Title: Knowledge, Attitude and Practices Towards Preventive Strategies Against COVID-19 Pandemic Among Nigerian Young Adults: A Cross-Sectional Survey

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Authors Contribution Statement: .

Contributor Role	Role Definition	Authors 1	2	3	4	5	6
Conceptualization	Ideas; formulation or evolution of overarching research goals and aims.	x		x			
Data Curation	Management activities to annotate (produce metadata), scrub data and maintain research data (including software code, where it is necessary for interpreting the data itself) for initial use and later reuse.	x	x				
Formal Analysis	Application of statistical, mathematical, computational, or other formal techniques to analyze or synthesize study data.	x					
Funding Acquisition	Acquisition of the financial support for the project leading to this publication.						
Investigation	Conducting a research and investigation process, specifically performing the experiments, or data/evidence collection.	x	x	x	x	x	X
Methodology	Development or design of methodology; creation of models	x		x			
Project Administration	Management and coordination responsibility for the research activity planning and execution.	x	x	x			
Resources	Provision of study materials, reagents, materials, patients, laboratory samples, animals, instrumentation, computing resources, or other analysis tools.						
Software	Programming, software development; designing computer programs; implementation of the computer code and supporting algorithms; testing of existing code components.	x					
Supervision	Oversight and leadership responsibility for the research activity planning and execution, including mentorship external to the core team.						
Validation	Verification, whether as a part of the activity or separate, of the overall replication/reproducibility of results/experiments and other research outputs.						
Visualization	Preparation, creation and/or presentation of the published work, specifically visualization/data presentation.	x	x	x			
Writing – Original Draft Preparation	Creation and/or presentation of the published work, specifically writing the initial draft (including substantive translation).	x					
Writing – Review & Editing	Preparation, creation and/or presentation of the published work by those from the original research group, specifically critical review, commentary or revision – including pre- or post-publication stages.	x	x	x	x	x	X

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Discussion Points:

1. How compliant are young Nigerians with the preventive measures against the spread of COVID-19?
2. What is the level of knowledge about COVID-19 among Nigerian youths?
3. Level of optimism about the control of the pandemic among Nigerian young adults

ABSTRACT

Background: Since the COVID-19 pandemic, a lot of efforts have been aimed at promoting preventive measures towards curtailing the spread of the disease. The effectiveness and compliance with these measures are mostly determined by the Knowledge, Attitude and Practices (KAP) of the citizenry. We sought to determine the KAP of young Nigerian adults towards preventive strategies against COVID-19.

Methods: An online survey was done using an 18-question questionnaire to assess the KAP among young Nigerian adults. Data obtained were screened for error and analyzed with SPSS version 23.

Results: A total of 925 valid responses were received with a 96.25% response rate. Females made up 52.4% of the respondents, 62.4% were aged between 21-24 and 88.4% were from South-western Nigeria. The mean knowledge score was 9.02 (SD=1.19) with a maximum possible knowledge score of 13. Most of the respondents (91.7%) agreed that COVID-19 will eventually be successfully controlled. Only 31.1% had been wearing masks when leaving home. The confidence of winning the battle against COVID-19 differed significantly across the ethnic groups ($p<0.01$). Ages between 15 and 24 were morelikely to visit crowded places, $p<0.01$. There was an association between the wearing of a mask and level of education ($p<0.05$).

Conclusion: The study revealed a good knowledge level and an optimistic attitude towards the control of the pandemic. However, much more work needs to be done by the government and health officials to translate these to better practices towards prevention and control as the battle against the COVID-19 pandemic continues.

Key Words: Attitude, Coronavirus Disease 2019, Knowledge, Prevention

INTRODUCTION

The Coronavirus Disease 2019 (COVID-19) is an illness caused by the novel Coronavirus also called Severe Acute Respiratory Syndrome Coronavirus 2 (SAR-CoV2), which was first discovered during an outbreak of respiratory illness in Wuhan, Hubei province, China, and reported to the World Health Organization (WHO) on the 31st of December, 2019.[1] COVID-19 was declared a global health emergency on the 30th of January, 2020, and was subsequently declared a pandemic on the 11th of March, 2020.[1,2,3]

The nomenclature of the disease has undergone rigorous reviews as the WHO termed the deadly virus COVID-19 to avoid any form of discrimination based on region, person, or nationality. In this light, particular mention is given to the efforts of the Coronavirus Study Group of the International Committee on the Taxonomy of Viruses, which on the 11th of February, 2020 issued a statement officially designating the novel virus as Severe Acute Respiratory Syndrome Coronavirus 2; SARS-CoV2.[4] It is important to note that the coronaviruses as a family are not necessarily unique to humans, and they have a potential to cause pandemics, hence the occurrence of the Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Sydrome (SARS).

Since the outbreak of the COVID-19, there has been a steady rise in the number of confirmed cases of the disease all over the world including Nigeria. As of 22nd of August, 2021, a total of 211,288,358 cases had been confirmed with 4,422,666 confirmed deaths in 209 countries and territories, with a possible surge in the number of cases subsequently.[5] This has prompted extraordinary measures on the part of governments worldwide to curb the spread of the virus. Such measures include stay-at-home orders, self-isolation and quarantine of visitors, use of hand sanitizers and washing of hands in public places, enforcement of social distancing protocols, and use of facemasks in public places amongst others.[6]

Research into the transmission of the disease shows that people at higher risk of infection include individuals with a travel history to countries with a high number of confirmed cases, health workers caring for COVID-19 patients, and close contacts of infected patients[7]. When infected, COVID-19 follows a more severe course in the elderly (65 years and above) and those with longstanding chronic illnesses.[8] Major symptoms of the disease include fever, cough, fatigue, and body aches. Other less common symptoms include diarrhea, loss of sense of taste or smell, headaches, shortness of breath, and respiratory distress. Dyspnea is a usuall associated with severe infection.[8–10] It has been shown that about onethird of infections ma be asymptomatic, although this does not exclude the ability to infect. (reference). Since the discovery of COVID-19, the transmission of the disease has grown from local to community transmission, necessitating the strict measures instituted by the Nigerian government in other to curtail the spread of the virus. While there are a growing need and attempt at understanding the pathogenesis of the coronavirus, the government and various parastatals continue to ensure compliance to the already constituted measures.[11]

Despite the growing attention given to COVID-19 in Nigeria and globally, there is still a lot of misinformation about the virus. More so, compliance with the safety measures and precautions is largely dependent on how informed the citizens are about the coronavirus based on evidence from previous disease outbreaks such as the Ebola virus.[11] The young adults occupy a larger portion of the Nigerian population either as students at

different levels of education or as “working-class” and are prone to risky behaviors that could jeopardize effort by the government and health care workers in combating the spread of the virus. Early studies in Nigeria showed a mortality rate of about 2.6% and a preponderance of the male gender.[12] Despite the available data in Nigeria and globally, there is a need to objectively assess how informed the Nigerian youths are about the coronavirus as important precedence to COVID-19 guidelines adherence. This study aims to assess the knowledge, attitudes and practices about COVID-19 among young adults in Nigeria. Data from this study will be beneficial to the Nigeria Center for Disease Control and potentially to other low-income nations in the fight against the COVID-19 pandemic.

MATERIALS AND METHODS

Study Design and Setting

This was a cross-sectional study based on a survey of young adults in southwestern Nigeria which include Lagos, Oyo, Ondo, Ekiti, Ondo, and Ogun state or other states in Nigeria. Participants were recruited into the study by convenience sampling using a web-based questionnaire designed in Google Forms. This method of data collection was adopted due to the restriction in movement imposed by the Nigerian government as one of the measures to curb the spread of the coronavirus disease 2019. Study participants were encouraged to share the link to the survey with others on their various social media timelines.

Study Participants

The study inclusion criteria were being a young adult with 16 to 35 years of age, from Nigeria, who reside in any of the states in southwestern Nigeria and who granted informed consent and permission to share collected data.. The exclusion criteria include Nigerian young adults who resided outside the country as of the data collection period and/or outside the age bracket (16-35). Also, particpants who partially completed their questionnaire were exluded from the study. All respondents were recruited into the study by convenience sampling method.

Data Collection

The link to the online survey was shared via social media platforms (Whatsapp, Twitter, and Facebook) using the authors' immediate social network and each participant was encouraged to do so too. Data was collected within two weeks (19th of April, 2020- 3rd of May, 2020). Accompanying the questionnaire was a poster that represented the cover page of the questionnaire and contained information about the purpose of the study, anonymity of participants' responses, and voluntariness of participation. Those who read the poster would then further answer a question as to whether they are willing to participate or not. Participants who selected a "YES" (as indicative of a willingness to be recruited into the survey) could proceed to the questionnaire while those whose responses were "NO" to the consent question were automatically logged out of the form. The .csv file generated from the Google Form was exported to SPSS for data cleaning and analysis.

Research Tool

The self-administered questionnaire was sectioned into two: Sociodemographics and Knowledge, Attitude and Practices (KAP) about COVID-19. The KAP aspect of the questionnaire was developed and adapted from a similar study carried out in China.[7] The internal consistency of the KAP questionnaire was acceptable (Cronbach alpha coefficient of 0.71 in the sampled population). The questionnaire was was written in English language and was not translated into any Nigerian language. The sociodemographic section was composed of Age (16-20, 21-25, 26-30, and 31-35), Gender (Male, Female), Marital Status (Single, Married, Divorced, Engaged), and Tribe (Yoruba, Hausa, Igbo, Others), State of residence of respondents included Southwestern states (Oyo, Lagos, Ekiti, Ogun, Ondo, and Osun state) and Others (other states outside southwestern Nigeria). The variable 'Religion' was categorized into Christianity, Islam, Traditional (African indigenous religions), and Others (religious practices that can not be categorized as Christianity, Islam, and Traditional).

The Knowledge subsection was made up of 13 (clinical presentation K1-K4, route of transmission K5-K7, prevention, and control of COVID-19 K8-K13.(Table 1). These questions were answered on a TRUE/FALSE. Every TRUE response was assigned 1 point while a FALSE was assigned 0. Overall, a maximum of 13 points was attainable for the knowledge questions if all questions were answered correctly. However, the level of knowledge of each respondent was further assessed by a grading system. Respondents with 0-4, 5-7, 8-10, and 11-13 were regarded as having poor, average, good, and excellent knowledge respectively.

The attitude of respondents towards the control of the COVID-19 was assessed by two questions (A1 and A2) assessing the respondents' belief in the future control of COVID-19 and if Nigeria as a nation could win the battle against the disease. Practices towards preventive strategies were measured with three questions (P1-P3) assessing the adherence of the participants to measures instituted by the government such as wearing of facemask, regular washing of hands, and avoiding crowded places.

Data Analysis

Data obtained were screened for errors and completeness after which the data were analyzed using IBM-SPSS version 23 for windows. Results were presented in frequency, percentage, mean, and standard deviation (SD). Chi-square test was used to investigate whether there is a relationship between knowledge of COVID-19 and practices towards preventive strategies against COVID-19. Multivariate analysis was used to explore the association between sociodemographic characteristics of participants and knowledge of COVID 19. Significance was set at a p-value <0.05.

Ethics statement

Our study protocol, methodology, and tool were approved by the University of Ibadan and University College Hospital Ethical Committee with IRB of **UI/EC/20/0293** before the commencement of the research.

RESULTS

A total of 961 responses were collected within two weeks from the first day the survey was launched. Of these respondents, 7 were excluded for not consenting to participate in the study, 10 were invalid, and 19 did not meet the eligibility criteria. Consequently, 925 data were considered valid for statistical analysis. Females constituted the majority of the study participants with them accounting for 52.4% (n=485) of the total. 62.4% (n=577) were between ages 21-25, 92.4% (n=855) practiced Christianity as a religion and 71.6% (n=662) were of the Yoruba ethnic group. 97.5% (n=901) of the study participants were single. 88.4% (n=818) of the participants were from South-western Nigeria and 69% (n=639) had a Bachelor's degree and above (Table 2).

Overall, 92.3% (n=853) of the study participants had a good to excellent knowledge score (Figure 1). The mean knowledge score was 9.02, SD 1.186. 92.3% (n=854) agreed that the clinical symptoms of COVID-19 include fever, fatigue, dry cough, and body pains. Almost all the participants- 98.2% (n=908) believed that there was no cure for COVID-19 as at the time of the study and that early symptomatic and supportive treatment can help most patients recover from the infection. 96.6% (n=894) believed that the virus spreads via respiratory droplets of infected individuals. Other responses are as shown in Figure 2. There was not a significant difference in knowledge scores across socio-demographic characteristics of participants.

The majority of the respondents agreed that COVID-19 will eventually be successfully controlled (n=848, 91.7%), and this attitude differed significantly across the different ethnic groups ($p<0.05$). A fewer number of the participants, (n=788, 85.2%) picked 'yes' to the question- "do you have confidence that Nigeria can win the battle against the COVID-19 virus?". The confidence of winning the battle against COVID-19 differed significantly across the ethnic groups ($p<0.01$, Table 3).

Asked about their practices towards prevention of the disease, 83.9% (n=775) of the participants responded that they had not been to any crowded place in recent days (Figure 3). There was a very strong association with age group and knowledge level at $p<0.01$ (Table 4). 92% (n=851) responded that they had been washing their hands regularly. There was a significant association with gender, marital status, and level of education ($p<0.05$) (Table 4). However, only 31.1%, participants with a tertiary education or more, (n=288) had been wearing masks when leaving home, (Figure 3) and there was a significant association between wearing of masks when leaving home and the level of education ($p<0.05$). There was a significant association between regular hand washing and knowledge of COVID-19 ($p<0.001$). Multivariate analysis yielded no significant finding.

DISCUSSION

The coronavirus disease 2019, popularly known as COVID-19 was first discovered in Wuhan city, China.[13] Following its discovery, the disease has subsequently spread to over two hundred countries of the world, causing global disarray and posing threats to all aspects of human endeavors.[14–16]

Nigeria is the largest and most populated country in Africa with a population size of over two hundred million people[17]. As a densely populated country, Nigeria is at greater risk of spreading the coronavirus among its citizens given the already established mode of spread and risk factors.[9,11] The Nigerian population is largely constituted by children and young people given the life expectancy of Nigerians.[17,18] During the early phase of the pandemic in Nigeria, one of the calls for this study was the rising belief about the immunity of young people to the virus, a belief that led to the flaunting of guidelines put in place by the Federal Ministry of Health (FMoH) by the youths. Future approaches could include the population of people over 35 years of age, to know if there's a difference in KAP among these populations. This study, therefore, provides objectively measured epidemiological data to assess the KAP of COVID-19 among this set of Nigerians.

In this study, there were more female participants (52.4%) than male and single individuals (97.5%). The overall knowledge score in this study was nine out of a total score of thirteen which means that majority of the respondents have good knowledge of COVID-19. These findings are in line with previously published data in India, Egypt and China.[19–23] The high overall knowledge of COVID-19 as seen in this study may be partly because the majority of the respondent have a minimum of tertiary education or degrees. This is in tandem with finding from other studies conducted within and outside Nigeria.[11,19,20] Likewise, it is common knowledge that the sample population in this study are more acclimatized to the internet and social media which were the major means of sensitizing various population groups about the COVID-19 pandemic during the rapid rising phase of the disease in Nigeria.[6,7] Internet and social medial have also been documented to have played a tremendous role in keeping the people informed about the COVID-19 pandemic as documented in other studies,[6,24] this agrees with our findings even though the Nigeria Center for Disease Control (NCDC) sends daily text messages to educate the people about measures to curb the infection and spread of the virus. Knowledge of the prevention and control of COVID-19 was interestingly higher when compared to other COVID-19 knowledge questions and most of the participants (Table 1) generally believed that there is no cure for the coronavirus disease. Good knowledge of COVID-19 as documented in this study is consistent with that of Isah et al., in a study conducted in Northern part of Nigeria where despite the adequate knowleage of COVID-19 among the participants, adherence to preventive measures is still being paverted by misconceptions about the virus.[25] These findings are in tandem with that of Nwagbara et al., a trend that is consistent in many indigenous African studies. This trend is predominant in many African studies contrary to findings in other continents.[26]

When explored, there was no association found between knowledge scores and sociodemographic characteristics of participants in this study. However, when compared to their married counterpart, respondents whose marital status is single had a lower COVID-19 knowledge score. This finding could be because unmarried people tend to be care-free sometimes as compared to married ones who may be eager to know more about the disease due to the lives of immediate family members such as children, husbands, and wives.[6,7,27] Also, the

mean knowledge score was lower among participants with lower educational qualifications (Table 2). In an Ugandan study, females were were more adherent to preventive measures against COVID-19 than males.[28] This is similar to the finding in this study, in which a greater proportion of females were more likely to adhere to preventive practices compared to males (Table 4).

Practices towards preventive strategies by each participant were assessed using three questions(P1-P3, Table 1). Overall, positive responses towards the preventive strategies against COVID-19 were recorded as over seventy percent of the respondent were complaining about the social distancing practices and avoidance of crowded places and regular washing and/or sanitizing of hands (Table 3 and 4). On the contrary, greater than sixty percent of the respondents defiled the use of face masks when going out to public places despite evidence showing the effectiveness of face masks in reducing the infection and transmission of the coronavirus. According to Reuben et al., knowledge of COVID-19 does not match up with practices towards the virus.[6] Meanwhile, Kim et al., documented that having a family member infected with the virus, high socioeconomic status is related with good attitudes and practices towards the virus.[29] Various factors could have been responsible for the poor compliance with the use of face masks among these young people, one of which could have been the exponential rise in the price of face masks as a result of its limited availability and inflated prices.[30-32] Second, this sample population believes they are immune to the virus and so this belief could have influenced their compliance with mask usage. Also, the non-use of face masks may have been influenced by early statements from health authorities in which it was not clear whether their use was effective or not.

One of the strong points of this study is its large sample size and the ability to pull such responses during the rapid rise of theCOVID-19 virus in Nigeria, especially in the southwest where the majority of the daily new cases were recorded. Our data captured individuals who can be said to belong to the middle-to-high social class as demonstrated by the sociodemographic characteristics of our study. This, in part, may be responsible for the good level of knowledge about COVID-19 among men and women equally.

Due to the nature of the questionnaire, a larger portion of Nigerian young adults may reside in the rural areas where there is limited internet access, and/or some without mobile phones given the modality of the data collection tool. Therefore, our data do not capture the majority in these categories that are more likely to have poor knowledge about COVID-19 and inappropriate attitudes and practices towards preventive strategies. These limitations strengthen the need for further research among these groups of people. Also, due to the restriction in movement during the period of data collection, which informed the mode of data collection, KAP about COVID-19 may be better assessed through other forms such as key-informant interviews, focused group discussion, and so on.

RECOMMEDATIONS

As the pandemic continues to ravage all aspect of human endeavours, government and health related bodies must intersify efforts in order to reach the young adults.

CONCLUSION

Our study has demonstrated good knowledge of young adults in Nigeria towards COVID-19 and developed a positive attitude and practices towards the preventive strategies necessary to curtail the spread of the virus as the battle for life and survival continues under the siege of the pandemic. Citizens, governments, and agencies can join hands to fight the pandemic as they continue to know more about the virus and develop positive attitudes and practices towards the prevention of further transmissions.

REFERENCES

1. World Health Organization. Coronavirus Disease 2019 Situation Report. Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200121-sitrep-1-2019-ncov.pdf?sfvrsn=20a99c10_4. Last updated Jan 30, 2020; Cited April 2020
2. World Health Organization. Coronavirus Disease 2019 Situation Report. Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200311-sitrep-51-covid-19.pdf?sfvrsn=1ba62e57_10. Last updated Mar 11, 2020; Cited Dec 30, 2020
3. D Cucinotta, M Vanelli. WHO Declares COVID-19 a Pandemic. Acta Biomed. 2020 Mar 19;91(1):157–60.
4. WHO Director-General's remarks at the media briefing on 2019-nCoV. Available from: https://www.who.int/director-general/speeches/detail/who-director-general-s-remarks-at-the-media-briefing-on-2019-ncov-on-11-february-2020. Last updated Feb 11, 2020; Cited April 24,2021
5. World Health Organization. COVID-19 Weekly Epidemiological Update Week 12. online.Available at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports. Last updated Nov 2020; Cited April 24, 2021
6. Reuben RC, Danladi MMA, Saleh DA, Ejembi PE. Knowledge, Attitudes and Practices Towards COVID-19: An Epidemiological Survey in North-Central Nigeria. J Community Health. 2020 July.
7. Zhong B-L, Luo W, Li H-M, Zhang Q-Q, Liu X-G, Li W-T, et al. Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. Int J Biol Sci. 2020;16(10):1745–52.
8. Ouassou H, Kharchoufa L, Bouhrim M, Daoudi NE, Imtara H, Bencheikh N, et al. The Pathogenesis of Coronavirus Disease 2019 (COVID-19): Evaluation and Prevention. Journal of Immunology Research. 2020 Jul 10;2020:1–7.
9. Weiss SR, Leibowitz JL. Coronavirus Pathogenesis. In: Advances in Virus Research [Internet]. Elsevier; 2011 [cited 2020 Dec 31]. p. 85–164.
10. Perlman S. Pathogenesis of Coronavirus-Induced Infections: Review of Pathological and Immunological Aspects. In: Enjuanes L, Siddell SG, Spaan W, editors. Coronaviruses and Arteriviruses [Internet]. Boston, MA: Springer US; 1998. p. 503–13. (Advances in Experimental Medicine and Biology; vol. 440).
11. Olapegba PO, Ayandele O, Kolawole SO, Oguntayo R, Gandi JC, Dangiwa AL, et al. A Preliminary Assessment of Novel Coronavirus (COVID-19) Knowledge and Perceptions in Nigeria [Internet]. Rochester, NY: Social Science Research Network; 2020 May. Report No.: ID 3584408.
12. Nivette A, Ribeaud D, Murray A, Steinhoff A, Bechtiger L, Hepp U, et al. Non-compliance with COVID-19-related public health measures among young adults in Switzerland: Insights from a longitudinal cohort study. Social Science & Medicine. 2020;268:113370.
13. Burki TK. Coronavirus in China. Lancet Respir Med. 2020 Mar;8(3):238.

14. Venkataram T, Goyal N, Dash C, Chandra PP, Chaturvedi J, Raheja A, et al. Impact of the COVID-19 Pandemic on Neurosurgical Practice in India: Results of an Anonymized National Survey. Neurol India. 2020 Jun;68(3):595–602.
15. Spinoit A-F, Haid B, Hiess M, Banuelos B, Hoen L 't, Radford A, et al. Impact of the COVID-19 Pandemic on Paediatric Urology Practice in Europe: A Reflection from the European Association of Urology Young Academic Urologists. European Urology. 2020 Jul;78(1):122–4.
16. Punia V, Nasr G, Zagorski V, Lawrence G, Fesler J, Nair D, et al. Evidence of a Rapid Shift in Outpatient Practice During the COVID-19 Pandemic Using Telemedicine. Telemedicine and e-Health. 2020 May 19;tmj.2020.0150.
17. Gerland P, Raftery AE, Ševčíková H, Li N, Gu D, Spoorenberg T, et al. World population stabilization unlikely this century. Science. 2014 Oct 10;346(6206):234
18. Ogungbenle S, Olawumi O, Obasuyi F. Life Expectancy, Public Health Spending And Economic Growth In Nigeria: A Vector Autoregressive (Var) Model. European Scientific Journal. 2013 Jul 1;9:1857–7881
19. Isah MB, Abdulsalam M, Bello A, Ibrahim MI, Usman A, Nasir A, et al. Coronavirus Disease 2019 (COVID-19): Knowledge, attitudes, practices (KAP) and misconceptions in the general population of Katsina State, Nigeria. medRxiv. 2020 Jun 14;2020.06.
20. Olum R, Chekwech G, Wekha G, Nassozi DR, Bongomin F. Coronavirus Disease-2019: Knowledge, Attitude, and Practices of Health Care Workers at Makerere University Teaching Hospitals, Uganda. Front Public Health . 2020 Apr 30;8.
21. Rakhmanov O, Dane S. Knowledge and Anxiety Levels of African University Students Against COVID-19 During the Pandemic Outbreak by an Online Survey. Journal of Research in Medical and Dental Science. 2020;8(3):5.
22. Huynh G, Nguyen TNH, Tran VK, Vo KN, Vo VT, Pham LA. Knowledge and attitude toward COVID-19 among healthcare workers at District 2 Hospital, Ho Chi Minh City. Asian Pacific Journal of Tropical Medicine. 2020 Jun 1;13(6):260.
23. Mp O, An M, Of E, No E. Knowledge, Attitudes and Fears of HealthCare Workers towards the Corona Virus Disease (COVID-19) Pandemic in South-South, Nigeria. Health Science Journal. 2020;11.
24. Lau LL, Hung N, Go DJ, Ferma J, Choi M, Dodd W, et al. Knowledge, attitudes and practices of COVID-19 among income-poor households in the Philippines: A cross-sectional study. J Glob Health [Internet]. ;10(1).
25 Isah MB, Abdulsalam M, Bello A, Ibrahim MI, Usman A, Nasir A, et al. Corona Virus Disease 2019 (COVID-19): Knowledge, attitudes, practices (KAP) and misconceptions in the general population of Katsina State, Nigeria. :27
26 Nwagbara UI, Osual EC, Chireshe R, Bolarinwa OA, Saeed BQ, Khuzwayo N, et al. Knowledge, attitude, perception, and preventative practices towards COVID-19 in sub-Saharan Africa: A scoping review. Chemin I, editor. PLoS ONE. 2021 Apr 19;16(4):e0249853.

27. Miguel FK, Machado GM, Pianowski G, de Francisco Carvalho L. Compliance with containment measures to the COVID-19 pandemic over time: Do antisocial traits matter? Personality and individual differences. 2020;168:110346.

28 Okello G, Izudi J, Teguzirigwa S, Kakinda A, Van Hal G. Findings of a Cross-Sectional Survey on Knowledge, Attitudes, and Practices about COVID-19 in Uganda: Implications for Public Health Prevention and Control Measures. Jiang W, editor. BioMed Research International. 2020 Dec 4;2020:1–8.

29 Kim JK, Crimmins EM. How does age affect personal and social reactions to COVID-19: Results from the national Understanding America Study. PLOS ONE. 2020 No10;15(11):e0241950.

30. Livingston E, Desai A, Berkwits M. Sourcing personal protective equipment during the COVID-19 pandemic. Jama. 2020;323(19):1912–4.

31. Wright AL, Sonin K, Driscoll J, Wilson J. Poverty and economic dislocation reduce compliance with covid-19 shelter-in-place protocols. University of Chicago, Becker Friedman Institute for Economics Working Paper. 2020;(2020–40).

32. Cook TM. Personal protective equipment during the coronavirus disease (COVID) 2019 pandemic–a narrative review. Anaesthesia. 2020;

FIGURES AND TABLES.

Figure 1: Knowledge Level of Participants by Gender

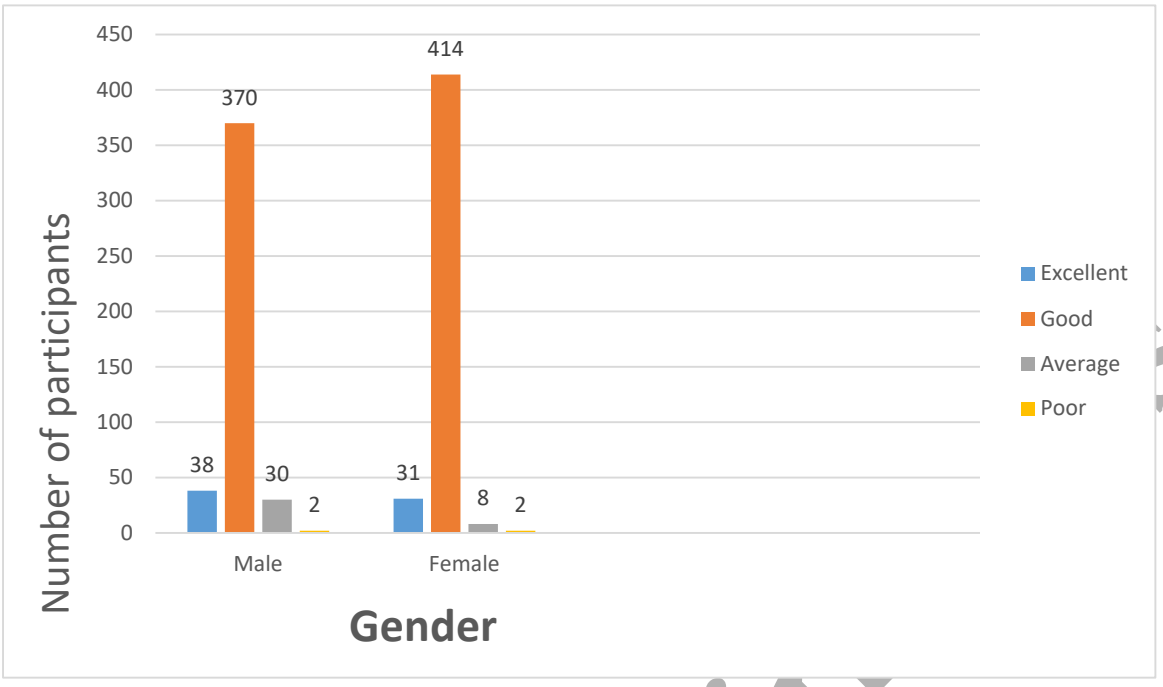
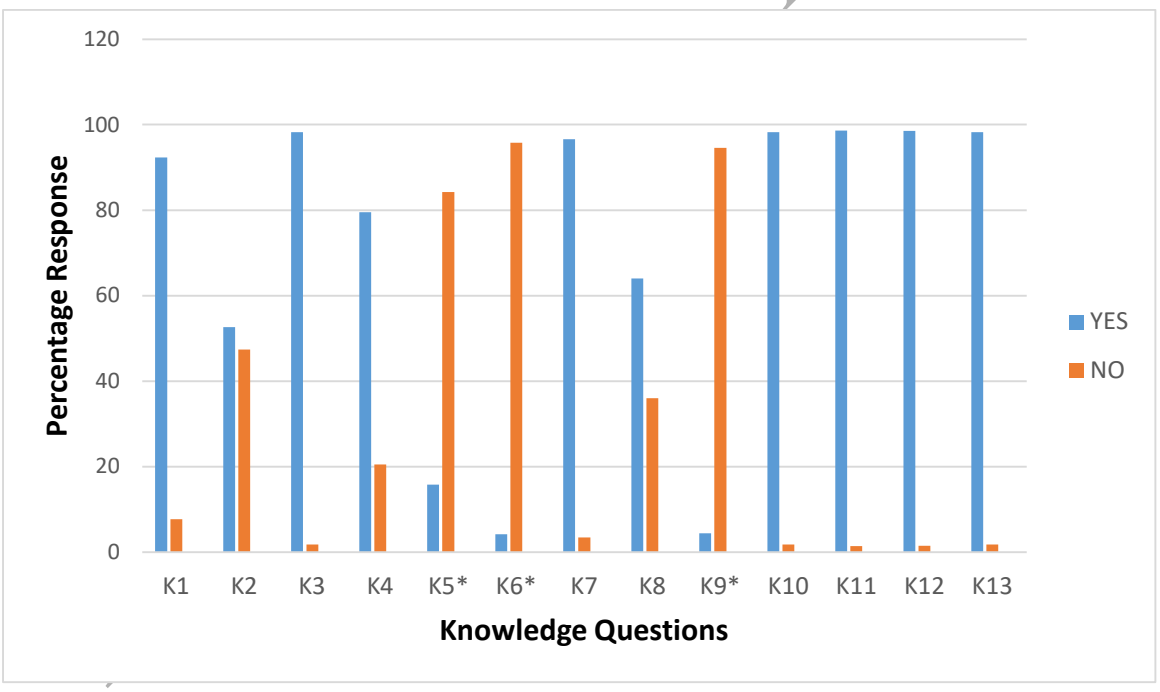
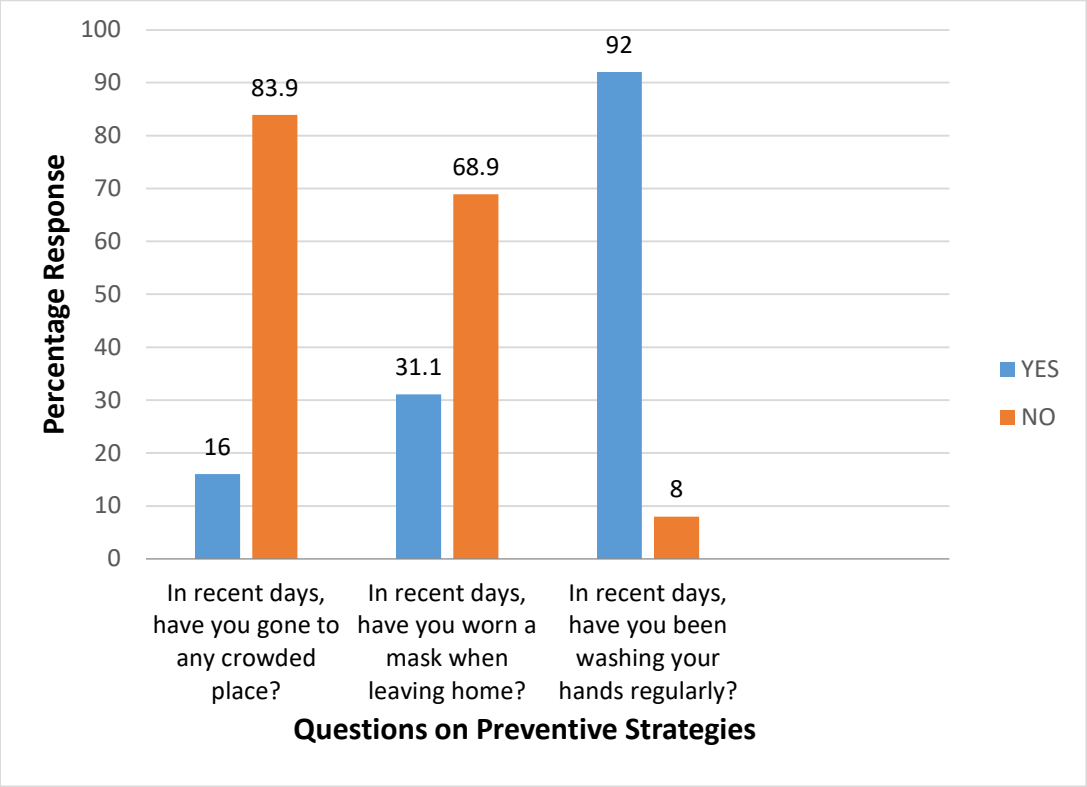


Figure 2: Percentages of responses to each of the Knowledge questions



*"No" is the appropriate response**

Figure 3: Percentage responses to questions on Preventive strategies against COVID-19



1 **Table 1**. **Elements of the Questionnaire and Responses**

Questions	Options
Knowledge (correct rate, % of the total sample)	
K1. The main clinical symptoms of COVID-19 are fever, fatigue, dry cough, and body pains. (92.3)	True, False
K2. Unlike the common cold, stuffy nose, runny nose, and sneezing are less common in persons infected with COVID-19 virus. (52.6)	True, False
K3. There currently is no effective cure for COVID-19 but early symptomatic and supportive treatment can help most patients recover from the infection. (98.2)	True, False
K4. Not all persons with COVID-19 will develop to severe cases. Only those who are elderly, have chronic illnesses, and are obese are more likely to be severe cases. (79.5)	True, False
K5. Eating or contact with wild animals would result in infection by the COVID-19 virus. (84.2)	True, False
K6. Persons with COVID-19 cannot transmit the virus to others when fever is not present. (95.8)	True, False
K7. The COVID-19 virus spreads via respiratory droplets of infected individuals. (96.6)	True, False
K8. Ordinary residents can wear general medical masks to prevent the infection by the COVID-19 virus. (64.0)	True, False
K9. It is not necessary for children and young adults to take measures to prevent the infection by the COVID-19 virus. (94.6)	True, False
K10. To prevent the infection by COVID-19, individuals should avoid going to crowded places such as train stations and avoid taking public transportation. (98.2)	True, False
K11. Isolation and treatment of people who are infected with the COVID-19 virus are effective ways to reduce the spread of the virus. (98.6)	True, False
K12. People who have contact with someone infected with the COVID-19 virus should be immediately isolated in a proper place. (98.5)	True, False
K13. In general, the observation period is 14 days. (98.2)	True, False
Attitudes	
A1. Do you agree that COVID-19 will finally be successfully controlled?	Agree, Disagree
A2. Do you have confidence that Nigeria can win the battle against the COVID-19 virus?	Yes, No
Practices	
P1. In recent days, have you gone to any crowded place?	Yes, No
P2. In recent days, have you worn a mask when leaving home?	Yes, No
P3. In recent days, have you been washing your hands regularly?	Yes, No

2

Table 2. Demographic Characteristics of Participants and Knowledge Score About COVID-19 by Demographic Variables

Characteristics	Number of participants (%)	Knowledge score (mean ± SD)	p-value
Gender: Female	485 (52.4)	9.0 ± 1.2	
Male	440 (47.6)	9.1 ± 1.2	0.586
Age group (years): 16-20	184 (19.9)	9.0 ± 1.2	
21-25	577 (62.4)	9.0 ± 1.2	
26-30	128 (13.8)	9.2 ± 1.1	
31-35	36 (3.9)	9.4 ± 0.8	0.354
Religion: Christianity	855 (92.4)	9.0 ±1.2	
Islam	59 (6.4)	9.1 ± 1.4	
Traditional	2 (.2)	10.5 ± 0.7	
Others	9 (1.0)	8.6 ± 0.7	0.435
Ethnicity: Yoruba	662 (71.6)	9.0 ± 1.2	
Igbo	162 (17.5)	9.0 ± 1.3	
Hausa	5 (.5)	9.2 ± 1.3	
Others	96 (10.4)	9.1 ± 1.1	0.097
Marital status: Single	902 (97.5)	9.0 ± 1.2	
Engaged	1(0.1)	8.0	
Married	21 (2.3)	9.4 ± 0.9	
Divorced	1 (.1)	9.0	0.998
Highest level of education: Secondary	213 (23)	8.9 ± 1.2	
Associate degree	73 (7.9)	9.0 ± 1.6	
Bachelor degree	585 (63.2)	9.1 ± 1.1	
Masters and above	54 (5.8)	9.1 ± 1.1	0.668
Current state of residence: Southwest	818 (88.4)		
Others	107 (11.6)		0.913

Table 3. Attitudes Towards COVID-19 by Demographic Variables

Characteristics	Attitudes, n (%)					
	Final success in controlling		p-value	Confidence of winning		p-value
	Agree	Disagree		Yes	No	
Gender: Female	450(92.8)	35(7.2)		422(87.0)	63(13.0)	
Male	398(90.5)	42(9.5)	0.200	367(83.4)	73(16.6)	0.122
Age group (years): 16-20	168(91.3)	16(8.7)		158(85.9)	26(14.1)	
21-25	529(91.7)	48(8.3)		486(84.2)	91(15.8)	
26-30	117(91.4)	11(8.6)		115(89.8)	13(10.2)	
31-35	34(94.4)	2(5.6)	0.939	30(83.3)	6(16.7)	0.425
Religion: Christianity	786(91.9)	69(8.1)		733(85.7)	122(14.3)	
Islam	54(91.5)	5(8.5)		49(83.1)	10(16.9)	
Traditional	1(50.0)	1(50.0)		5(55.6)	4(44.4)	
Others[a]	7(77.8)	2(22.2)	0.075	2(100.0)	0(0.0)	0.070
Ethnicity: Yoruba	617(93.2)	45(6.8)		582(87.9)	80(12.1)	
Igbo	144(88.9)	18(11.1)		129(79.6)	33(20.4)	
Hausa	4(80.0)	1((20.0)		4(80.0)	1(20.0)	
Others[b]	83(86.5)	13(13.5)	**0.046**	74(77.1)	22(22.9)	**0.005**
Marital status: Single	826(91.6)	76(8.4)		769(85.2)	133(14.8)	
Engaged	1(100.0)	0(0.)		1(100.0)	0(0.0)	
Married	20(95.2)	1(4.8)		18(85.7)	3(14.3)	
Divorced	1(100.0)	0(0.0)	0.959	1(100.0)	0(0.0)	0.971
Highest level of education: Secondary	196(92.0)	17(8.0)		178(83.6)	35(16.4)	
Associate degree	70(95.9)	3(4.1)		68(93.2)	5(6.8)	
Bachelor degree	535(91.5)	50(8.5)		498(85.1)	87(14.9)	
Masters and above	47(87.0)	7(13.0)	0.349	45(83.3)	9(16.7)	0.233
Current state of residence: Southwest	95(88.8)	12(11.2)		82(76.6)	25(23.4)	
Others[c]	753(92.1)	65(7.9)		707(86.4)	111(13.6)	

[a] religions that were not included on the survey, [b]minority ethnic groups

[c]states apart from the six in southwestern Nigeria

1 Table 4: Practices Towards COVID-19 by Demographic Variables

Characteristics	Practices, n (%)								
	Going to crowded places		p-value	Mask wearing		p-value	Regular hand washing		p-value
	Yes	No		Yes	No		Yes	No	
Gender: Female	78 (16.1)	407 (83.9)		162(33.4)	323(66.6)		460(94.8)	25(5.2)	
Male	72 (16.4)	368(83.6)	0.908	126(28.6)	314(73.7)	0.118	391(88.9)	49(11.1)	**0.001**
Age group (years): 16-20	15(8.2)	169(91.8)		57(31.0)	127(69)		170(92.4)	14(7.6)	
21-25	105(18.2)	472(81.8)		168(29.1)	409(70.9)		527(91.3)	50(8.7)	
26-30	25(19.5)	103(80.5)		49(38.3)	79(61.7)		119(93.0)	9(7.0)	
31-35	5(13.9)	31(86.1)	**0.009**	14(38.9)	22(61.1)	0.161	35(97.2)	1(2.8)	0.597
Religion: Christianity	137(16.0)	718(84.0)		268(31.3)	587(68.7)		787(92.0)	68(8.0)	
Islam	12(20.3)	47(79.7)		19(32.2)	40(67.8)		55(93.2)	4(6.8)	
Traditional	1(50.0)	1(50.)		0(0)	2(100)		1(50.0)	1(50.0)	
Others[a]	0(0)	1(100)	0.242	1(11.1)	8(88.9)	0.451	8(88.9)	1(11.1)	0.169
Ethnicity: Yoruba	112(16.9)	550(83.0)		193(29.2)	469(70.8)		603(91.1)	59(8.9)	
Igbo	22(13.6)	140(86.4)		54(34.2)	104(65.8)		150(92.6)	12(7.4)	
Hausa	1(20)	4(80)		3(60.0)	2(40.0)		5(100)	0(0)	
Others[b]	15(15.6)	81(84.4)	0.766	38(39.6)	58(60.4)	0.082	93(96.9)	3(3.1)	0.225
Marital status: Single	145(16.1)	756(83.9)		278(30.8)	624(69.2)		829(91.9)	73(8.1)	
Engaged	0(0)	1(100)		1(100)	0(0)		0(0)	1(100)	
Married	5(23.8)	16(76.2)		8(38.1)	13(61.9)		21(100)	0(0)	
Divorced	0(0)	1(100)	0.830	19(100)	0(0)	0.127	1(100)	0(0)	**0.009**
Highest level of education: Secondary	29(13.6)	184(86.4)		51(23.9)	162(76.1)		186(87.3)	27(12.7)	

Associate degree	9(12.3)	64(87.7)		27(37.0)	46(63)		70(95.9)	3(4.1)	
Bachelor degree	101(17.3)	484(82.7)		188(32.1)	397(67.9)		543(92.8)	42(7.2)	
Masters and above	11(20.4)	43(79.6)	0.387	22(40.7)	32(59.3)	0.031	52(96.3)	2(3.7)	**0.021**
Current state of residence: Southwest	133(16.3)	685(83.7)		252(30.8)	566(69.2)		748(91.4)	70(8.6)	
Others[c]	17(15.9)	90(84.1)		36(33.6)	71(66.4)		103(96.3)	4(3.7)	0.084

[a] religions that were not included on the survey, [b]minority ethnic groups

[c]states apart from the six in southwestern Nigeria