

Knowledge of COVID-19 and practices regarding its prevention among medical students at Usmanu Danfodiyo University, Sokoto, Nigeria

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ABSTRACT

Background: As key stakeholders in healthcare, medical students play a crucial role in understanding the COVID-19 virus and implementing preventive measures to curb its transmission. **Aim:** This study aimed to investigate the knowledge of COVID-19 and practices regarding its prevention among medical students at Usmanu Danfodiyo University, Sokoto, Nigeria. **Materials and Methods:** A cross-sectional study was conducted among 249 randomly selected medical students at Usmanu Danfodiyo University Sokoto, Nigeria. A structured self-administered questionnaire was used to obtain information on the research variables. Data were analysed using IBM SPSS version 25 statistical computer software package. **Results:** Most respondents demonstrated good overall knowledge of COVID-19, understanding its agent and transmission (89.2%), symptoms and signs (98.4%), risk factors and diagnosis (89.4%) and prevention of COVID-19 (99.2%). However, despite overall good knowledge of the disease by most respondents (96.8%), it did not correlate with any of the sociodemographic variables, and only 35.3% practised adequate preventive measures, with fewer consistently wearing masks (32.5%) or vaccinated (6.0%). Factors influencing preventive practices included age, gender, school year, and ethnicity, with younger individuals, females, those in the 3rd school year, and those belonging to the Igbo ethnic group exhibiting higher adherence. **Conclusion:** Most of the respondents in this study demonstrated good knowledge of COVID-19, but only about a third practised adequate preventive measures, and this was associated with age, gender, year of study, and ethnicity. These findings underscore the need for the government to design targeted interventions to improve adherence to preventive measures, particularly among certain demographic groups.

Keywords: COVID-19, knowledge, preventive practices, medical students

INTRODUCTION

The COVID-19 pandemic has emerged as a profound global health crisis, presenting unprecedented challenges to healthcare systems, societies, and economies worldwide. Since its inception in late 2019, the novel coronavirus, SARS-CoV-2, has rapidly spread across continents, necessitating urgent public health responses to mitigate its impact. In Nigeria, as in many other countries, the healthcare sector has been at the forefront of combating the spread of COVID-19. As key stakeholders in healthcare, medical students play a crucial role in understanding the virus and implementing preventive measures to curb its transmission.

This study aims to investigate the knowledge of COVID-19 and practices regarding its prevention among medical students at Usmanu Danfodiyo University, Sokoto,

Nigeria. Understanding the knowledge and practices regarding COVID-19 among medical students is essential in guiding public health interventions and strategies tailored to this demographic.

Globally, numerous studies have investigated COVID-19-related knowledge and practices among medical students. For instance, Olum et al.¹ conducted a cross-sectional study among Ugandan medical students and found variations in knowledge levels regarding COVID-19 symptoms, transmission routes, and preventive measures. Similarly, studies conducted in other countries such as Pakistan² and Jordan³ revealed gaps in the understanding of COVID-19 among medical students, particularly regarding transmission dynamics and infection control practices. These studies have also

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highlighted the need for targeted educational interventions to address misconceptions and promote adherence to preventive practices among medical students. In Nigeria, however, limited research has been conducted specifically on COVID-19 knowledge and practices among medical students. However, studies among healthcare workers and the general population offer insights into the broader context of COVID-19 awareness and behaviour in the country. A study conducted by Nwoga et al.⁴ among medical students in a tertiary institution in Enugu, Nigeria, reported that whereas 65.4% had good knowledge, and 77.6% had good practices, less than half of them (48.6%) had good attitude towards COVID-19 prevention. A knowledge, attitude and practice survey of the COVID-19 pandemic among the general public, including Health Care Workers in a Muslim community in Kano, Nigeria, reported that 30.47% had good knowledge, 17.8% had good attitude, while 25.96% had good practice.⁵ Another study by Reuben et al.⁶ assessed the knowledge, attitude, and practice of COVID-19 preventive measures among residents of a north-central Nigerian community, revealing varying levels of awareness and compliance with recommended guidelines. These studies underscore the importance of understanding the context-specific challenges and opportunities in addressing COVID-19 among Nigerian populations, including medical students.

Medical students, as future healthcare providers, have a unique role in the COVID-19 response, both as frontline workers in training and as agents of public health promotion in their communities. Research conducted globally has highlighted the pivotal role of medical education in shaping COVID-19-related knowledge and behaviours among medical students. For example, Alsoufi et al.⁷ emphasised the importance of integrating COVID-19 education into medical curricula to ensure that students are adequately prepared to respond to public health emergencies. Similarly, Miller et al.⁸ emphasised the invaluable contribution of medical students in frontline healthcare settings during the pandemic, where they gained firsthand experience in diagnosing and managing COVID-19 cases under supervision.

Despite the global efforts to combat COVID-19, challenges and barriers persist in effectively disseminating accurate information and promoting preventive practices among medical students. Misinformation and misconceptions surrounding the virus have been identified as significant barriers to knowledge and

behaviour change. In Nigeria, sociocultural factors, inadequate access to resources, and institutional constraints may further impede the adoption of preventive practices among medical students. Addressing these challenges requires multifaceted approaches that take into account the unique sociocultural context and educational needs of Nigerian medical students.

Given the limited research on COVID-19 knowledge and practices among medical students in Nigeria, particularly in the context of Usmanu Danfodiyo University, Sokoto, this study aims to fill a critical gap in the existing literature. By assessing the knowledge of COVID-19 and practices regarding its prevention among medical students at this institution, this research seeks to provide valuable insights into the effectiveness of current educational efforts and identify areas for improvement. Moreover, the findings of this study can inform targeted interventions and policies to enhance COVID-19 education and preparedness among medical students in Nigeria, ultimately contributing to the broader goal of controlling the spread of the virus and mitigating its impact on public health.

MATERIALS AND METHODS

Study Design, Population and Area

This was a cross-sectional study among medical students at the College of Health Sciences of Usmanu Danfodiyo University, Sokoto, Nigeria, in June and July 2021. Medical students from the 2nd to 6th school year who gave consent to participate in the study were considered eligible and enrolled in the study.

Sample Size Estimation and Sampling Technique

The sample size was estimated at 249 using the Cochrane formula for estimating sample size in cross-sectional studies,⁹ (after adjusting for a finite population of 620 medical students in the 2nd to 6th years in the College of Health Sciences, Usmanu Danfodiyo University Sokoto) based on a null prevalence of 50% (since no similar previous study was available), a 5% margin of error, and an anticipated 95% response rate. The eligible participants were selected by systematic sampling technique after a proportionate allocation of the number of participants to be selected from each of the five classes (i.e., school years) was done.

Data Collection

A structured self-administered questionnaire was developed after an extensive review of the literature and

used to obtain information on the sociodemographic characteristics of the study participants, their knowledge of COVID-19 (including agent and mode of transmission, symptoms and signs, and risk factors/diagnosis), and their preventive practices. The questionnaire was pretested on 25 students in the Faculty of Medical Laboratory Science of the Institution. The necessary adjustments were made based on the observations made during the pretesting.

Data Analysis

Data were analysed using IBM SPSS version 25 computer statistical software package. Knowledge of the agent and mode of transmission of COVID-19 was assessed on a 13-item scale; one point was awarded for a correct response, while a wrong response or no response received no point; this gives a minimum of 0 and a maximum of 13 points. Those who scored ≥ 8 points were graded as having good knowledge, while those who scored < 8 points were graded as having poor knowledge. Knowledge of symptoms and signs of COVID-19 was assessed on a 10-item scale; one point was awarded for a correct response, while a wrong response or no response received no point; this gives a minimum of 0 and a maximum of 10 points. Those who scored ≥ 6 points were graded as having good knowledge, while those who scored < 6 points were graded as having poor knowledge.

Knowledge of risk factors and diagnosis of COVID-19 was assessed on a 5-item scale; one point was awarded for a correct response, while a wrong response or no response received no point; this gives a minimum of 0 and a maximum of 5 points. Those who scored ≥ 3 points were graded as having good knowledge, while those who scored < 3 points were graded as having poor knowledge. Knowledge of the prevention of COVID-19 was assessed on an 8-item scale; one point was awarded for a correct response, while a wrong response or no response received no point; this gives a minimum of 0 and a maximum of 8 points. Those who scored ≥ 5 points were graded as having good knowledge, while those who scored < 5 points were graded as having poor knowledge.

Overall knowledge of COVID-19 was assessed on a 36-item scale; one point was awarded for a correct response, while a wrong response or no response received no point; this gives a minimum of 0 and a maximum of 36 points. Those who scored ≥ 22 points were graded as having

good knowledge, while those who scored < 22 points were graded as having poor knowledge.

The practice of COVID-19 prevention was assessed on an 8-item scale; one point was awarded for observing a practice, while zero was awarded for not observing it; this gives a minimum of 0 and a maximum of 8 points. Those who scored ≥ 5 points were graded as having adequate practice, while those who scored < 5 points were graded as having inadequate practice. Quantitative variables were summarised using mean and standard deviations, while qualitative variables were summarised using frequencies and percentages. Chi-square analysis was used to determine the factors that are associated with adequate practice of COVID-19 prevention. All levels of statistical significance were set at $p < 0.05$.

Ethical Consideration

Institutional ethical clearance was obtained from the Ethical Committee of Usmanu Danfodiyo University Teaching Hospital (UDUTH), Sokoto, Nigeria. Informed consent was also obtained from the participants before commencing questionnaire administration.

RESULTS

Sociodemographic characteristics of respondents

All the 249 questionnaires administered were filled and used for analysis, giving a response rate of 100%. The mean age of the respondents was 24.46 ± 2.81 . The majority of respondents were aged 16-25 years (61.8%) and were males (75.9%). Most of the respondents were single (92.4%) and were Moslems (82.7%). The majority of respondents belong to the Hausa ethnic group (53.8%) and reside in the school's hostel (Table 1).

Respondents knowledge of agent, transmission, and symptoms and signs of COVID-19

Most of the respondents had good knowledge of the agent and transmission of COVID-19 (89.2%) and its symptoms and signs (98.4%). Most of them (98.0%) knew that the disease was caused by a virus (98.0%) and was transmitted by inhalation (96.8%) and by touching contaminated surfaces (90.0%). Also, most of the respondents knew fever, dry cough and sore throat as symptoms of the disease (Table 2).

Respondents' knowledge of risk factors, diagnosis and prevention of COVID-19

Most of the respondents had good knowledge of the risk factors and diagnosis of COVID-19 (89.4%). Almost all,

247 (99.2%) of the 249 respondents had good knowledge of the prevention of the disease. The majority of respondents (82.7%) knew that young adults are not at risk of severe disease (82.7%) and that the disease can be diagnosed through a Polymerase Chain Reaction (PCR) test. Also, most of the respondents know that the disease can be prevented through regular hand washing with soap under running water (98.2%) and by immunisation with the COVID-19 vaccine (94.8) [Table 3]. Most of the respondents (96.8%) had good overall knowledge of the disease (Figure 1), but there was no association between good knowledge of COVID-19 and any of the respondents' sociodemographic variables (Table 4).

Table 1: Sociodemographic characteristics of respondents

Variables	Frequency (%) n = 249
Age group (years)	
16-25	154 (61.8)
26-35	95 (38.2)
Mean ± SD	24.46 ± 2.81
Sex	
Male	189 (75.9)
Female	60 (24.1)
Marital status	
Single	230 (92.4)
Married	19 (7.6)
Religion	
Islam	206 (82.7)
Christianity	43 (17.3)
Tribe	
Hausa/Fulani	134 (53.8)
Yoruba	38 (15.3)
Igbo	12 (4.8)
Others	65 (26.1)
School year	
2 nd	69 (27.7)
3 rd	51 (20.5)
4 th	34 (13.7)
5 th	62 (24.9)
6 th	33 (13.3)
Place of residence	
Hostel	157 (63.1)
Rented house alone	52 (20.9)
At home with parents	40 (16.1)

Respondents' COVID-19 preventive practices

COVID-19 preventive practices were adequate in only about a third, 88 (35.3%) of the 249 respondents (Table 5). Whereas the majority of respondents wash their hands regularly and thoroughly with soap under running water, only about a third of them (32.5%) consistently wear face masks to lectures and other places, and only a few of them (6.0%) have received the COVID-19 vaccine (Table 5). The proportion of respondents with adequate COVID-19 preventive practices was significantly higher ($p < 0.05$)

among the respondents that were aged 16-25 years (42.2%) than those that were aged 26-35 years, it was significantly higher among females (46.7%) than males (31.7%), it was significantly higher among those in the 3rd school year than those in the other school years, and it was significantly higher among those who belong to the Igbo ethnic group than those who belong to the other ethnic groups (Table 6).

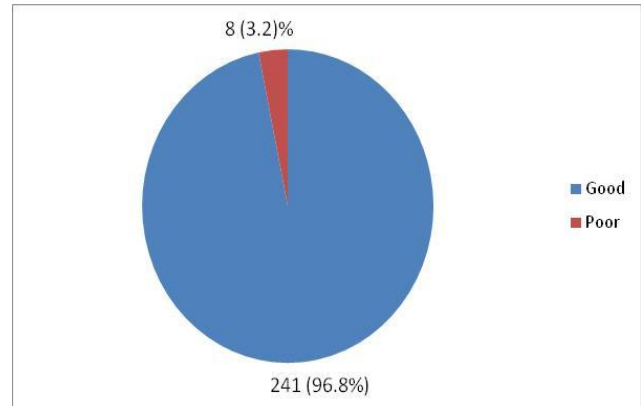


Figure 1: Respondents' overall knowledge of COVID-19

DISCUSSION

This study investigated the knowledge of COVID-19 and practices regarding its prevention among medical students at Usmanu Danfodiyo University, Sokoto, Nigeria. Overall, the results indicate a high level of awareness and understanding among the respondents regarding the agent, transmission dynamics, symptoms, risk factors, diagnosis, and prevention strategies associated with COVID-19. These findings align with previous research conducted in Nigeria and other countries, which has similarly reported high levels of knowledge among various population groups.^{1,6,10} The study revealed that a significant proportion of respondents had good knowledge of the agent and transmission of COVID-19, with over 89% correctly identifying the virus as the causative agent and recognising inhalation and contact with contaminated surfaces as the primary modes of transmission. Additionally, the vast majority of respondents were able to identify common symptoms of COVID-19, such as fever, dry cough, and sore throat.

Table 2: Respondents' knowledge of agent, transmission, and symptoms and signs of COVID-19

Variables	Frequency (%) n = 249
Knowledge of agent and transmission of COVID-19	
Knew that COVID-19:	
Is caused by a virus	244 (98.0)
Is not caused by bacteria	231 (92.8)
Is not caused by parasites	224 (90.0)
Is not caused by fungi	222 (89.2)
Is transmitted through inhalation	241 (96.8)
Is not transmitted by skin contact	111 (44.6)
Is transmitted through handshaking	205 (82.3)
Is not transmitted through contaminated foods and drinks	189 (75.9)
Is transmitted by touching contaminated surfaces	224 (90.0)
Is not transmitted from mother to fetus	124 (49.8)
Is not transmitted through blood transfusion	118 (47.4)
Is transmissible from animals to man	145 (58.2)
Is not transmitted through breast milk	110 (44.2)
Knowledge grading:	
Poor	27 (10.8)
Good	222 (89.2)
Knowledge of symptoms and signs of COVID-19	
Knew that concerning COVID-19:	
Fever is a symptom	246 (98.8)
Dry cough is a symptom	237 (95.2)
Headache is a symptom	236 (94.8)
Diarrhoea is a symptom	169 (67.9)
Sore throat is a symptom	226 (90.8)
Symptoms may appear within three days of infection	145 (58.2)
Hospitalisation indicates severe illness	222 (89.2)
Admission to the intensive care unit indicates severe illness	227 (91.2)
Intubation or mechanical ventilation indicates severe illness	232 (93.2)
Death indicates severe illness	237 (95.2)
Knowledge grading:	
Poor	4 (1.6)
Good	245 (98.4)

These findings are consistent with studies conducted in Nigeria and other African countries, which have reported widespread awareness of COVID-19 transmission routes and symptoms among healthcare professionals and the general population.^{1,6,10} A robust understanding of these fundamental aspects of the disease is crucial for implementing effective preventive measures and controlling its spread within the community.

Moreover, the study found that most respondents demonstrated good knowledge of the risk factors, diagnosis, and prevention strategies associated with COVID-19. The majority correctly identified young

adults as being susceptible to severe disease outcomes and recognised the Polymerase Chain Reaction (PCR) test as the primary diagnostic method for COVID-19. Furthermore, there was a high level of awareness regarding preventive measures, including regular handwashing with soap and water and vaccination with the COVID-19 vaccine. These findings are consistent with existing literature, which has documented widespread knowledge of COVID-19 risk factors, diagnostic modalities, and preventive strategies among various population groups in Nigeria and other African countries.^{1,6,10}

Table 3: Respondents' knowledge of risk factors, diagnosis, and prevention of COVID-19

Variables	Frequency (%) n = 249
Knowledge of risk factors and diagnosis of COVID-19	
Knew that regarding COVID-19:	
Young adults are not at risk of severe disease	206 (82.7)
Older adults are at risk of severe disease	230 (92.4)
Adults of any age with underlying medical conditions are at risk of severe disease	225 (90.4)
Is not diagnosed based on the symptoms of the disease alone	175 (70.3)
Is diagnosed through laboratory test [i.e., Polymerase Chain Reaction (PCR) in persons with or without symptoms]	224 (90.0)
Knowledge grading:	
Poor	29 (11.6)
Good	220 (89.4)
Knowledge of prevention of COVID-19	
Knew that COVID-19 can be prevented through the following ways:	
Regular and thorough hand washing with soap under running water	245 (98.2)
Covering mouth and nose with the bent elbow or tissue when coughing or sneezing, dispose of tissue properly into a dustbin and sanitise hands	242 (97.2)
Avoid touching eyes, nose and mouth with unwashed hands	242 (97.2)
Maintain at least 2 meters distance between you and anyone who is coughing or sneezing around you	246 (98.8)
Anyone who has travelled recently from a country with widespread community transmission of COVID-19 outbreak in the last 14 days should stay at home and self-isolate	238 (95.6)
Anyone who has travelled recently from a country with widespread community transmission of the COVID-19 outbreak in the last 14 days and has a fever, cough, or breathing difficulty should call NCDC for screening and treatment	243 (97.6)
Immunisation with COVID-19 vaccine	236 (94.8)
Wearing of facemask regularly	245 (98.4)
Knowledge grading:	
Poor	2 (8.0)
Good	247 (99.2)

Such comprehensive understanding among medical students is essential for effective patient care, public health interventions, and advocacy efforts aimed at controlling the pandemic. On the contrary, the 96.8% prevalence of good knowledge of COVID-19 among the respondents in this study is substantially higher than the 69.5% prevalence obtained among Health Care Providers in Kaduna State, Nigeria,⁵ and the 30.47% prevalence obtained in a community survey in Kano, Nigeria.¹¹ The high level of knowledge of COVID-19 prevention among

the respondents in this study could be due to the fact that being students gave them the opportunity to receive comprehensive information about the disease from their teachers. This finding is supported by the findings in a study conducted among medical and dental students undergoing clinical postings at two public universities in Lagos, Nigeria, which reported that the students perceived their involvement as volunteers during the COVID-19 pandemic as a form of educational experience.¹²

Table 4: Distribution of overall knowledge of COVID-19 by the respondents' sociodemographic characteristics

Variables	Overall knowledge of COVID-19		Test of significance
	Poor Frequency (%)	Good Frequency (%)	
Age group (years)			
16-25	7 (4.5)	147 (95.5)	$\chi^2= 2.305,$ $p = 0.129$
26-35	1 (1.1)	94 (98.9)	
Sex			
Male	4 (2.1)	185 (97.9)	$\chi^2= 3.032,$ $p = 0.082$
Female	4 (6.7)	56 (93.3)	
Marital status			
Single	8 (3.5)	222 (96.5)	Fisher's $\chi^2= 0.683,$ $p = 0.409$
Married	0 (0)	19 (100)	
Religion			
Islam	5 (2.4)	201 (97.6)	$\chi^2= 2.368,$ $p = 0.124$
Christianity	3 (7.0)	40 (93.0)	
Tribe			
Hausa/Fulani	3 (2.2)	131 (97.8)	Fisher's $\chi^2= 1.732,$ $p = 0.630$
Yoruba	2 (5.3)	36 (94.7)	
Igbo	0 (0)	12 (100)	
Others	3 (4.6)	62 (95.4)	
School year			
2 nd	4 (5.8)	65 (94.2)	Fisher's $\chi^2= 5.841,$ $p = 0.211$
3 rd	3 (5.9)	48 (94.1)	
4 th	0 (0)	34 (100)	
5 th	0 (0)	62 (100)	
6 th	1 (3.0)	32 (97.0)	
Place of residence			
Hostel	5 (3.2)	152 (96.8)	$\chi^2= 0.133,$ $p = 0.688$
Rented house alone	2 (3.8)	50 (96.2)	
At home with parents	1 (2.5)	39 (97.5)	

$\chi^2=$ Pearson's Chi square test; Fisher's $\chi^2=$ Fisher's exact Chi square test

Table 5: Respondents' COVID-19 preventive practices

Variables	Frequency (%) n = 249
COVID-19 preventive practices	
Wash hands regularly and thoroughly with soap under running water or use alcohol-based sanitiser if water is not available	180 (72.3)
Cover mouth and nose with bent elbow or tissue while coughing and dispose of tissue properly into a dustbin and sanitise hands	152 (61.0)
Avoid touching eyes, nose and mouth with unwashed hands	113 (45.4)
Maintain at least 2 meters distance between self and anyone who is coughing or sneezing	134 (53.8)
Always wear a face mask to lectures and other places	81 (32.5)
Have received the COVID-19 vaccine	15 (6.0)
Practice grading:	
Inadequate	161 (64.7)
Adequate	88 (35.3)

Despite the commendable levels of knowledge observed among the respondents, the study identified gaps in COVID-19 preventive practices. Only about a third of

the respondents reported adequate preventive practices, with suboptimal adherence to consistent mask-wearing and low uptake of the COVID-19 vaccine.

Table 6: Factors associated with adequate COVID-19 preventive practices among respondents

Variables	COVID-19 preventive practices		Test of significance
	Inadequate Frequency (%)	Adequate Frequency (%)	
Age group (years)			
16-25	89 (57.8)	65 (42.2)	$\chi^2= 8.328$, p = 0.004*
26-35	72 (75.8)	23 (24.2)	
Sex			
Male	129 (68.3)	60 (31.7)	$\chi^2= 4.437$, p = 0.035*
Female	32 (53.3)	28 (46.7)	
Marital status			
Single	152 (66.1)	78 (33.9)	$\chi^2= 2.691$, p = 0.101
Married	9 (47.4)	10 (52.6)	
Religion			
Islam	130 (63.1)	76 (36.9)	$\chi^2= 1.257$, p = 0.262
Christianity	31 (72.1)	12 (27.9)	
Tribe			
Hausa/Fulani	80 (59.7)	54 (40.3)	$\chi^2= 8.026$, p = 0.045*
Yoruba	24 (63.2)	14 (36.8)	
Igbo	6 (50.0)	6 (50.0)	
Others	51 (78.5)	14 (21.5)	
School year			
2 nd	51 (73.9)	18 (26.1)	$\chi^2= 26.74$, p < 0.001
3 rd	18 (35.3)	33 (64.7)	
4 th	21 (61.8)	13 (38.2)	
5 th	48 (77.4)	14 (22.6)	
6 th	23 (69.7)	10 (30.3)	
Place of residence			
Hostel	106 (67.5)	51 (32.5)	$\chi^2= 3.161$, p = 0.206
Rented house alone	34 (65.4)	18 (34.6)	
At home with parents	21 (52.5)	19 (47.5)	

χ^2 = Pearson's Chi square test; *Statistically significant (p < 0.05)

While the low level of adequate COVID-19 preventive practices obtained in this study differs from the finding of a study conducted among medical students in Iran¹³ reported that most of the respondents (94.2%) had a high level of performance in COVID-19 preventive behaviours, it is consistent with the generally poor COVID-19 preventive practices found in research conducted among healthcare workers and the general population in Nigeria,^{5,11} which has highlighted challenges in translating knowledge into behaviour change and adopting recommended preventive measures. Addressing these gaps requires targeted interventions aimed at promoting behaviour change, addressing misconceptions, and addressing barriers to vaccine acceptance and uptake.

Furthermore, this study identified sociodemographic disparities in COVID-19 preventive practices, with variations observed based on age, gender, school year, and ethnic affiliation. Younger respondents, females, those in

the 3rd school year, and individuals belonging to the Igbo ethnic group were found to have higher levels of adherence to preventive measures. Similar to the findings in this study, a study conducted among health care providers in Kaduna State, Nigeria, also found associations between good COVID-19 preventive practices and sociodemographic variables such as respondents' ethnicity and cadre.¹¹ These findings underscore the importance of considering sociocultural factors and context-specific determinants in designing tailored interventions to promote equitable access to and uptake of preventive measures. Efforts to address disparities in preventive practices should adopt a multifaceted approach that accounts for the diverse needs and preferences of different population groups, including targeted communication strategies and community engagement initiatives.

CONCLUSION

In conclusion, whereas most of the respondents in this study demonstrated good knowledge of COVID-19, only about a third practised adequate preventive measures, with adherence to preventive measures being significantly higher among younger individuals, females, those in the 3rd school year, and those belonging to the Igbo ethnic group. These findings underscore the need for government to design targeted interventions, particularly among certain demographic groups, to improve adherence to preventive measures.

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Conflict of interest

None declared.

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