



COVID-19 pandemic: an online-based survey of knowledge, perception, and adherence to preventive measures among educated Nigerian adults

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Abstract

Aims One of the ways to manage the current coronavirus disease 2019 (COVID-19) pandemic is to monitor the public knowledge, risk perceptions, adherence to preventive measures, and level of preparedness behaviors. This is important in resource-limited countries. This study determined the knowledge and perception regarding COVID-19; adherence to COVID-19 preventive measures; as well as predictors of self-perceived risk of contracting COVID-19 among Nigerian adults.

Methods A cross-sectional study was conducted among Nigerian adults ≥ 18 years using an online survey. A convenience sampling method was utilized to recruit a total of 1022 study participants. The participants were recruited using the authors' social media networks. Data were analyzed using descriptive and inferential statistics at a 5% level of statistical significance.

Results Generally, a high proportion of respondents had correct knowledge about COVID-19. However, only approximately half (49.8% and 49.9%) had correct knowledge that obesity was a risk factor for COVID-19 and that antibiotics cannot be used to treat COVID-19. Most (84.1%) did not have a self-perceived risk of contracting COVID-19. Most (81.0%) have been avoiding crowded places and 61.3% washed their hands frequently. Predictors of self-perceived risk of COVID-19 were age 40–59 years (OR 2.05, CI 1.217–3.435), ≥ 60 years (OR 4.68, CI 1.888–11.583), and visiting crowded places (OR 2.27, CI 1.499–3.448).

Conclusion Our study recommends more rigorous public health education aimed at improving COVID-19 outbreak response in Nigeria. In addition, physical and social distancing should be emphasized across all age groups with additional focus on the older population.

Keywords Coronavirus disease 2019 · Pandemic · Risk perception · Transmission control · Nigeria

Introduction

Coronavirus disease 2019 (COVID-19) has been a major public health concern since December 2019 when it was first detected in Wuhan, China. The causal virus called the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is highly infectious and the disease has recorded more than 19 million cases within the space of approximately eight months of the outbreak. As of August 5, 2020, 215 countries of the world (Worldometer 2020) have been affected by the highly infectious SARS-CoV-2 and it still has a high chance of reaching many new territories. The **global mortality rate was pegged at approximately 3.76% in early August 2020 (Worldometer 2020), but a shift from this is expected to occur before the end of the pandemic.**

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Coronavirus disease 2019 was first confirmed in Nigeria on February 27, 2020, in Lagos State. The index case was an Italian who traveled from Italy to Nigeria (Maclean and Dahir 2020). On March 9, 2020, a Nigerian who had contact with the Italian was confirmed the second person infected with SARS-CoV-2. Nigeria ranked 3rd in the total number of active COVID-19 cases in Africa as of August 4, 2020. As of the time of this report, there were 44,433 confirmed cases, from which 31,851 and 910 have recovered and died, respectively (Worldometer 2020). To curtail the spread of SARS-CoV-2 in Nigeria, a total lockdown was first imposed on two states (Lagos and Ogun states) and the Federal Capital Territory (FCT), while others were subjected to a partial lockdown. However, as at the time of this report, the lockdown has been relaxed for the recovery of the economy.

Coronavirus disease 2019 has become a major issue in Nigeria as cases have been confirmed in all 36 states of the country, including the FCT (Nigeria Centre for Disease Control 2020). From an epidemiological point of view, the observed trend in the incidence of newly confirmed cases in Nigeria suggests that it may take a while before the country can flatten the COVID-19 incidence curve. Due to the lack of a vaccine or proven drugs for the management of the disease, transmission control becomes a very important intervention that can abate the spread of the disease in the community and health care settings (Li et al. 2020). This is even more important in a country that is deficient in a good public health care system. Despite the efforts put in place by the Nigerian government to mitigate the impact of COVID-19, poor public knowledge, attitudes, and practices of people relative to COVID-19 control can mar even the best national public health response.

Nigeria is currently in the heat of the COVID-19 pandemic, and to guarantee a successful early containment of the disease, in the absence of a vaccine, adherence to control measures determined by peoples' knowledge, attitudes, and practices toward COVID-19 is very important (Zhong et al. 2020). The aim of this study therefore was to determine the knowledge and perception of COVID-19 among educated Nigerian adults during a period when Nigeria is experiencing a consistent increase in the number of new cases. This study also assessed the adherence of Nigerian adults to the current COVID-19 preventive measure guidelines in Nigeria. Lastly, this study determined the predictors of self-perceived risk of contracting COVID-19 among the study participants. Findings from this study would provide useful information for public health policy development and implementation for quick response to the COVID-19 outbreak in Nigeria.

Materials and methods

Study area

The study was carried out in Nigeria, the most populated country in Africa. The country's population was estimated to be approximately 206 million in 2019 (World Population Prospects 2019). Nigeria is located on latitude 10° North and longitude 8° East and has a total area of 923,768 km². According to the World Bank, approximately 49% of the population live in rural areas, and 51% in urban areas in 2019 (World Bank 2020). As at the time of this study, it was estimated that Nigeria had 96.05 million internet users amounting to 46.6% of the population (Clement 2020). The literacy rate among the Nigerian adult population was 62.02% in 2018 (UNESCO <http://uis.unesco.org/en/country/ng>).

Study design and sample size

This cross-sectional study was conducted from March 31 to April 25, 2020. To avoid physical contact with our participants, a convenience sampling method was utilized to recruit the study participants. We used the research team's social media networks (WhatsApp, Facebook, Twitter, and Instagram) and emails to source information via an online-based survey. The participants resided predominantly in urban and peri-urban communities. Only adults (age 18 years and above) were recruited for the study. Nigerians in the diaspora, foreigners living in Nigeria, and medical practitioners were excluded from the study. COVID-19 transmission is still on-going; thus, we had no prevalence data that could be used for the estimation of the sample size. Therefore, the minimum sample size was calculated based on the country's estimated 100 million adults population in 2019 (World Population Prospects 2019) and a 4% precision using an online-based sample size estimator (<https://www.checkmarket.com/sample-size-calculator>). A 95% confidence level was used for the sample size estimation. Although a sample size of 601 participants was computed, all those who volunteered to participate in the study were included. Overall, we recruited 1258 participants for the study, but only 1022 had data that were fit for analysis. The study precision improved to approximately 3% when the inflated sample size of 1022 was used.

Data collection

Data was collected using a structured questionnaire adapted from the National Health Commission of the People's Republic of China protocols and guidelines on COVID-19 (National Health Commission of the People's Republic of China 2020a, b). The questionnaire comprised four sections, namely socio-demographics, knowledge about COVID-19, perceptions about COVID-19, and adherence to preventive measures.

Section one of the questionnaire comprised 10 questions on the socio-demographic characteristics of the participants. Information such as age, gender, educational level, religion, and marital status were obtained in this section. In section two, 26 questions related to knowledge about transmission, risk factors, symptoms, disease progression, treatment, and prevention of COVID-19 were asked. The third section had questions related to the perception of the respondents about COVID-19. The final section contained 12 questions on adherence to preventive measures against COVID-19.

Ethical approval

The study protocol was approved by the Ethics Committee of the University of Medical Sciences/Teaching Hospital, Ondo City, Ondo State, Nigeria. Careful explanation of the purpose, content, and implication of the research was made known to the participants. Confidentiality of the information provided was assured.

Statistical analysis

Data generated were checked for accuracy and coded. Subsequently, the data were then exported to SPSS version 24 (SPSS, Chicago, IL) for statistical analysis. Descriptive statistics such as frequency counts, percentages, and means were used to present responses that emanated from the survey. Chi-square test was used to determine bivariate associations between the dependent variable and selected socio-demographic features such as age, gender, marital status, and occupation of respondents; knowledge; perception; and preventive measures on COVID-19. Logistic regression analysis was used to determine the predictors of self-perceived risk of contracting COVID-19 among subjects recruited for the study. Variables on socio-demographic characteristics, knowledge, perception, and preventive measures on COVID-19 were included in the model. The statistical level of significance was set at $P < 0.05$.

Results

The mean age of the participants was 33.4 ± 11.8 years, 53.5% were males, and 52.2% were not married. The majority (88.5%) of the participants had education up to the tertiary level and approximately two-fifth (40.3%) were civil servants (Table 1).

Most of the respondents had encountered information about the mode of transmission (94.1%) and prevention (91.4%) of COVID-19. The internet was the most (97.0%) frequently reported source of information about the disease (Table 2).

Table 1 Sociodemographic characteristics of the respondents

Variables	Frequency (N = 1022)	Percentage (%)
Age (years)		
18–39	756	74.0
40–59	230	22.5
≥ 60	36	3.5
Gender		
Male	547	53.5
Female	475	46.5
Marital status		
Married	489	47.8
Not married	533	52.2
Education		
Tertiary	904	88.5
Senior secondary	112	11.0
Primary	6	0.6
Religion		
Christianity	956	93.5
Islam	56	5.5
Others	10	1.0
Occupation		
Trading	101	9.9
Civil servant	412	40.3
Farming	21	2.1
Self-employed	6	0.6
Student	241	23.6
Unemployed	79	7.7
Others	162	15.9

Correct knowledge about the mode of transmission, risk factors, symptoms, disease progression, treatment, and prevention of COVID-19 was generally high among the study participants. A high proportion (80.4%) of the respondents correctly reported that chronic diseases were a risk factor for severe COVID-19, but only 49.8% knew that obesity was a risk factor for severe COVID-19. Although a higher proportion of the respondents correctly knew that cough (95.3%) and fever (89.3%) were symptoms of COVID-19, only a few correctly knew that fatigue (47.4%) and muscle pain (30.9%) were also symptoms of the disease. Less than half (46.0%) knew that persons infected with SARS-CoV-2 had reduced occurrence of common cold-associated symptoms such as stuffy nose, runny nose, and sneezing. Quite a number (86.3%) of the respondents knew that not all persons infected with SARS-CoV-2 progressed to the severe form of COVID-19 and 70.5% knew that most people infected with SARS-CoV-2 will not die of the disease. Even though almost all the participants (94.7%) correctly reported that there was currently no effective cure but early management of COVID-19 could aid recovery, 50.1% still wrongly stated that antibiotics

Table 2 COVID-19 information which respondents have heard about

Variables	Frequency (N = 1022)	Percentage (%)
Information domain*		
Transmission	962	94.1
Prevention	934	91.4
Management	668	65.4
People at risk	774	75.7
Others	40	3.9
Frequency of hearing about COVID-19		
Very often	810	79.3
Often	158	15.5
Sometimes	41	4.0
Never	13	1.3
Sources of information*		
Internet	991	97.0
Radio	545	53.3
Television	797	78.0
Health centers	205	20.1
Friends	593	58.0
Community members	270	26.4
Church	416	40.7
Mosque	35	3.4
Others	31	3.0

*Multiple response

Others (information domain); conspiracy theories, benefit of good hygienic practices, data and statistics, death rate, economic impacts, genotypic mutation, convalescent plasma therapy, pathophysiology, diagnosis, morphology

Others (sources of information); WHO, NCDC, UNICEF, newspaper, place of work, university led webinar, seminar/training, books, family members

can be used to treat COVID-19. More than 90% of the participants knew that avoidance of crowded places, staying at home during transmission, and regular hand washing with soap under running tap could prevent COVID-19 transmission (Table 3).

A total of 98.5% agreed that the outbreak of COVID-19 in Nigeria was real, while about a tenth (8.4%) perceived it as a disease of the rich people. Although 54.1% of the respondents perceived that the government of Nigeria is not handling the COVID-19 outbreak well, most (95.8%) still believed the government will win the battle against the COVID-19 outbreak in Nigeria (Table 4).

Only a few, 15.9%, believed they were at risk of contracting COVID-19. The commonly adduced reasons for not being at risk of contracting COVID-19 among those who did not perceive themselves to be at risk of contracting COVID-19 were they always avoided crowded places (69.1%) and always washed their hands with soap under a running tap (67.1%) (Table 5).

This study showed that 19% of the respondents had visited crowded places recently, 38.7% did not wash their hands with soap under running water very often, 37% rarely or never used hand sanitizers, and 64% did not wear face masks. The majority (87.5%) of the respondents complied with the 'stay at home' government's policy to arrest the spread of COVID-19 (Table 6).

Factors that were significantly associated with self-perceived risk of contracting COVID-19 were age, gender, marital status, occupation, frequency of hearing about COVID-19, visitation to crowded places, use of hand sanitizers, compliance with a stay at home instruction from the government, and history of self-treatment with preventive drugs against COVID-19 ($P < 0.05$) (Table 7). Respondents who were 60 years and above were approximately five times more likely to perceive themselves as having a risk to contract the disease (OR 4.68, CI 1.888–11.583) compared to respondents aged 18–39 years. Female respondents were 0.5 times less likely to perceive themselves as having a risk to contract COVID-19 (OR 0.51, CI 0.352–0.751) when compared to male respondents. Respondents who were married were 0.5 times less likely to perceive themselves as having a risk to contract COVID-19 (OR 0.53, CI 0.321–0.888) compared to those who were not married. Visitation to crowded places was three times more likely to predict the self-perceived risk of contracting COVID-19 (OR 2.27, CI 1.499–3.448) compared to not visiting crowded places (Table 7).

Discussion

To the best of our knowledge, this is the first comprehensive report in Nigeria that considered the knowledge about the spread, symptoms, disease progression, risk factors, treatment, and preventive measures against COVID-19. Also, our study assessed perceptions about COVID-19 and adherence to preventive measures among the Nigerian population. We also determined the predictors of self-perceived risk of contracting COVID-19.

A common source of information about COVID-19 in this study was the internet. This is similar to what was reported in a recent study from Egypt, which also identified the internet as the most common source of information about COVID-19 (Abdelhafez et al. 2020). The use of the internet, however, has also increased the influx of fake and unauthenticated news. Caution should therefore be exercised in the use of online outlets as the major source of information by individuals. Doubtful online information should be verified from other reliable sources.

The knowledge about the spread, symptoms, disease progression, risk factors, treatment, and preventive measures against COVID-19 in this study was generally good. This can be attributable to the high level of education of our

Table 3 Knowledge about COVID-19 (N = 1022)

Variables	Correct response	Percentage (%)
Eating or contact with wild animals could result in infection with COVID-19	312	30.5
COVID-19 spreads via respiratory droplets of infected individuals when they sneeze or cough	999	97.7
No transmission of COVID-19 without fever or other symptoms	723	70.7
Money can serve as vehicle of COVID-19 transmission	839	82.1
Older people are more likely to have severe COVID-19	912	89.2
Chronic illnesses is associated with severe COVID-19	822	80.4
Non-obese condition is associated with severe COVID-19	509	49.8
Symptoms of COVID-19		
Fever	913	89.3
Fatigue	484	47.4
Cough	974	95.3
Muscle pain	316	30.9
Sneezing	889	87.0
Persons infected with COVID-19 have lower frequency in occurrence of common cold-associated symptoms	470	46.0
Not all persons with COVID-19 will develop severe cases of the disease	882	86.3
Most people infected with COVID-19 die from it	720	70.5
No effective cure for COVID-19 but early management of infection can aid recovery	968	94.7
Antibiotics can be used to treat COVID-19	510	49.9
Wearing of face mask can protect against infection with COVID-19	852	83.4
Children and young adults need not take measures to prevent against COVID-19 because the disease is more severe among old adults	878	85.9
Avoidance of crowded places is necessary for COVID-19 prevention	1004	98.2
Coronavirus disease can be prevented by avoiding the use of public transportation	949	92.9
Coronavirus disease can be prevented by staying at home during transmission period	1003	98.1
Coronavirus disease can be prevented by washing of hands regularly with soap and water under running tap	1007	98.5
Coronavirus disease can be prevented by covering of mouth and nose while sneezing or coughing	989	96.8
Isolation and treatment of people who are infected with COVID-19 are effective ways to reduce the spread of the virus	1004	98.2
People who have contact with someone infected with COVID-19 should be isolated immediately in a designated isolation center	999	97.7
The observation period during isolation of people who are infected with COVID-19 is 14 days	975	97.4

*Multiple response

respondents as corroborated by a study among educated people in China, which also revealed good knowledge about COVID-19 (Zhong et al. 2020). However, quite a number of our study's participants misconstrued sneezing as a symptom of COVID-19. This deviates from recent studies in Saudi Arabia and Malaysia, where the participants showed better knowledge in differentiating between common cold-related symptoms from those of COVID-19 (Al-Hanawi et al. 2020; Azlan et al. 2020). Although unprotected sneezing is one of the effective ways of transmitting the novel coronavirus from an infected individual, sneezing is not part of the community case definitions for COVID-19 according to NCDC guidelines. More public enlightenment on the community case definitions of COVID-19 is needed to avoid the stigma associated with sneezing in public places that are increasingly becoming high in Nigeria.

The approximately 20% and 50% of respondents who had lack of knowledge about the relationship between COVID-19 and chronic illnesses and obesity, respectively, is disturbing, as there is documented evidence that older individuals with chronic illnesses and obesity need to take extra precaution to prevent themselves from contracting COVID-19 because they are more at risk of suffering from COVID-19-related complications (Guan et al. 2020; Zhou et al. 2020).

Another call for concern is the reasonable number of respondents who believed that antibiotics can be used for managing COVID-19 and those who did not know that antibiotics cannot be used for managing COVID-19. These two groups of individuals could become victims of inappropriate use of antibiotics.

The observation that some individuals believed that COVID-19 is a disease of the rich is disturbing. This set of

Table 4 Perceptions about COVID-19

Variables	Frequency (N = 1022)	Percentage (%)
COVID-19 outbreak in Nigeria is real		
Strongly agree	740	72.4
Agree	267	26.1
Disagree	7	0.7
Strongly disagree	8	0.8
COVID-19 is a disease of the rich people		
Strongly agree	26	2.5
Agree	60	5.9
Disagree	458	44.8
Strongly disagree	478	46.8
Total lockdown of the nation will help to control the spread of COVID-19		
Strongly agree	541	52.9
Agree	405	39.6
Disagree	63	6.2
Strongly disagree	13	1.3
Compliance with preventive measures will curtail the spread of COVID-19 over time		
Strongly agree	683	66.8
Agree	324	31.7
Disagree	12	1.2
Strongly disagree	3	0.3
The Nigerian government is handling the problem with COVID-19 well		
Strongly agree	72	7.0
Agree	481	47.1
Disagree	352	34.4
Strongly disagree	117	11.4
I have confidence that Nigeria can win the battle against COVID-19		
Strongly agree	569	55.7
Agree	410	40.1
Disagree	35	3.4
Strongly disagree	8	0.8

individuals are not likely to adhere to the COVID-19 prevention guidelines and this may mar the current efforts targeted against this highly contagious disease. Findings from this study revealed that our study participants are quite optimistic that the Nigerian government can win the current battle against COVID-19. Study participants from recent studies among Saudi Arabia and Chinese populations also showed similar optimism (Al-Hanawi et al. 2020; Zhong et al. 2020). The previous Nigerian government response to the Ebola outbreak may be a possible reason why the participants are confident that the government can handle the current COVID-19 outbreak.

Even though our respondents reported adherence to some precautionary measures to prevent the spread of COVID-19, the adherence in our study was lower compared to the measures taken in other countries such as China and Egypt (Abdelhafez et al. 2020; Zhong et al. 2020). The lower adherence reported in our study was largely due to the inability of the participants to afford hand sanitizers and its scarcity. Others felt its use was not necessary. The use of a face mask by a few of our respondents was consistent with the observation recorded in Ethiopia (Akalu et al. 2020). The Centers for Disease Control and Prevention (CDC) has recommended the use of face masks in areas where there is significant community transmission of COVID-19 (CDC 2020). The WHO also recommended the use of face masks for the population at risk of exposure and the vulnerable groups (WHO 2020). In Nigeria, where there is no efficient public health alert system, reliable disinfection program, and increase in the transmission rates in many major cities, the government and the local public health agencies of the country have made the right decision in enforcing the wearing of face masks in public places.

The use of vitamins was the most common preventive chemotherapy used by our respondents. Although an earlier study supported the use of vitamins for the management of COVID-19 (Lee et al. 2020), a more recent review of the evidence on

Table 5 Self-perceived risk of contracting COVID-19

Variables	Frequency (N = 1022)	Percentage (%)
Self-perceived risk of contracting COVID-19		
No	859	84.1
Yes	163	15.9
Reasons for not being at risk of contracting COVID-19*		
I always avoid crowded places	706	69.1
I wash my hands always with soap under running tap	688	67.3
I always take chloroquine, herbs, and other medications as preventive measures	42	4.1
I always use hand sanitizer	486	47.6
I always use face mask whenever I go out	218	21.3
Others	123	12.0

Table 6 Adherence to COVID-19 preventive measures

Variables	Frequency	Percentage (%)
Visitation to crowded place in recent times		
Yes	194	19.0
No	828	81.0
Regular hand washing with soap and water under a running tap		
Very often	626	61.3
Often	297	29.1
Sometimes	92	9.0
Never	7	0.7
Use of hand sanitizer		
Always	644	63.0
Rarely	328	32.1
Never	50	4.9
Reasons for a rare or non-usage of hand sanitizer		
I cannot afford it	101	9.9
I do not know where to buy it	4	0.4
It is scarce to get	105	10.3
It is not necessary	103	10.1
Others	65	6.4
Wearing of face mask when leaving home in recent times		
Yes	368	36.0
No	654	64.0
Reasons for non-usage of face mask		
I cannot afford it	49	4.8
Price hike	101	9.9
I do not know how to use it	4	0.4
I do not know where to buy it	50	4.9
It is not necessary	334	32.7
I have been indoors	90	8.8
Others	26	2.5
Compliance with stay at home instruction from the government		
Yes	894	87.5
No	128	12.5
Reasons for non-compliance with stay at home instructions		
I earn daily income	33	3.2
My employer is not releasing me from work	25	2.4
I am on grade level 13 and above, so I have to go to work	18	1.8
I have urgent matters to attend to	31	3.0
I need to attend church or mosque	2	0.2
Others	19	1.9
History of self-treatment with perceived preventive drugs against COVID-19 since the outbreak		
Yes	288	28.2
No	734	71.8
Common medications used for self-prevention against of COVID-19		
Chloroquine	16	1.6
Antibiotics	17	1.7
Vitamins	220	21.5
Other	35	3.4

Table 7 Predictors of self-perceived risk of contracting COVID-19

	Self-perceived risk of contracting COVID-19		<i>P</i> value [†]	Adjusted OR (95% CI) [‡]	Adjusted <i>P</i> value [§]
	Yes (%)	No (%)			
Age (years)					
18–39	14.7	85.3	0.111	1.00 (Reference)	
40–59	18.7	81.3		2.05 (1.217–3.435)	0.007*
≥ 60	25.0	75.0		4.68 (1.888–11.583)	0.001*
Gender					
Male	19.7	80.3	<0.0001	1.00 (Reference)	
Female	11.6	88.4		0.51 (0.352–0.751)	0.001*
Marital status					
Married	14.9	85.1	0.393	0.53 (0.321–0.888)	0.016*
Not married	16.9	83.1		1.00 (Reference)	
Occupation					
Trading	18.8	81.2	0.597	1.318 (0.724–2.398)	0.366
Civil servant	16.7	83.3		1.00 (Reference)	
Farming	9.5	90.5		0.360 (0.078–1.662)	0.191
Student	16.6	83.4		1.201 (0.690–2.090)	0.517
Others	13.4	86.6		0.700 (0.425–1.155)	0.163
Frequency of hearing about COVID-19					
Very often	17.0	83.0	0.159	1.00 (Reference)	
Often	13.3	86.7		0.73 (0.430–1.207)	0.213
Sometimes/never	9.8	90.2		0.39 (0.125–1.199)	0.100
Visitation to crowded place in recent times					
Yes	24.2	75.8	< 0.0001	2.27 (1.499–3.448)	<0.001*
No	14.0	86.0		1.00 (Reference)	
Regular hand washing with soap and water under a running tap					
Very often	13.8	86.1	0.125	1.00 (Reference)	
Often	18.5	81.5		1.25 (0.835–1.863)	0.280
Sometimes	21.7	78.3		1.69 (0.926–3.096)	0.087
Never	14.3	85.7		0.49 (0.056–4.342)	0.523
Use of hand sanitizer					
Always	16.6	83.4	0.247	1.00 (Reference)	
Rarely	13.7	86.3		0.70 (0.466–1.058)	0.091
Never	22.0	78.0		1.29 (0.613–2.730)	0.499
Compliance with stay at home instruction from the government					
Yes	15.2	84.8	0.089	1.00 (Reference)	
No	21.1	78.9		1.16 (0.791–1.915)	0.566
History of self-treatment with perceived preventive drugs against COVID-19 since the outbreak					
Yes	17.4	82.6	0.440	1.15 (0.782–1.691)	0.479
No	15.4	84.6		1.00 (Reference)	

[†] *P* value in chi-square test; [‡] Adjusted odds ratio in logistic regression (confidence interval); [§] Adjusted *P* value in logistic regression; *Significant values

Others; Self-employed, unemployed

the use of vitamin D for treatment or prevention in COVID-19 rebuffed this (Grant et al. 2020).

Older adults and those who visited crowded places were more likely to have a self-perceived risk of contracting

COVID-19 from our study. These are not surprising because documented risk factors for transmission of COVID-19 included older age and overcrowding. These results, therefore, underscores the importance of physical and social distancing

across all age groups with additional focus on the older population. Females and married persons were less likely to have a self-perceived risk of contracting COVID-19. The reason why this was so remains unclear and more research may need to be conducted to determine the reason for this.

The limitation of this study was that the uneducated people and those living in rural areas who are likely to be more vulnerable due to poor knowledge and poor preventive measures practices were not represented in this study. It is therefore very important to conduct a similar study among the uneducated and rural dwellers in Nigeria. Also, the online nature of the study did not permit us to conduct a focus group discussion and in-depth interviews, which could have further provided us with more details on the participants' responses. Despite these limitations, this study was able to add to the existing body of knowledge on COVID-19 in Nigeria.

Currently, COVID-19 is being transmitted actively in Nigeria. To effectively break the chain of transmission of the current outbreak, there is an urgent need for robust public enlightenment regarding the disease. In addition, physical and social distancing should be emphasized across all age groups with additional focus on the older population. The use of a face mask should be enforced in public places to further prevent community transmission.

Authors contributions OTO – Conception, design, data collection, first manuscript draft; VOO – Design, data collection, extensive manuscript revision; OAO – Data analysis, manuscript revision; AM – online questionnaire design and curation; ITO, WOA, RIN, IAA, AMT, OOO, IAA, BPO, JKK, YDO, COO & AAA – Data collection, manuscript revision. All authors approved the final manuscript draft.

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Compliance with ethical standards

Conflict of interest The authors declare no conflict of interest.

Ethical approval The study protocol was approved by the Ethics Committee of the University of Medical Sciences/Teaching Hospital, Ondo City, Ondo State, Nigeria.

Informed consent Not applicable.

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