

Original Research Article

Knowledge, attitude, and practices towards COVID-19: a cross-sectional study among nursing and midwifery students in Jalingo, Nigeria

Hope Inegbenosun*, Clement Chinedu Azodo, John Chukudi Anionye,
Collins Usunobun Inegbenosun, Obinna Chukwunwike Njoku

Department of Periodontics, University of Benin Teaching Hospital, Benin City, Nigeria

Received: 17 December 2020

Accepted: 05 February 2021

*Correspondence:

Dr. Hope Inegbenosun,

E-mail: inegbenosun190@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: The coronavirus disease (COVID-19) infection rate and mortality among Nigerian health care workers appear to be on the increase. Aside from health workers, it has caused millions of infections and deaths worldwide. This study determined the level of knowledge, attitude, and practices of nursing and midwifery students towards COVID-19 in a North-Eastern Nigerian state.

Methods: A total of 156 respondents were involved in this institutional-based cross-sectional study, conducted after the lockdown period. A total of 17 questions were used to assess the KAP with knowledge appraised with 12 questions, attitudes with 2 questions, and practices with 3 questions.

Results: The majority of the students (53.80%) possessed a good level of knowledge regarding COVID-19, while 40.4% had fair knowledge regarding COVID-19 with only 5.80% having poor knowledge of COVID-19. The mean knowledge of COVID-19 in this study was 9.40 ± 1.353 with an overall 78% correct answer rate. A vast majority of the respondent (82.7% and 98.1%) had strong confidence in Nigeria and believed that the pandemic will soon be over, respectively. Only a few avoided large gatherings of people (30.8%) with the vast majority reporting to have worn a mask when going out (84.6%) and washing their hands with running water and soap frequently as recommended (73.1%). In multiple logistic regression analyses, the COVID-19 knowledge score (OR: 0.39-0.40, 95%CI: 0.26 – 0.62, $P < 0.05$) was significantly associated with a lower likelihood of negative preventive practices towards COVID-19.

Conclusions: The participants in this study showed good knowledge, positive attitudes, and good practices toward COVID-19. There is still a need to strategize and implement periodic educational interventions and training on infection control practices among healthcare workers including students.

Keywords: Attitude, COVID 19, Knowledge, Practices

INTRODUCTION

COVID-19 is caused by the new coronavirus SARS-CoV-2.¹ The virus was reported to have originated from bats and the first cases of the virus were first reported in Wuhan, Hubei Province in China suggesting a possible animal-to-human spread.² The disease clinically presents

as an asymptomatic infection with some patients developing severe respiratory complications.³ The clinical presentations of the disease include fever, fatigue, dry cough, malaise, and breathing difficulty.^{3,4} The human-to-human transmission of the virus is very alarming and worrisome as it has caused far more than a million deaths worldwide in over 220 countries and territories. In

consequence, COVID-19 was declared a global pandemic on March 11, 2020, by the World Health Organization, after having been seen as a "Public Health Emergency of International Concern (PHEIC)" on January 30, 2020.⁵⁻⁷

Before the registration of the COVID-19 index case in Lagos, Nigeria, and its subsequent spread to other states in Nigeria in February 2020, many Nigerians thought that the ailment was that of white men and that it would never get to Sub-Saharan Africa due to its hot weather condition. To avoid further spread of the virus, the Presidency announced a total lockdown of activities as a nationwide effort to slow the spread of the deadly virus on March 26, 2020. Despite the directive, some states in the country, especially those in North-Eastern Nigeria including Taraba State, continued their normal routine activities without observing social distancing and other preventive measures, as given by the Nigerian Centre for Disease Control.⁸ Taraba State consequently recorded her first group of six index cases among 130 interstate travelers intercepted at the state borders just 5 days after implementation of a total lockdown in the state was announced by the Deputy Governor on April 21, 2020, about a month after a total national lockdown was advised by the Presidency. Taraba State, at the time of writing this manuscript (November 19th, 2020), had a total of 156 confirmed COVID-19 cases with 139 (89.1%) discharged, 11 (7%) currently receiving treatment at the designated facilities in the state, and unfortunately 6 (3.9%) deaths.⁹ It is strongly believed by the authors that the true values of COVID-19 cases are far more than what is reported due to poor testing and surveillance in the state.

Healthcare workers (HCWs) such as medical doctors, dental surgeons, nurses, laboratory scientists, and other allied health professionals are tasked with offering healthcare services to the sick either directly or indirectly.^{10,11} This job makes them prone to infections and diseases especially during this pandemic where they have been considered by the Occupational Safety and Health Administration to be at high risk of exposure to the deadly coronavirus due to its mode of transmission.^{12,13} Despite the good works of the HCWs in offering care which has led to the recovery of over 39 million people out of the 35 million confirmed global cases as of November 19, 2020, the World Health Organization have reported that more than 450,000 HCWs were infected within their line of duty with more than 1000 HCWs having lost their lives to the deadly virus globally.^{14,15} As reported by news media, there are currently about 812 infected HCWs in Nigeria with an undocumented number of deaths.^{16,17}

As members of the health care team, nurses play a very crucial role in caring for patients.¹⁸ They take up essential roles in the assessment of patients and the administration of medications. Therefore, the knowledge, attitude, and practice of future nursing practitioners are very essential to controlling this deadly virus. There is a

need for nursing students to be trained in pandemic management so they can be better prepared in times like this. The variation of knowledge, attitude, and practices toward COVID-19 among individuals, communities, and even among various health institutions further justified the need for this study in North-Eastern Nigeria where the literacy rate is reported to be very low and where very little research has been done in this context.¹⁹⁻²³

As far as the authors are aware, this is the first cross-sectional study to assess and evaluate the knowledge, attitudes, and practices of individuals in Taraba State, within North-Eastern Nigeria that is ravaged by high poverty and illiteracy levels.^{24,25} The fact that very few studies have been conducted in this context and none have been done among nursing and midwifery students in Nigeria further justified the need for this study. Since these students are among the future HCWs who will be directly interacting with patients, there is a need to assess their KAP as inadequacy will translate to practices that may directly increase the risk of spread among staff and further spread to the communities. This study aims to evaluate the knowledge, attitude, and practices of nursing and midwifery students towards COVID-19. This will aid in curriculum reviews aimed at enlightening them about infectious diseases and their management and thus ensuring a reduction in infectious disease burden among HCWs and the community when they start practicing.

METHODS

Study design and participation

This is an institutional-based cross-sectional study conducted in the School of Nursing and Midwifery, Jalingo, Taraba in North-Eastern Nigeria during the period from November 10, 2020, to November 21, 2020. The targeted population was the nursing and midwifery students of the institution. All the students from the first year to final year were invited to participate in the study.

Sample size/sampling

Systematic sampling technique was used to recruit 156 consenting participants which exceeded the minimum sample size calculated using Cochran's formula for epidemiological studies. $n = z^2 p (1-P) / d^2$ Where n = sample size, z = statistics for a level of confidence (set at 1.96 corresponding to 95.0% confidence level), p = prevalence = 88.59%, being the prevalence of participants that had good knowledge of COVID-19 in a previous study carried out in South-Eastern Nigeria, $q = 1-P$ and d = degree of accuracy desired (error margin) = 5% (0.05).²⁶

Study instrument

A pilot study was conducted on 6 subjects comprising of 3 nursing and 3 midwifery students of the school to test the questionnaire validity and reliability and they were

excluded afterward from the study and the data generated excluded from the final analysis. Adjustments were made to the questionnaire based on the response given.

The questionnaire used for this study had two parts: Socio-demographics and a section assessing the knowledge, attitude, and practices of the participants. The variables in the socio-demographic section included age, gender, class in school, department, marital status, state of origin, and parents' highest level of education.

A total of 17 questions were used to assess the KAP with knowledge appraised with 12 questions (K1 to K12), attitudes with 2 questions (A1-A2), and practices with 3 questions (P1-P3). The questions on knowledge were about COVID-19 clinical presentations, transmission routes of the virus, and the disease prevention and control strategies. Answers to these questions were either true or false with an additional "I don't know" option. Every correct answer in the knowledge sub-section was awarded one point with no point awarded for an incorrect answer. The total scores ranged from 0 to 12 with higher values signifying an increased level of COVID-19 knowledge. Knowledge score was categorized as poor when the score was less than or equal to 6, moderate when the score is between 7 and 9, and good when it was greater than ≥ 10 .

The questions on attitude were used to assess the level of confidence in the Government in successfully controlling the virus. Questions on practices investigated the participants' level of cooperation with the directives given by the Nigerian Centre for Disease Control (NCDC) in the prevention and control of coronavirus.

RESULTS

The respondents' socio-demographic data are presented in Table 1 below. As shown in the table, over half (69.3%) of the students were females with most of the respondents single (85.7%) and between the ages of 21–25 years of age (48.7%) with a mean of 24.04 ± 3.825 . The highest proportion of the respondents was in their second year (61.3%) while the least proportion was the year 1 students (21.7%). About two-thirds of the participants were in the department of basic nursing (68.7%) with the majority of them from Taraba State (85.7%). Concerning parents' highest level of education, most of the respondents claimed that their parents had up to tertiary education (75.3% and 43.4% for fathers and mothers, respectively).

Table 1: Demographic characteristics of participants and knowledge score of COVID-19.

Characteristics	n (%)	Knowledge Score (mean \pm standard deviation)	t	P value	
Age (years)	17 -20	33 (21.9)	9.73 \pm 0.876	2.813	0.063
	21–25	78 (48.7)	9.15 \pm 1.415		
	≥ 26	45 (29.4)	9.60 \pm 1.468		
Gender	Male	51 (30.7)	8.82 \pm 1.740	15.229	< 0.001
	Female	105 (69.3)	9.69 \pm 1.013		
Marital Status	Single	135 (85.7)	9.31 \pm 1.352	4.831	0.029
	Married	21 (14.3)	10.00 \pm 1.225		
Grade	Year 1	33 (21.7)	9.64 \pm 0.994	0.750	0.474
	Year 2	96 (61.3)	9.22 \pm 1.502		
	Year 3	87 (55.8)	9.38 \pm 1.416		
Department	Basic Nursing	108 (68.7)	9.33 \pm 1.421	0.954	0.330
	Basic Midwifery	48 (31.3)	9.56 \pm 1.183		
State of Origin	Taraba	132 (85.7)	9.52 \pm 1.275	6.880	0.010
	Non-indigene	24 (14.3)	8.75 \pm 1.595		
Father's highest level of education	No education	9 (4.9)	8.00 \pm 2.291	8.669	< 0.001
	Primary education	6 (3.9)	9.50 \pm 1.643		
	Secondary education	27 (16.0)	8.67 \pm 1.732		
	Tertiary education	114 (75.3)	9.68 \pm 0.980		
Mother's highest level of education	No education	18 (10.0)	8.17 \pm 2.176	9.772	< 0.001
	Primary education	24 (14.5)	8.88 \pm 1.650		
	Secondary education	48 (32.1)	9.81 \pm 0.891		
	Tertiary education	66 (43.4)	9.64 \pm 0.939		

The level of knowledge among the nursing and midwifery students regarding the COVID-19 pandemic is presented in Figure 1 below. A total of 12 questions were used to assess the level of knowledge among the students. As shown in Figure 1, the majority of the students (53.80%)

possessed a good level of knowledge regarding COVID-19, while 40.4% had fair knowledge regarding COVID-19 with only 5.80% having poor knowledge of COVID-19. The mean knowledge of COVID-19 in this study was 9.40 ± 1.353 (range 0-12). This score suggests

an overall 78% (9.40/12*100) correct answer rate. Knowledge test scores differed significantly across the categories of gender (p<0.001), marital status (p=0.029), state of origin (0.010) and parents' highest level of education (both at p<0.001). In multiple logistic regression analyses, the COVID-19 knowledge score (OR: 0.39-0.40, 95%CI: 0.26-0.62, p<0.05) was significantly associated with a lower likelihood of negative preventive practices towards COVID-19 (Table 5).

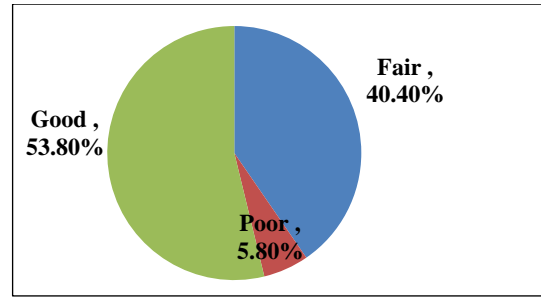


Figure 1: Knowledge scores of the participants.

Table 2: Attitudes of the students towards COVID-19 by demographic variables.

Characteristics		Attitudes, N (%)			
		Success in controlling COVID-19		Confidence in Nigeria	
		Agree	Disagree	Yes	No
Age (years)	17 -20	45 (100.0)	0 (0)	42 (93.3)	3 (6.7)
	21–25	33 (100.0)	0 (0)	30 (90.9)	3 (9.1)
	≥26	75 (96.2)	3 (3.8)	57 (73.1)	21 (26.9)
Gender	Male	51 (100.0)	0 (0)	42 (82.4)	9 (17.6)
	Female	102 (97.1)	3 (2.9)	87 (82.9)	18 (17.1)
Marital status	Single	132 (97.8)	3 (3.2)	111 (82.2)	24 (17.8)
	Married	21 (100.0)	0 (0)	18 (85.7)	3 (14.3)
Grade	Year 1	33 (100.0)	0 (0)	30 (90.9)	3 (9.1)
	Year 2	27 (100.0)	0 (0)	27 (100.0)	0 (0)
	Year 3	93 (96.9)	3 (3.1)	72 (75.0)	24 (25.0)
Department	Basic nursing	105 (97.2)	3 (2.8)	93 (86.1)	15 (13.9)
	Basic midwifery	48 (100.0)	0 (0)	36 (75.0)	12 (25.0)
State of origin	Taraba	129 (97.7)	3 (2.3)	114 (86.4)	18 (13.6)
	Non-indigene	24 (100.0)	0 (0)	15 (62.5)	9 (37.5)
Father's highest level of education	No education	9 (100.0)	0 (0)	3 (33.3)	6 (66.7)
	Primary education	6 (100.0)	0 (0)	6 (100.0)	0 (0)
	Secondary education	27 (100.0)	0 (0)	27 (100.0)	0 (0)
	Tertiary education	111 (97.4)	3 (2.6)	93 (81.6)	21 (18.4)
Mother's highest level of education	No education	18 (100.0)	0 (0)	12 (66.7)	6 (33.3)
	Primary education	24 (100.0)	0 (0)	21 (87.5)	3 (12.5)
	Secondary education	48 (100.0)	0 (0)	42 (87.5)	6 (12.5)
	Tertiary education	63 (95.5)	3 (4.5)	54 (81.8)	12 (18.2)
Total		153 (98.1)	3 (1.9)	129 (82.7)	27 (17.3)

The respondents' attitude towards the COVID-19 pandemic was assessed using two questions that had an "Agree" or "Disagree" and a "Yes" or "No" response. A vast majority of the respondent showed a high degree of optimism regarding the pandemic with almost all respondents (98.1%) in agreement that the pandemic will be finally controlled. The proportion of "disagree" regarding the above question was 1.9%. The attitude towards the "final success" in controlling the COVID-19 pandemic did not significantly differ among the socio-demographic variables statistically (p>0.05). A vast majority of the respondents (82.7%) had strong

confidence that Nigeria can win the battle against the COVID-19 virus with just 27 participants (17.3%) with a contrary opinion. The attitude towards "confidence of Nigeria winning" was statistically significant across the various age groups, class, and state of origin (p<0.05). The result of the multiple binary logistic regression carried out showed that 25-35 years age group (OR: 13.73, 95% CI: 3.67-51.35, p<0.001), year 3 students (OR: 10.47, 95% CI: 2.77-39.58, p=0.001) and Tarabans (OR: 7.33, 95% CI: 1.79-30.09, p=0.006) were significantly associated with no confidence in Nigeria winning the battle (Table 2, 3, 5).

Table 3: Results of multiple binary logistic regression analysis on factors significantly associated with attitudes towards COVID-19.

Variable	OR (95% CI)	P value
A2: No confidence in Nigeria winning the battle		
Age-group (25-35 vs. 17-24 years)	13.73 (3.67–51.35)	<0.001
Class (year 3 vs. year 1 and 2)	10.47 (2.77–39.58)	0.001
State of origin (Tarabans vs. Non-Indigene)	7.33 (1.79–30.09)	0.006

Table 4: Practices of the students towards COVID-19 by demographic variables.

Characteristics		Practices, n (%)					
		Gone to a crowded place		Worn a mask		Washed Hands	
		Yes	No	Yes	No	Yes	No
Age (years)	17-20	30 (66.7)	15 (33.3)	42 (93.3)	3 (6.7)	39 (86.7)	6 (13.3)
	21–25	21 (63.6)	12 (36.4)	24 (72.7)	9 (27.3)	15 (45.5)	18 (54.5)
	≥26	57 (73.1)	21 (26.9)	66 (84.6)	12 (15.4)	60 (76.9)	18 (23.1)
Gender	Male	33 (64.7)	18 (35.3)	42 (82.4)	9 (17.6)	39 (76.5)	12 (23.5)
	Female	75 (71.4)	30 (28.6)	90 (85.7)	15 (14.3)	75 (71.4)	30 (28.6)
Marital Status	Single	93 (68.9)	42 (31.1)	111 (82.2)	24 (17.8)	93 (68.9)	42 (31.1)
	Married	15 (71.4)	6 (28.6)	21 (100.0)	0 (0)	21 (100.0)	0 (0)
Grade	Year 1	24 (72.7)	9 (27.3)	24 (72.7)	9 (27.3)	18 (54.5)	15 (45.5)
	Year 2	21 (77.8)	6 (22.2)	21 (77.8)	6 (22.2)	18 (66.7)	9 (33.3)
	Year 3	63 (65.6)	33 (34.)	87 (90.6)	9 (9.4)	78 (81.3)	18 (18.8)
Department	Basic nursing	78 (72.2)	30 (27.8)	90 (83.3)	18 (16.7)	69 (63.9)	39 (36.1)
	Basic midwifery	30 (62.5)	18 (37.5)	42 (83.3)	6 (12.5)	45 (93.8)	3 (6.3)
State of Origin	Taraba	84 (63.5)	48 (36.4)	111 (84.1)	21 (15.9)	102 (77.3)	30 (20.7)
	Non-indigene	24 (100.0)	0 (0)	21 (87.5)	3 (12.5)	12 (50.0)	12 (50.0)
Father's highest level of education	No education	6 (66.7)	3 (33.3)	6 (66.7)	3 (33.3)	6 (66.7)	3 (33.3)
	Primary education	6 (100.0)	0 (0)	3 (50.0)	3 (50.0)	3 (50.0)	3 (50.0)
	Secondary education	24 (88.9)	3 (11.1)	24 (88.9)	3 (11.1)	15 (55.6)	12 (44.4)
	Tertiary education	72 (63.2)	42 (36.8)	99 (86.9)	15 (13.2)	90 (78.9)	24 (21.1)
Mother's highest level of education	No education	15 (83.3)	3 (16.7)	9 (50.0)	9 (50.0)	9 (50.0)	9 (50.0)
	Primary education	15 (62.5)	9 (37.5)	21 (87.5)	3 (12.5)	21 (87.5)	3 (12.5)
	Secondary education	33 (68.8)	15 (31.3)	48 (100.0)	0 (0)	33 (68.8)	15 (22.7)
	Tertiary education	45 (68.2)	21 (31.8)	54 (81.8)	12 (18.2)	51 (77.3)	15 (22.7)
Total		108 (69.2)	48 (30.8)	132 (84.6)	24 (15.4)	114 (73.1)	42 (26.9)

Table 5: Results of multiple binary logistic regression analysis on factors significantly associated with practices towards COVID-19.

Variable	OR (95% CI)	P Value
P2: Not wearing a mask		
Class (year 1 and 2 vs. year 3)	5.73 (1.95 -16.85)	0.002
Mothers' highest level of education (graduate vs. non-graduate)	0.25 (0.08–0.78)	0.018
COVID-19 knowledge score	0.39 (0.26–0.59)	<0.001
P3: Don't wash hands		
Gender (females vs. males)	3.86 (1.38-10.84)	0.010
Class (year 1 and 2 vs. year 3)	5.06 (1.48–17.34)	0.010
State of origin (Tarabans vs. Non-Indigene)	0.16 (0.05–0.50)	0.002
COVID-19 knowledge score	0.40 (0.27–0.62)	<0.001

Concerning the practices of the respondents toward COVID-19, only a few avoided large gatherings of people (30.8%) with the vast majority reporting to have worn a mask when going out (84.6%) and washing their hands with running water and soap frequently as recommended (73.1%). The rates of the two latter practices significantly differed across some of the demographic variables

($p < 0.05$). Multiple binary logistic regression results showed that Year 1 and 2 students (vs. Year 3 students, OR: 5.73, 95% CI: 1.95-16.85), $p = 0.002$), graduate mothers (vs. non-graduate mothers, OR: 0.25, 95% CI: 0.08-0.78, $p = 0.018$) and COVID-19 knowledge score (OR: 0.39, 95% CI: 0.26-0.59, $p < 0.001$) were significantly associated with not wearing a face mask

outside. Also, female gender (vs. male, OR: 3.86, 95% CI: 1.38-10.84, $p=0.010$), year 1 and 2 students (vs. year 3 students, OR: 5.06, 95% CI: 1.48-17.34, $p=0.010$), Tarabans (vs. non-indigenes, OR: 0.16, 95% CI: 0.05 – 0.50, $p=0.002$) and COVID-19 knowledge score (OR: 0.40, 95% CI: 0.27–0.62, $p<0.001$) were significantly associated with not washing hands with running water and soap frequently as advised (Table 4 and 5).

DISCUSSION

In this study, the authors present the result of a questionnaire-based study carried on nursing and midwifery students in the capital city of Taraba State in North-Eastern Nigeria. A total of 156 students participated in the cross-sectional study. The overall mean knowledge score was 9.40 ± 1.35 (range 0-12). With an overall 78% correct answer rate. Most of the students possessed a good knowledge of COVID-19 (53.80%). Several studies conducted in Asian countries, Kenya, and Nigeria are in agreement with our finding of good COVID-19 knowledge.^{21,23,27-30} This trend is possible because the World Health Organization and NCDC are rightfully feeding the populace with enough COVID-19 information through the available news media. This can also be attributed to the fact that the respondents in this study were students of the nursing profession and so are expected to be quite knowledgeable.

Good knowledge of COVID-19 is of paramount importance to establishing positive attitudes toward coronavirus which is necessary for promoting healthy behaviours among the students. It is, therefore, necessary for the government to invest in activities that will promote awareness of the disease. In this study, a vast majority 98.1% of the students believed that COVID-19 will be finally controlled, and also 82.7% were confident that Nigeria can win the fight against the deadly coronavirus. This finding was far higher than the 65% and 78% reported in a similar study in West Bengal.³¹ This shows that a large population of students have strong confidence in their country, Nigeria. A study in China showed a 97.1% level of confidence among the residents that participated in the study.²⁷

A vast majority of the respondents in this study reportedly took precautionary measures by use of face masks and also washing their hands. This is a good sign as it indicates a high level of willingness of the people in effecting behavioural changes to fighting COVID-19 together. Furthermore, it can be said that the awareness campaigns of both the Federal Ministry of Health (FMOH) and the NCDC were fruitful in educating the populace as it largely reflected on the attitudinal changes of the respondents as 84.6% and 73.1% reported to have worn a mask and washed their hands frequently, respectively. This is contrary to the findings from a previous study, which reported that only about 35% of the study participants wore face masks.³² Although, quite a majority of the respondents still visited crowded places,

only a few (30.8%) agreed that all large gatherings should be avoided. This finding recorded in this study could be attributed to the fact that the study was conducted when the ban on large gatherings on more was lifted by the Presidency.

In the study area, only about 56.9% of the adult population is literate in English.²⁵ Also, Taraba State has a poverty headcount rate of 87.73% and this means that a large number of the inhabitants in the state will be probably illiterates and under-privileged.²⁴ Undoubtedly, this will translate to poor knowledge and negative attitudes towards COVID-19 and thus negates all the efforts put forward by the Government toward flattening the curve of the disease. Therefore, there is a need for another study to be done among this group of vulnerable persons using methods that is best for them.

CONCLUSION

The COVID-19 pandemic has a profound effect on the health system, with over 1000 HCW's lives lost globally. The participants in this study showed good knowledge, positive attitudes, and good practices toward COVID-19. There is still a need to strategize and implement periodic educational interventions and training on infection control practices among healthcare workers including students who will be taking over the job in the nearest future.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee of School of Nursing and Midwifery, Jalingo

REFERENCES

1. Fauci AS, Lane HC. Covid-19-navigating the uncharted. *N Engl J Med*. 2020;382(13):1268–9.
2. Liu T, Hu J, Kang M, Lin L, Zhong H, Xiao J, et al. Transmission dynamics of 2019 novel coronavirus *Lancet*. (2019-nCoV);2020.
3. Carsetti R, Rosado MM, Donnanno S, Guazzi V, Soresina A, Meini A, et al. The loss of IgM memory B cells correlates with clinical disease in common variable immunodeficiency. *J Allergy Clin Immunol*. 2005;115(2):412-7.
4. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A novel coronavirus from patients with pneumonia in China, 2019. *N Engl J Med*; 2020.
5. Cucinotta D, Vanelli M. Who Declares COVID-19 a pandemic. *Acta Biomed*. 2020;91:157–60.
6. Cai J, Sun W, Huang J, Gamber M, Wu J, He G. Indirect virus transmission in cluster of COVID-19 cases, Wenzhou, China, 2020. *Emerg Infect Dis*. 2020;26(6):1343-5.
7. Wang L, Li J, Guo S, Xie N, Yao L, Cao Y, et al. Real-time estimation and prediction of mortality caused by COVID-19 with patient information based algorithm. *Sci Total Environ*. 2020:138394.

8. Nigerian Centre for disease control (NCDC). (2020). Frequently asked questions on Coronavirus, 2020. Available at: <https://covid19.ncdc.gov.ng/faq/>. Retrieved May 8, 2020.
9. Nigeria Centre for Disease Control (NCDC). Covid-19 outbreak in Nigeria situation report s/n:045, 2020. Available at: <https://ncdc.gov.ng/news>. Accessed 19 Nov 2020.
10. Mohanty A, Kabi A, Mohanty AP. Health problems in healthcare workers: A review. *J Family Med Prim Care*. 2019;8:2568-72.
11. Wise ME, De Perio M, Halpin J, Jhung M, Magill S, Black SR, et al. Transmission of pandemic (H1N1) 2009 influenza to healthcare personnel in the United States. *Clin Infect Dis*. 2011;52(suppl 1):S198–S204.
12. Inegbenosun H, Ofiri EP, Azodo CC. COVID-19 and its implications in dental care. *J Adv Med Med Res*. 2020;32(14):53-7.
13. Bandyopadhyay S, Baticulon RE, Kadhum M, Alser M, Ojuka DK, Badereddin Y, Kamath A, Parepalli SA, Brown G, Iharchane S, Gandino S. Infection and mortality of healthcare workers worldwide from COVID-19: a scoping review. medRxiv. 2020 Jan 1.
14. Medscape Coronavirus Resource Center, 2020. In memoriam: Healthcare workers who have died of COVID-19. Available at: <https://www.medscape.com/viewarticle/927976>. Accessed 19 Nov 2020.
15. Nigeria Center for Disease Control, 2020. Nigeria launches COVID-19 online course on infection prevention and control (IPC). Available at: <https://ncdc.gov.ng/news/258/nigeria-launches-covid-19-online-course-on-infection-prevention-and-control-%28ipc%29>. Accessed 20 Nov 2020.
16. Mwai P, Giles C. Coronavirus: How vulnerable are health workers in Nigeria? 2020. Available at: <https://www.bbc.com/news/world-africa-53013413>. Accessed 19 Nov 2020.
17. Joshi KP, Madhura L, Jamadar D. Knowledge and awareness among nursing students regarding the COVID-19: a cross sectional study. *Int J Commu Med Pub Heal*. 2020;6(2):e19160.
18. Bhagavathula AS, Aldhalei WA, Rahmani J, Mahabadi MA, Bandari DK. Knowledge and Perceptions of COVID-19 Among Health Care Workers: Cross-Sectional Study. *JMIR Public Health Surveill*. 2020;6:e19160.
19. Zhou M, Tang F, Wang Y, Nie H, Zhang L, You G, Zhang M. Knowledge, attitude and practice regarding COVID-19 among health care workers in Henan, China. *J Hosp Infect*. 2020;105:183-7.
20. Saqlain M, Munir MM, Ur Rehman S, Gulzar A, Naz S, Ahmed Z, et al. Knowledge, attitude, practice and perceived barriers among healthcare professionals regarding COVID-19: A cross-sectional survey from Pakistan. *J Hosp Infect*. 2020;105:419–23.
21. Khader Y, Al Nsour M, Al-Batayneh OB, Saadeh R, Bashier H, Alfaqih M, et al. Dentists' awareness, perception, and attitude regarding COVID-19 and infection control: Cross-sectional study among Jordanian dentists. *JMIR*. 2020;6:e18798.
22. Giao H, Le An P, Thi Ngoc Han N, Van Khanh T, Kim Ngan V, Van Tam V, et al. Knowledge and attitude toward COVID-19 among healthcare workers at District 2 Hospital, Ho Chi Minh City. *Asian Pac J Trop Med*. 2020;13:6–11.
23. National Bureau of Statistics (NBS). 2019 Poverty and Inequality in Nigeria: Executive Summary. Abuja: National Bureau of Statistics, 2019.
24. National Bureau of Statistics (NBS). National Literacy Survey, 2010. Abuja: National Bureau of Statistics, 2010.
25. Mbachau CNP, Azubuike CM-C, Mbachau II, Ndukwu CI, Ezeuko AY-A, Udigwe IB, et al. COVID-19 infection: knowledge, attitude, practices, and impact among healthcare workers in a South-Eastern Nigerian state. *J Infect Dev Ctries*. 2020;14:943-52.
26. Zhong BL, Luo W, Li HM, Zhang QQ, Liu XG, Li WT. 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.
27. Azlan AA, Hamzah MR, Sern TJ, Ayub SH, Mohamad E. Public knowledge, attitudes and practices towards COVID-19: A cross-sectional study in Malaysia. *PLoS ONE*. 2020;15(5): e0233668.
28. Austrian K, Pinchoff J, Tidwell JB, White C, Abuya T, Kangwana B. COVID-19 related knowledge, attitudes, practices and needs of households in informal settlements in Nairobi, Kenya. *Bull World Health Organ*. 2020.
29. Olapegba PO, Ayandele O, Kolawole SO, Oguntayo R, Gandhi JC, Dangiwa AL, et al. A preliminary assessment of novel coronavirus (COVID-19) knowledge and perceptions in Nigeria. *BMJ*. 2020.
30. Acharyya A, Ghosh S, Ghosh M, Sarkar K, Ghosh S, Bhattacharya A, Ghosh K. Knowledge, attitudes, and practices towards COVID-19 among hospital staff of West Bengal during COVID-19 outbreak: A hospital based cross sectional study. *Asian J Med Sci*. 2020;11(6):1-8.
31. Abdelhafiz AS, Mohammed Z, Ibrahim ME, Ziady HH, Alorab M, Ayyad M, et al. Knowledge, perceptions, and attitude of Egyptians towards the novel coronavirus disease (COVID-19). *J Comm Heal*. 2020;45(5):881-90.

Cite this article as: Inegbenosun H, Azodo CC, Anionye JC, Inegbenosun CU, Njoku OC. Knowledge, attitude, and practices towards COVID-19: a cross-sectional study among nursing and midwifery students in Jalingo, Nigeria. *Int J Community Med Public Health* 2021;8:1122-8.