, Berkshire, United Kingdom*
[3]*Centre for Health and Development, University of Port Harcourt (UNIPORT), River State, Nigeria*
[4]*Department of Medical Rehabilitation, Faculty of Health Sciences and Technology, College of Medicine, University of Nigeria, Enugu Campus, Nsukka, Nigeria*
[5]*Division of Endocrinology and Metabolism, Faculty of Medicine, Prince of Songkla University HatYai, Songkhla, Thailand*

ABSTRACT

Objectives. Youths can function as agents of change by disseminating essential information, but they are also considered a vulnerable group in the COVID-19 pandemic. Literature on COVID-related knowledge, attitude, and anxiety has not focused comprehensively on youths. This study assesses the knowledge, attitudes, and anxiety level of youths in eastern Nigeria during the COVID-19 pandemic.

Methods. We conducted a descriptive cross-sectional study using an online survey among young people between the ages of 18 and 35 years in southeastern Nigeria during the COVID-19 pandemic. We analyzed data using the Statistical Package for Social Science (SPSS) version 25 software. We used descriptive statistics, the Chi-square test, and bivariate and multivariate logistic regression analyses to measure the associations. A p-value of < 0.05 was considered statistically significant at a 95 percent confidence level.

Results. We included 397 participants. Majority of the study participants (88%) had a high level of knowledge about COVID-19. Around 68% showed a good attitude toward COVID-19 prevention, overall low anxiety related to the COVID-19 pandemic was proportionally higher at 57.43%. Knowledge and educational level were statistically significantly associated with anxiety levels related to the COVID-19 pandemic.

Conclusion. The young adults had a good knowledge of the COVID-19 transmission and symptoms, positive attitude, and low anxiety levels. Those with higher educational levels had good knowledge and lower anxiety level. Public health and mental health experts can use this material to help reduce high levels of anxiety among the vulnerable population affected by the pandemic.

Keywords: COVID-19, knowledge level, attitudes, anxiety level, Nigerian youths

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Corresponding author:
Batholomew Chibuike James, MPH, Ed.D, DrPH
Public Health Program, School of Professional Studies
Angeles University Foundation
MacArthur Highway, Angeles City, Pampanga 2009, Philippines
Email: Jmsbatholomew@gmail.com
ORCiD: https://orcid.org/0000-0003-2159-5624

INTRODUCTION

Coronaviruses belong to the family of respiratory viruses which bring about the common cold, Middle East Respiratory Syndrome (MERS), and severe acute respiratory syndrome (SARS).[1] In 2019, the coronavirus disease (COVID-19) was isolated and has also come to be known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).[2] The disease has since been declared a global pandemic ravaging all nations and associated with direct burdens on morbidity and mortality.[3] This has forced the global population to institute several disease control

and prevention measures with severe social and economic impacts.[2] As part of the disease control and prevention measures, many countries imposed nationwide lockdowns in line with the World Health Organization (WHO) guidelines to help curtail the spread of the virus and save the global health systems from total collapse.[4]

During the pandemic period, restrictions were made on international, national, and inter-state transport links, markets, office and business transactions, schools (primary, secondary and tertiary), sports, religion, and all other related social gatherings.[5] Nigeria has not been an exception to the impact of this pandemic. As of 30th January 2022, a total of 253,023 confirmed cases and 3,135 deaths have been reported in Nigeria.[6]

An imposition of lockdown in the country began on March 30, 2020. This was gradually eased in three phases from the 4th of May 2020 to the 10th of May 2021.[4,7] Apart from the morbidity and mortality associated with the virus, there have been serious mental health implications. The emergence and outbreak of the novel coronavirus have also been trailed by some devastating effects globally, such as confusion, anxiety, and fear among the general public.[3] Higher incidence of anxiety disorder has been recorded after the start of the pandemic compared to the pre-pandemic level.[8–10] Such increase was also observed in Nigeria and was attributed to several factors, including inconsistent inflow of news about the pandemic, social distancing measures, loss of employment or income, constant robberies, and reports of food shortages and hunger.[11,12] However, the impact of health education in improving knowledge, changing unfavorable behaviors and attitudes, and effectively curbing infectious diseases and epidemics has been widely documented in the literature.[13] Because the population of Nigeria is relatively young, with a median age of 18.1 years, youths can function as agents of change by disseminating essential information.[14,15] Hence, youths are considered a vulnerable group in the pandemic.

This study assessed COVID-19-related knowledge, attitudes, and anxiety levels and their association with young people during the pandemic. It is crucial and would provide better insight to address knowledge and attitude gaps relating to the disease, thus helping control and manage the current ongoing pandemic and perhaps minimizing possible future outbreaks. It will further provide an insight into how the anxiety levels of the general public have changed following the imposed restrictions. All this information can serve as important basic information for stakeholders in public health and policymakers, enabling the planning of educational and health interventions for the population.

METHODS

Study design and setting

This was an online correlational cross-sectional study carried out among youths residing in five southeastern states of Nigeria: Anambra, Enugu, Imo, Aba, and Ebonyi. Anambra state is a commercial state known for businesses and entrepreneurs with a population of a 2.5 million in 2018; Enugu state is known to be the center of government in the southeastern region with a population estimated to be around 3.8 million in 2012, Imo state is known for entertainment, businesses, and farming with a population of 4.928 million in 2017. Abia state is also a commercial business area in eastern Nigeria, with 4,112,230 million in the last census. The last state, Ebonyi state is mainly known for farming and agriculture in general and had a population of 2,176,947 million during the latest census in 2018.[15] Between May 2021 and August 2021, the researchers recruited the study participants and collected data using an online platform. An online survey was adopted to minimize the spread of COVID-19 between participants and researchers.

Study Population and Eligibility Criteria

The study population included the Nigerian young adult population aged 18 to 35 years resident in the study area of this survey during the pandemic. Study participants' inclusion criteria included residence in the Southeast and the ability to understand the study questionnaire in the English language.

Sample Size Estimation

The total number of participants was calculated to be 397 using the following procedure for calculating qualitative variables in a cross-sectional survey:[16]

$$n = \frac{Z_\alpha^2 pq}{d^2}$$

n = sample size (?)
Z_α = standard normal variate (at 5% type 1 error (P <0.05) it is 1.96)
P = expected proportion in population based on pilot study, which is estimated at 43% of the southeastern population.
q = 1-P, complementary COVID-19 Pandemic knowledge attitude and anxiety
d = level of precision = 0.05

$$\text{therefore; sample size} = \frac{1.96^2 \times 0.43 \times (1-0.43)}{0.05^2} = 376$$

The sample size was expanded by 10% to account for non-response/attrition, resulting in 414 participants when rounded to the nearest ten.

To reach the needed number of study participants, we used a convenience sampling strategy. This is a non-probability sampling technique that allows participants to be chosen depending on their accessibility.[17] For data analysis, only questionnaires with all sections filled out by the respondents were considered.

Study Instrument

The questionnaire used for this study was adapted from previously published studies based on the author's permission and was modified slightly to easily understand and align

with the study objectives.[18,19] The questionnaire had four sections. The first section elicited data on sociodemographic characteristics, including respondents' age, sex, marital status, education, occupation, average household income, and ethnicity. In the second section, we asked participants to test their knowledge about the COVID-19 pandemic. The third section elicited responses on the respondents' attitudes toward the COVID-19 pandemic. This section included ten questions with three alternative responses ("Yes," "No," and "Maybe"). The fourth section of the questionnaire assessed the anxiety related to the COVID-19 pandemic comprising 15 questions structured on a four-point Likert scale ("Very much so," "Moderately so," "Somewhat," and "Not at all"). Two epidemiologists and biostatisticians assessed the content validity of the questionnaire, and we implemented their recommendations. The questionnaire was also pilot tested on 20 people selected by face-to-face purposive sampling, and the result was not included in the analysis. Cronbach's alpha was used to assess its validity. The outcome was 0.85, indicating that it was reliable.

Data Sources

The adapted questionnaire was drafted using an online Google Form. It was made open to all recognized Nigerian young adult residents who fit the study criteria from five southeastern states. To avoid duplicate survey completion, participants' invitations to participate in the study were distributed on social media platforms using a "one-time-only link" to the online questionnaire. Participants were automatically directed to the survey's entrance page after clicking on this "one time only" link to the questionnaire, which provided information on the study's aims, informed consent, rules of participation, data privacy, and the survey's potential risks and advantages. It took roughly 15 to 20 minutes to complete the study. The "one time only" link to the questionnaire was lost if it was not completed in one sitting. Participants could access the survey and complete it on a computer or a mobile device for convenience.

Variable Measurement and Protocols

Knowledge about the COVID-19 pandemic. We used 14 multiple-choice questions from a previous study by Lin et al.[19] The overall knowledge score for each participant was ascertained by assigning the score of 0 for each question with an incorrect response and 1 for each question with the correct response, then summing the scores. The scores were then converted scores to a percentage (out of a total of 14 points). We categorized the participants into three levels of knowledge according to arbitrary cut-off points: poor (0%-30% score), fair (31%-60%), and good (61%–100%).

Attitude toward COVID-19 pandemic. We used 10 questions adapted from a published study by Zhong et al.[18] Measurement questions included statements with three Likert-like responses ("Yes," "Maybe," and "No"). Each "Yes" response received a score of 2 points, each "Maybe" a score of 1 point, and "No," a score of 0 points. The attitude scores were summed, converted to percentages (out of a total of 20 points), and categorized the participants into three groups: poor (0%–30%), fair (31%–60%), and good (61%–100%).

Anxiety regarding the COVID-19 pandemic. We used 15 questions previously used in a survey by Lin et al.[19] Questions were structured into a 4-point Likert scale format based on their extent of agreement with the statement: "very much so," "moderately so," "somewhat," "not at all" with scores of 3, 2, 1, and 0 assigned, respectively. Negatively formulated statements were reverse coded. The scores were summed to calculate the anxiety scores, converted to percentages (out of 45 possible points), and categorized the participants into three levels of anxiety: low (0%-30%), moderate (31%-60%), and high (61%-100%).

Study analysis

We processed, edited, sorted, and coded data using a Microsoft Excel spreadsheet. Data analysis was done with the Statistical Package for Social Science (SPSS) version 25 software. This entire process was done on a computer using a password to ensure the utmost confidentiality. The data analysis included descriptive statistics (frequency, percentage, mean, standard deviation), which presented the distribution of the study participants according to the outcomes of interest. We employed the Chi-square test to determine the association of sociodemographic factors with anxiety levels. Then we used bivariate and multivariate logistic regression analyses to assess the extent to which knowledge and attitude about the COVID-19 pandemic were associated with COVID-19 related anxiety. A p-value of < 0.05 was considered statistically significant at the 95 percent confidence level.

Ethical considerations and consent

The health research ethics committee of the University of Nigeria Teaching Hospital, Ituku/Ozalla, Enugu, Nigeria, granted ethical permission for this study (Authorization number: NHREC/05/01/2008B-FWA00002458-1RB00002323). All participants agreed to anonymize their responses and compile them for research and publication. Only those who agreed to participate in the survey were automatically directed to it.

RESULTS

Data was obtained from 397 respondents with a response rate of 95.9%.

Sociodemographic Characteristics of the Respondents

Most respondents were between 25 and 29 years old (48.6%) and 55.9% were males. Majority (83.6%) were single, and had diploma/BSc degrees (80.1%). In addition to this, less than half (42.8%) of the respondents were gainfully employed.

Details of the monthly earnings revealed that they mostly (30.7%) earned over ₦90,000. The table further showed the ethnic origin of the respondents, with the majority (79.9%) from Ibo and 67.8% living in urban settings (Table 1).

Knowledge about the COVID-19 Pandemic

In general, an overall good knowledge about the COVID-19 pandemic was demonstrated by 88.2% of the respondents (Table 2). Specifically, the participants' level of awareness and knowledge of COVID-19 transmissions and symptoms shows that all participants have heard about COVID-19, with the majority getting their information from the Internet/social media (82.1%). 91.2% correctly identified that COVID-19 is caused by a virus and not wild animals (65.0%). Their responses further showed that the majority could accurately establish that persons may be asymptomatic following infection (80.9%) and anyone can be infected (98.0%). Their good level of knowledge was also reflected in their ability to correctly identify the symptoms, mode of transmission, and preventive measures for the virus (Table 2).

Table 1. Demographic characteristics of respondents (n=397)

Characteristics	Frequency (n)	Percentage (%)
***Age** (years)*		
18-24	86	21.7
25-29	193	48.6
30-35	118	29.7
Sex		
Male	222	55.9
Female	175	44.1
Marital Status		
Single	332	83.6
Married	65	16.4
Educational level		
Primary	2	0.5
Secondary	12	3.0
Diploma/BSc	318	80.1
MSc/PhD	65	16.4
Occupational Status		
Employed	170	42.8
Self-employed	109	27.5
Student/ Not working	118	29.7
Average household income in Nigerian Naira		
<15,000	74	18.6
15,001-30,000	81	20.4
30,001-60,000	68	17.1
60,001-90,000	52	13.1
> 90,000	122	30.7
Residential location		
Urban	269	67.8
Semi-urban	94	23.7
Rural	34	8.6
State of Residence		
Enugu	128	32.2
Abia	48	12.1
Ebonyi	41	10.3
Imo	40	10.1
Anambra	112	28.2

Attitudes towards COVID-19 Transmission and Symptoms

Most participants (68.0%) had a good attitude towards the COVID-19 virus transmission and symptoms (Table 3). Given the myths surrounding the pandemic, the majority (72.0%) agreed that the virus was real, and believed that preventive measures such as hand washing (93.7%), isolating/quarantining symptomatic individuals, and social distancing (91.9%) will minimize infection transmission. In addition, they were willing to read and share the right information about COVID-19 (94.2%) (Table 3).

Anxiety related to COVID-19 Pandemic

In responses to anxiety measurement questions, the most reported symptoms included not feeling frightened, worried, confused, tense, and upset. Slightly more than half (57.4%) of the respondents had low anxiety levels towards the COVID-19 pandemic, while the rest had either moderate (29.2%) or high levels of anxiety (13.4%). Therefore, majority of the respondents felt calm about the pandemic (57.2%), were not at all tense (63.2%), not upset related to the pandemic (57.2%), not frightened, or not worried (50.9%). However, majority were confused (67.3%) (Table 4).

Association between Sociodemographic Factors and Anxiety Level

There was no statistically significant association between sociodemographic variables and the level of anxiety towards the COVID-19 pandemic except for respondents' educational status (Table 5). Those with an MSc/PhD level of education experienced significantly lower anxiety levels (72.3%) compared to those with a diploma/BSc (55.5%) or ≤ secondary level education (33.3%) ($p = 0.006$) (Table 5).

Association between Knowledge, Attitude, and Anxiety Levels

The adjusted odds ratios showed that participants with good knowledge about COVID-19 transmission and symptoms were 2.42 times more likely to experience low levels of anxiety related to the COVID-19 pandemic compared to those with poor knowledge about COVID-19 transmission and symptoms (OR 2.42, 95% CI 1.15, 5.09). In other words, the odds of experiencing moderate to high levels of anxiety are lower for those with good knowledge of the COVID-19 transmission and symptoms, hence a statistically significant association ($p < 0.05$). Meanwhile, it was also found that by keeping attitude constant, the odds of participants experiencing higher levels of anxiety only increased by 0.68 (OR 0.68, 95% CI 0.43, 1.08). This suggests that participants with good attitudes were only 0.68

Table 2. Knowledge about COVID 19 transmission and symptoms (n=397)

Knowledge	Frequency (n)	Percentage (%)
Have heard of COVID-19	397	100.00
Source of information about COVID-19 [μ]		
Internet/social media	326	82.11
TV	193	48.61
Government enlightenment campaign	141	35.52
Friends and family	134	33.75
Newspaper	101	25.44
Others	8	2.02
COVID-19 virus is the same as the Flu virus?		
Yes	83	20.91
No	266	67.00
I don't know	48	12.09
Participant's response when asked what causes COVID-19		
Virus	362	91.18
Bacteria	10	2.52
Fungi	1	0.25
I don't know	24	6.05
Eating or contacting wild animals results in COVID-19 infection?		
Yes	76	19.14
No	258	64.99
I don't know	63	15.87
Which disease(s) do you think are similar to COVID-19? [μ]		
SARS	200	50.38
Malaria	176	44.33
Ebola	113	28.46
Typhoid	55	13.85
HIV/AIDS	33	8.31
None of the above	36	9.07
COVID-19 positive person could show no symptoms?		
Yes	321	80.86
No	62	15.62
I don't know	14	3.53
How long does it take for the COVID-19 symptoms to show-up?		
Less than 7 days	25	6.30
1-4 days	336	84.63
2-21 days	19	4.79
I don't know	17	4.28
When asked who can be infected with COVID-19		
Anyone can be infected	389	97.98
Young adults only	4	1.01
White people only	3	0.76
Older people only	1	0.25
Hand washing is important for the prevention of the infection?		
Yes	393	98.99
Maybe	4	1.01
Alcohol-based sanitizers	390	98.24
Soap/detergents	267	67.25
Clean surfaces with diluted chlorine	207	52.14
Water alone	6	1.51
The length of time hand washing takes to kill the virus		
Less than 20s	64	16.12
The 20s to 1 min	312	78.59
I don't know	21	5.29
Participant's response when asked to list symptoms of COVID-19		
Breathing difficulty	355	89.42
High fever	338	85.14
Dry cough	318	80.10
Fatigue	250	62.97
Runny nose	158	39.80
Muscle pain	132	33.25
Bleeding	17	4.28
Participant response when asked to mention how the virus spreads		
Air droplets (from patient sneezing/ coughing)	364	91.69
Close contact with people who have the virus	335	84.38
Contact with contaminated surfaces	319	80.35
Mosquitoes/flies	1	0.25
I don't know	7	1.76
Participants' overall knowledge of COVID-19		
Poor (0%-30% score)	2	0.50
Fair (31%- 60% score)	45	11.34
Good (61%-100% score)	350	88.16

[μ] *Multiple response option questions and participants are allowed to tick more than one.*

times more likely to experience higher levels of anxiety, hence no statistically significant association (p > 0.05) (Table 6).

DISCUSSION

We found good levels of knowledge and attitude among the study participants, with low levels of knowledge and poor attitude being significantly associated with COVID-related anxiety.

Awareness and Knowledge of COVID-19 Transmission and Symptoms

Literature in public health promotions has shown that public knowledge of a disease condition is an essential predictor of effective preventive practices in society.[20,21] This study revealed that the southeastern part of Nigerian youth had a high level of knowledge about COVID-19. Most of them got educative information about COVID-19 from social media, TVs, and friends and families. This finding is indicative of the effectiveness of the national and international campaign that was launched to reduce the spread of the pandemic following its outbreak on December 31, 2019. This finding is dissimilar to that of earlier studies in the literature on knowledge and awareness about COVID-19 among Nigerians, which reported that Nigerians showed poor awareness and compliance with the COVID-19 campaign and showed doubtful attitudes about the actual existence of the pandemic in the country.[5,22,23] Thus, while Nigerian and

Table 3. Attitude towards COVID-19 transmission and symptoms (n=397)

Characteristics	"Yes" (2 points)	Maybe (1 point)	"No" (0 points)
Think washing hands frequently can lower the risk of coronavirus infection	372 (93.70)	18 (4.53)	7 (1.76)
How likely to quarantine/isolate if you have fever and cough	293 (73.80)	55 (13.85)	49 (12.34)
Think social distance is essential to stop the spread	365 (91.94)	20 (5.04)	12 (3.02)
Think traveling across/within the country is safe during these times	60 (15.11)	47 (11.84)	290 (73.05)
Will you accept the COVID-19 vaccine	157 (39.55)	98 (24.69)	142 (35.77)
Patients with COVID-19 who are declared cured, should not be allowed to stay within the community at this time	83 (20.91)	76 (19.14)	238 (59.95)
Willing to read and share with others the right information about COVID-19	374 (94.21)	17 (4.28)	6 (1.51)
Believe COVID-19 in Nigeria is real	286 (72.04)	53 (13.35)	58 (14.61)
Government response towards controlling COVID-19 satisfactory	47 (11.84)	46 (11.59)	304 (76.57)
Media/social media coverage of the COVID-19 pandemic satisfactory?	204 (51.39)	59 (14.86)	134 (33.75)

Overall Attitude towards COVID-19	Frequency	Percent
Poor *(0%-30% score)*	9	2.27
Fair *(31%-60% score)*	118	29.72
Good *(61%-100% score)*	270	68.01

Table 4. Anxiety related to COVID-19 pandemic (n= 397)

Characteristics	Very much so (3 points)	Moderately so (2 points)	Somewhat (1 point)	Not at all (0 points)
I feel calm*	227 (57.18)	121 (30.48)	36 (9.07)	13 (3.27)
I am tense	19 (4.79)	60 (15.11)	67 (16.88)	251 (63.22)
I feel upset	41 (10.33)	44 (11.08)	85 (57.18)	227 (57.18)
I am presently worrying over possible misfortunes	57 (14.36)	59 (14.86)	102 (25.69)	179 (45.09)
I feel satisfied*	118 (29.72)	135 (34.01)	76 (19.14)	68 (17.13)
I feel frightened	32 (8.06)	45 (11.34)	70 (17.63)	250 (62.97)
I feel comfortable *	149 (37.53)	126 (31.74)	65 (16.37)	57 (14.36)
I feel nervous	31 (7.81)	52 (13.10)	83 (20.91)	231 (58.19)
I am worried	51 (12.85)	51 (12.85)	93 (23.43)	202 (50.88)
I feel confused	32 (8.06)	40 (10.08)	58 (14.61)	267 (67.25)
I wish I could be as happy as others seem to be	113 (28.46)	60 (15.11)	59 (14.86)	165 (41.56)
I am calm, cool, and collected*	238 (59.95)	104 (26.20)	40 (10.08)	15 (3.78)
I have disturbing thoughts	60 (15.11)	59 (14.86)	83 (20.91)	195 (49.12)
I make decisions easily*	92 (23.17)	160 (40.30)	85 (21.41)	60 (15.11)
I get in a state of tension or turmoil as I think over my recent concerns and interest	62 (15.62)	95 (23.93)	107 (26.95)	133 (33.50)

Overall anxiety level	Frequency (n)	Percentage (%)
Low *(0-30% score)*	228	57.43
Moderate *(30- 60% score)*	116	29.22
High *(60- 100% score)*	53	13.35

** responses scored in reverse*

other developing countries were previously reported to have low knowledge and understanding of correct facts about COVID-19 [5] (NCDC, 2020), this study finding suggests progress and evidence that the programs and strategies to educate the Nigerian public through social media, TVs, and government enlightenment campaign are productive. Another study in 2020 in India reported a moderate level of knowledge of COVID-19 infection and its preventive measures,[3] which is contrary to this present study, which shows a higher knowledge of COVID-19 infection and preventive measures. Similarly, other recent studies on knowledge and awareness of COVID-19 [24–26] have also confirmed that Nigerians have good knowledge of COVID-19, which corroborates with the findings of this present study.

However, the cut-off points for "high" level of knowledge in our study were arbitrarily based primarily on

Table 5. Association between sociodemographic characteristics and anxiety level among survey participants (n=397)

Variables	Anxiety Levels		P-value*
	Low (n=228)	Moderate/ High (n=169)	
***Age** (years)*			
18-24	50 (58.14)	36 (41.86)	0.426
25-29	116 (60.10)	77 (39.90)	
30-35	62 (52.54)	56 (47.46)	
Gender			
Male	125 (56.31)	97 (43.69)	0.683
Female	103 (58.86)	72 (41.14)	
Educational Level			
≤Secondary[R]	5 (33.33)	10 (66.67)	0.0057*
Diploma/BSc	176 (55.52)	141 (44.48)	
MSc/PhD	47 (72.31)	18 (27.69)	
Residential area			
Rural[R]	19 (55.88)	15 (44.12)	0.227
Semi-urban	47 (50.00)	47 (50.00)	
Urban	161 (60.07)	107 (39.93)	

**Based on chi-square test of association*

Table 6. Logistic regression analyses on the association between knowledge, attitude, and anxiety levels

Variables	Anxiety Levels		Model 1[a]	Model 2[b]	Model 3[c]
	Low (n=228)	Moderate/ High (n=169)			
Knowledge					
Good	216 (59.18)	149 (40.82)	2.42*	2.42*	2.17*
Poor	12 (37.50)	20 (62.50)	(1.15-5.12)	(1.15-5.12)	(1.01-4.69)
Attitude					
Positive	163 (55.07)	133 (44.93)	0.70	1.04	1.00
Negative	65 (64.36)	36 (35.64)	(0.43-1.08)	(0.69-1.57)	(0.67-1.54)

**Statistically significant (p<0.05)*

[a] Model 1: Crude OR (95% CI)
[b] Model 2: Adjusted OR (95% CI), adjusted for age and sex
[c] Model 3: Adjusted OR (95% CI), Model 2 plus an adjustment for education

the distribution of the scores, and the knowledge points measured in our study may not necessarily correspond to the thought process that functioned as the drivers of engaging in COVID-19 prevention and control activities.[21] Furthermore, certain questions (e.g., source of information about COVID-19) did not directly measure knowledge. Construct validity of knowledge measurement questions was a major issue in this study.

Attitude towards COVID-19 Transmission and Symptoms

Similarly, the Attitude of Nigerian youths toward COVID-19 prevention was found to be proportionally high. Still, a substantial proportion of the population reported poor attitudes despite accurate knowledge about the pandemic. Major areas of doubt were in adhering to preventive measures and perception about government and media efforts' roles in sensitizing the public. Given this measure of misconceptions and unbelief among Nigerians, Reuben et al.,[24] in their study, stated that community-based health campaigns are required to sustain positive attitudes toward recommended preventive and interventional measures to curb the pandemic. A study conducted in s sub-Saharan Africa in the year 2020 reported a poor attitude towards the COVID-19 pandemic,[27–29] which is contrary to the present study that showed a positive attitude towards the COVID-19 pandemic among youth. A survey in Kenya and Bangladesh in 2021 among youth supported our present findings.[30,31] Meanwhile, Reuben et al.[24] corroborated with the findings of a higher proportion of good attitudes shown in this study while documenting the trajectory of changes in attitudes towards the Pandemic that have taken place over time. Including an initial misconception that the infection is a 'big man disease or white men's disease.' Thus, this change in positive attitudes might have been due to different information dissemination methods on controlling pandemics, especially through the internet.[14]

However, there were issues with attitudes measurement questions. Attitude refers to one's feelings toward a certain behavior. While some of the attitude measurement questions could be considered as attitudes towards COVID-19 prevention efforts, such as the willingness to accept the COVID-19 vaccine or stigmatization of recovered patients, others (e.g., opinion on the effectiveness of hand hygiene in reducing the risk of infection, whether COVID-19 in Nigeria is real) do not seem to reflect this construct accurately. Caveat regarding construct validity is recommended in the interpretation of our findings of attitudes. Future studies should consider asking questions related to practices, behaviors, and beliefs as have been done in other settings.[21]

Anxiety Related to the COVID-19 Pandemic

Furthermore, the rapid spread of the infection into the phase of community transmission negatively influenced the anxiety level of the Southeastern Nigerian Youths. This study shows that almost half (42.8%) of the population showed increased anxiety levels associated with the COVID-19 pandemic while (57.4%) shows low anxiety levels. This corroborates with previous findings linking young people with an increased risk of COVID-19-related anxiety.[8,21,32] Also, it agrees with the report of Salari et al.[9] who showed that COVID-19 caused physical health concerns and reduced mental health status among the general public. The

most trigger for anxiety disorder among Nigerian youth has been linked with fear of the unknown, inconsistent inflow of news, social distancing, increasing numbers of sufferers and deaths, lack of jobs, loss of employment, incessant robbery attacks, and worst of all, a hunger that characterized the period.[10,12] Another finding reported from a descriptive survey on Nigerians' psychological distress experience amid the COVID-19 Pandemic showed that about 51% and 49% of Nigerians present moderate and severe anxiety disorders, respectively.[8] Thus, a deliberate effort to reduce the anxiety level of Nigerians is necessitated, and this is possible by intervening in the trigger factors. However, important limitations appeared in the measurement of our outcome: anxiety. We adopted an ad hoc instrument used in a previous study in China[19] instead of the standard tool for the measurement of anxiety disorders such as the Generalized Anxiety Disorder 7 (GAD-7) questionnaire, which had an established sensitivity and specificity at specific cut-off scores and had been used and validated in numerous previous studies.[33] This undermined the validity of our outcome measurement.

Factors Associated with Anxiety Level

Educational level was the only statistically significant factor associated with anxiety level related to the COVID-19 pandemic. Those with an MSc/PhD level of education experienced proportional lower anxiety levels followed by those with a diploma/BSc, and the most anxiety level was recorded among those with secondary level education. This finding suggests that academic exposure helps position the youths to increase access to accurate information.[34] Since knowledge of infection patterns and appropriate precautions to reduce its spread is associated with better mental health in a disease outbreak[5,35] arguably, the more educated persons in the population responded in more informed behavior than their less-educated counterparts. Knowledge can potentially motivate individuals to make decisions, preventing and curbing the epidemics by causing positive behavioral changes and perceptions toward the pandemic.[5]

Association between knowledge, attitude, and anxiety levels

The significance of knowledge as a determinant of anxiety level was further illustrated in the positive relationship between good knowledge about COVID-19 transmission and symptoms to lower risk for related anxiety; as the odds of experiencing moderate to high levels of anxiety showed to be lower for those that have good knowledge. This finding agrees with the study of Galić et al.,[36] who examined the relationship between COVID-19 related knowledge and mental health in a Croatian population. Their results showed that lower levels of anxiety and pessimism were associated with higher levels of awareness about transmitting methods.

On the contrary, lack of adequate knowledge has been implied to be associated with high-risk behavior, and informed knowledge could cause a shift towards positive attitudes[5,37] and reduced anxiety levels[38] while helping to control the pandemic[8] Although we found an association between knowledge and anxiety, the findings of our study should only be considered exploratory and as a basis for future studies using GAD-7, the English version, as the primary measurement instrument for anxiety. These findings are of practical implication for policymakers and healthcare agencies to continue efforts to disseminate and maintain accurate public knowledge about the pandemic as key to reducing the spread.[5,36]

Strengths and Limitations

Our study's primary strength is in its contribution of basic information for relevant stakeholders regarding COVID-19-related anxiety in a vulnerable group with strong potential to contribute to the existing disease control and prevention efforts toward COVID-19 pandemic among youth residing in the eastern part of Nigeria and around the globe. However, several limitations should be considered in the interpretation of the study findings. Firstly, the cross-sectional study design limited any ability to make a causal inference concerning the association between knowledge and anxiety. Secondly, issues about the construct validity of the measurement of knowledge, Attitude, and anxiety related to COVID-19 affected the validity of the findings. Thirdly, this study was conducted only among youths with internet access and a relatively high level of socioeconomic status, which limited the generalizability of the findings beyond this specific context.

CONCLUSION

Residents in five southeastern Nigerian states had high knowledge, a positive attitude, and a low degree of anxiety. Higher educational levels were associated with lower levels of anxiety. Those with higher education qualifications had greater COVID-19 knowledge and understanding, as well as lower anxiety levels. There was no correlation between attitude and anxiety level. Study findings will enable mental health experts to concentrate their efforts on populations with high anxiety levels, informing them about the common negative psychological consequences if not managed properly and as well and encouraging them to engage in healthy practices. By focusing on the results of the study, Institutions like the National COVID-19 Commission and non-governmental organizations (NGOs) may devise and implement a psychologically sensitive strategy program to assist individuals in relaxing.

Statement of Authorship

All authors contributed in the conceptualization of work, acquisition and analysis of data, drafting and revising and approved the final version submitted.

Author Disclosure

All authors declared no conflicts of interests. All the authors have read and agreed to the final manuscript.

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