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Nigerian undergraduate students' perception towards COVID-19 prevention: Implications for policy

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Abstract
Objective: Universities provide a supportive and safe learning environment for students. To limit the transmission of COVID-19, the WHO has recommended several preventive measures including frequent washing of hands, hand sanitizer usage, the wearing of masks, social distancing, covering of mouth while sneezing, etc. Students need to comply with these personal hygiene practices to limit the transmission of COVID-19.
Methodology: A descriptive cross-sectional study design was used to assess the knowledge and practice of COVID-19 prevention among undergraduate students of Babcock University, Ilishan-Remo Ogun State, Nigeria. 430 respondents were selected using a multistage sampling technique. Data were analyzed using SPSS for Windows Version 21. A p-value of < 0.05 was regarded as statistically significant.
Results: 98.8%, 96.4%, and 84.1% of the respondents knew about COVID-19, know that it is a contagious disease, and know that a virus causes COVID-19 respectively. 60.4% and 56.7% heard about COVID-19 from the news and social media and had good knowledge of COVID-19 respectively. 38.2%, 36.7%, and 63.3% of the respondents have an average level of practice of COVID-19 prevention, had been vaccinated majorly with AstraZeneca brand of vaccine (20.6%), and are yet to be vaccinated respectively. There is no association between the knowledge of the prevention of COVID-19 and practice among undergraduate students of Babcock University (0.258, $\chi 2=5.300$).
Conclusion: The majority of the students had good and average knowledge of COVID-19 and its prevention respectively. There was no significant association between knowledge and practice of COVID-19 prevention.

Keywords: COVID-19, Vaccination, University, Undergraduate, Policy

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Plain English Summary
Universities are an essential aspect of a community's infrastructure, they provide a supportive and safe learning environment for students. Several preventive measures have been recommended by the WHO to restrict the spread of COVID-19. To this effect, students must comply with these preventive measures since they stay in confined spaces. A descriptive cross-sectional study design was used to assess the knowledge and practice of COVID-19 prevention among undergraduate students of a tertiary institution in Southwest Nigeria. A multistage sampling technique was used for the sample selection of 430 respondents. Our findings show that a little above average (56.7%) of the respondents had good knowledge of COVID-19, about 38.2% of the respondents have an average level of practice of COVID-19 prevention and a third of the respondents (36.7%) had been vaccinated majorly with AstraZeneca brand of vaccine (20.6%) while almost two-thirds of the respondents (63.3%) are yet to be vaccinated. The study further shows that there is no association between the knowledge of the prevention of COVID-19 and practice among undergraduate students of Babcock University.

Introduction
The Corona Virus Disease 2019 known as COVID-19 became a Public Health Emergency of International Concern (PHEIC) on January 30, 2020. The disease can infect people of all ages especially the aged population and more so immune-compromised individuals with pre-existing conditions like hypertensive disorder, and diabetes mellitus (1). To limit the transmission of COVID-19 WHO has recommended that everyone practices good personal hygiene which includes frequent washing of soiled hands or the use of sanitizer on unsoiled hands. They also encourage the wearing of masks, covering of mouth while sneezing and coughing, and also the use of disinfectant on surfaces that are frequently touched such as doorknobs and light switches.
Universities are an essential aspect of a community's infrastructure, they provide a supportive and safe learning environment for students. Students need to comply with these personal hygiene practices since they stay in confined spaces to limit the transmission of COVID-19 (2).
Even with proper precautions taken to limit the transmission of COVID-19, as of June 10, 2021, the total number of infected person cases worldwide was 174,032,728 with 3,738,030 deaths. The burden of the disease has affected everyone; businesses, health systems, and even university and non-university students. Life as we knew it may not be the same but we must embrace the new normal. A study carried out amongst undergraduate students of the Faculty of Applied Medical Sciences at King Khalid University, Abha, Kingdom of Saudi Arabia revealed that COVID-19 was familiar to the majority of the undergraduate students, with a mean knowledge score of 3.08.82 (range: 1–5), which indicates good knowledge. The mean attitude score was 3.02.61 (range: 0–4), indicating that the participants had positive attitudes. The mean score of practices was determined to be 5.47 (range: 0–7), indicating that they were perfect. There were no significant differences in COVID-19 knowledge, attitudes, or practice between males and females (p-value 0.05) (3). In a similar study carried out in Northern Nigeria, there were 886 research participants, with a mean age of 28.58yrs [SD: 10.25] (IQR: 22yrs–32yrs), 55.4 percent of whom were men, and 57.3 percent of whom had or were pursuing a university education. Students made up 40% of the participants, while public servants made up 20%. The total mean [standard deviation (SD)] for knowledge, attitude, and practice scores was 65.38 percent [SD15.90], 71.45 percent [SD14.10], and 65.04 percent [SD17.02], respectively. Using cut-off values of 75 percent, 86.5 percent, and 75 percent, 270 (30.47 percent) of the respondents had good knowledge, (158 (17.8%) had an excellent attitude, and 230 (25.96 percent) had good practice.[4] Over 48% did not believe COVID-19 came from animals, and 60% believed the epidemic was a result of God's judgment. Furthermore, 36% believed it was a virus created by humans (4).
The COVID-19 pandemic shifted life as we know it and universities all over the world had to implement prevention strategies to be able to open safely for in-person learning and to remain open for the semesters. This is a new disease, and information about it is not well known by the people, especially in this part of the world. The majority of students who have been at home due to the pandemic have been fed a series of information about COVID-19. Therefore the study will assess the level of knowledge, attitude towards, and practices of COVID-19 prevention among undergraduate students at Babcock University.

Methods
Study Area

Babcock University is a private faith-based co-educational Nigerian university, one of 61 private universities in Nigeria, and one of the universities in Nigeria owned and operated by the Seventh-day Adventist Church in the country. The university is located in Ilishan-Remo, Ikenne local government, Ogun State, Nigeria. It is situated off the Lagos-Ibadan expressway, with equidistance between both cities. During the study, the university's total population was estimated to be about 10,103 students, 1250 academic and 1390 non-academic staff. Babcock has nine schools and one college. Most of the university's students reside on campus, in 8 male and 9 female halls of residence with about 55% of its student population being females. The university compound has staff quarters on campus, where full-time staff, who form the majority of the staff population, reside.

Study Design:
A descriptive cross-sectional study was used to assess the knowledge and practice of COVID-19 prevention among undergraduate students of Babcock University. This study was carried out over four weeks (1st of February to 1st of March, 2022).

Study Population
They are undergraduate students of Babcock University while staff and postgraduate studies were exempted from this study

Sampling Size Determination
The minimum sample size was calculated to be 400 using the Kish formula (5), with a 95% confidence level, a prevalence of 65.4(4), and a 5% margin of error.

Sampling Technique
A multistage sampling technique was used for sample selection. First, a simple random method was used to select the number of halls of residence, followed by the selection of rooms per selected halls of residence, and finally, the selection of students through simple random in the rooms selected.

Study Instrument
A validated questionnaire was used for the data collection (6). The questionnaire consists of 3 sections; sociodemographic characteristics, knowledge of COVID-19 prevention, and practices of COVID-19 prevention. The knowledge and practice were scored based on the number of correctly answered questions. Knowledge scores ranged from 0 to 20, with scores less than 10 regarded as poor, 10-14 regarded as average, and a score of 15 and above regarded as good knowledge while the practice score; we have 16 questions, and score below 8 regarded as poor practice while a score of 8-11 is regarded as average and a score of 12 and above is regarded as good practice.

Data Analysis
The statistical analysis was done using IBM SPSS for Windows Version 21 (Armonk, NY). Descriptive statistical methods were used to summarize the data, frequency count, percentage, and tables were used to represent the data, while the level of association between knowledge and practice of COVID-19 prevention was analyzed using the Chi-square test. A p-value of < 0.05 was regarded as statistically significant.

Ethical considerations
Ethical approval was granted by the Babcock University Health Research Ethics Committee (BUHREC 878/21) for this study. Permission was also granted by the hall administrators and informed consent to participate in the study was obtained from the respondents, who were assured of strict confidentiality during and after the research.

Results
Table 1: the majority of the respondents are between 16-20 years of age (64.0%), males (59.5%), Christians (85.8%), Yoruba (43.4%) and are in the 200 level (45.7%).

Table1: Respondents' socio-demographics data

Variable	Frequency (N=422)	Percentage (%)
Age		
16-20	270	64.0
21-25	118	28.0
26 and above	34	8.1
Sex		
Male	251	59.5

Female	171	40.5
Ethnic group		
Yoruba	183	43.4
Ibo	124	29.4
Hausa	5	1.2
Others	111	26.0
Religion		
Christianity	362	85.8
Islam	35	8.3
Others	25	5.9
Academic year/level		
100	20	4.7
200	193	45.7
300	50	11.8
400	144	34.1
500	15	3.6

Table 2: shows that about 98.8% of the respondents have heard about COVID-19, also about 96.4 knows that it is a contagious disease, also 84.1% of the respondents know that COVID-19 is caused by a virus and 48.6% know that the incubation period is 3 to 14 days. About 60.4% of the respondents heard about COVID-19 from the news and social media. About 72.3% of the respondents affirmed that the disease is more dangerous among the elderly. About 90.5% stated that in suspecting infection with COVID-19, primarily they will measure fever with a thermometer. The result also shows that about 72.0% affirmed that to avoid contracting COVID-19, I avoid contact with individuals suspected to be infected with COVID-19. About 88.9% of the respondents stated that the disease can be transmitted directly through contact with infected surfaces. Also, 80.1% of the respondents affirmed that the disease is more dangerous in pregnant women**.**

Table 2: Level of knowledge of COVID**-19 among undergraduate students**

Variable	Frequency **(n=422)**	Percentage **(%)**
I have heard about COVID-19		
True	417	98.8
False	5	1.2
COVID-19 is a contagious disease		
True	407	96.4
False	10	2.4
No Opinion	5	1.2
The cause of COVID-19		
Virus	355	84.1
Fungi	5	1.2
Parasite	5	1.2
not sure	57	13.5
The incubation period of the disease		
less than 2 days	5	1.2
2 to 5 days	49	11.6
3 to 14 days	205	48.6
Greater than 14 days	104	24.6
No Opinion	59	14
Source of information		
Among the general public	69	16.4
News media/Social media and the internet	255	60.4

Family/friends	35	8.3
Scientific Articles / Journals	10	2.4
Health care providers	53	12.6
The treatment for COVID-19		
Symptomatic therapy.	40	9.5
Antibiotics	55	13
Antiviral	98	23.2
No treatment	73	17.3
No opinion	156	37
I measure fever with a thermometer In suspecting infection with COVID-19		
True	382	90.5
False	15	3.6
No Opinion	25	5.9
I visit a physician In suspecting infection with COVID-19		
True	373	88.4
False	30	7.1
No Opinion	19	4.5
I avoid unnecessary daily activities In suspecting infection with COVID-19		
True	319	75.6
False	64	15.2
No Opinion	39	9.2
I avoid contact with individuals suspected to be infected with COVID-19 to avoid contracting COVID-19		
True	304	72
False	59	14
No Opinion	59	14
The prevalence of COVID-19 disease is increasing in Nigeria		
True	372	88.2
False	30	7.1
No Opinion	20	4.8
Washing hands with water and soap can eliminate the disease		
True	142	33.6
False	132	31.3
No Opinion	148	35.1
The disease can be transmitted directly through cough from an infected person		
True	202	47.9
False	156	37
No Opinion	64	15.2
The disease can be transmitted directly through contact with infected surfaces		
True	375	88.9
False	15	3.6
No Opinion	28	6.6
The disease can be transmitted directly through the consumption of contaminated dairy and meat		
True	349	82.7
False	25	5.9
No Opinion	48	11.4
The disease can be transmitted directly through contact with infected individuals (handshaking, hugging, kissing)		

True	133	31.5
False	107	25.4
No Opinion	182	43.1
The disease is more dangerous in pregnant women		
True	338	80.1
False	10	2.4
No Opinion	74	17.6

Table 3: The level of knowledge of COVID-19 among respondents was rated on a 20-point rating scale with a mean score of 14.2 as shown in table 3. The result shows that a little above average (56.7%) of the respondents had good knowledge of COVID-19.

Table 3: Knowledge Score

Score	Frequency	Percent	Remark
(15-20)	239	56.7	Good
(11-14)	150	35.5	Average
(0-10)	33	7.8	Poor

Table 4: shows that 77.7% majority of the respondents affirmed that to prevent contracting and spreading COVID-19, they avoid unnecessary vacations. In addition, 74.4% majority of the respondents stated that to prevent contracting and spreading COVID-19, by avoiding handshakes, hugs, and kisses. Furthermore, 95.5% of the respondents stated that to prevent contracting and spreading COVID-19 by frequent hand washing. About 93.1% of them confirmed that to prevent contracting and spreading COVID-19 by paying more attention to hygiene than usual. Also, 87.0% of the participants affirmed that to prevent contracting and spreading COVID-19, by using a face mask. The result also revealed that about 63.3% of the respondents have not been vaccinated.

Table 4: Level of practices of COVID-19 prevention among undergraduate students

Statement (Variable)	Frequency	Percentage (%)
I avoid going out of my home to prevent contracting and spreading COVID-19		
True	236	55.9
False	124	29.4
No Opinion	62	14.7
I avoid unnecessary vacations to prevent contracting and spreading COVID-19		
True	328	77.7
False	49	11.6
No Opinion	45	10.7
I avoid consuming outdoor food to prevent contracting and spreading COVID-19		
True	195	46.2
False	188	44.5
No Opinion	39	9.2
I avoid handshaking, hugging, and kissing to prevent contracting and spreading COVID-19,		
True	314	74.4
False	69	16.4
No Opinion	39	9.2
I avoid public transportation (taxi, bus, subway, plane, train) to prevent contracting and spreading COVID-19		
True	311	73.7

False	88	20.9
No Opinion	23	5.5
I avoid going to work to prevent contracting and spreading COVID-19		
True	143	33.9
False	231	54.7
No Opinion	48	11.4
I frequently wash my hands To prevent contracting and spreading COVID-19		
True	403	95.5
False	10	2.4
No Opinion	9	2.1
I pay more attention to my hygiene than usual to prevent contracting and spreading COVID-19		
True	393	93.1
False	15	3.6
No Opinion	14	3.3
I use disinfectants and solutions to prevent contracting and spreading COVID-19,		
True	342	81
False	50	11.8
No Opinion	30	7.1
I use herbal products and traditional medicine, to prevent contracting COVID-19		
True	123	29.1
False	250	59.2
No Opinion	49	11.6

Table 5: the level of practice of COVID-19 prevention among respondents was rated on a 16-point rating scale with a mean score of 9.50. The result shows that about 38.2% of the respondents have an average level of practice in COVID-19 prevention.

Table 5: Practice Score

Score	Frequency	Percent	Remark
(12-16)	118	28	Good
(9-11)	161	38.2	Average
(0-8)	143	33.9	Poor

Mean Score = 9.50±2.5

Table 6: shows that there is no association between the knowledge of the prevention of COVID-19 and practice among undergraduate students of Babcock University (0.258, $\chi 2=5.300^{a}$).

Table 6: Association between knowledge and practice of COVID**-19 prevention**

Practice	Knowledge level			
	Good (%) N=239(56.7)	Average (%) N=150(35.5)	Poor (%) N=33(7.8)	p-value
Good	14(42.4%)	12(36.4%)	7(21.1%)	
Average	42(28.0%)	62(41.3%)	46(30.7%)	0.258
Poor	74(36.1%)	67(32.7%)	64(31.2%)	

Discussion

This was a study of knowledge and practice of COVID-19 prevention among undergraduate students of a private university. The majority of the respondents were male (59.5%), second-year

students (45.7), Christians (85.8%), and Yoruba by tribe (43.4%).

The mean age of this study was 20.6±, which was lower than a similar study done in South Korea (47.44± 14.78 years) and the same with a study done at Enugu state university 20.6 years, in West Africa 32.14± 8.359, north-central Nigeria 31.9 (7, 8, 9). The Mean age may be due to younger age groups entering private universities. The majority (92.2%) of the respondents of this study showed good knowledge as compared to the study done in Senegal, Guinea, Sierra Leone, Liberia, Cote d'Ivoire Burkina Faso, Togo, and Benin republic (10). This was attributed to the increased level of broadcast and the spreading of information about the disease across social media, the news, and even physically through word of mouth.

The majority of the respondents understood that COVID-19 is contagious and 84.1% believed it was viral as compared to a similar study done in Enugu where 69.7% believed it was viral, 72.8% in the study done in Senegal, Guinea, Sierra Leone, Liberia, Cote d'Ivoire, Burkina Faso, Togo, and Benin republic believed it was viral, and in north-central Nigeria, 91.9% believed it was viral also (8, 9, 10). This shows that there was good knowledge about the causative organism of the disease. 48.6% of the respondents thought that the incubation period of COVID-19 is 3 to 14 days as compared to the study in Enugu and north-central Nigeria where 75% and 92.2% respectively believed it was 1 to 14 days (7, 8). The source of information was from the news in this study as compared to studies in Senegal, Guinea, Sierra Leone, Liberia, Cote d'Ivoire, Burkina Faso, Togo, and Benin republic (80.1%), where mainstream media was the source of knowledge, in North-Central Nigeria (99.5%) they stated internet/social media and Television as their source of knowledge (9, 10). In this study, 72.3% of the respondents understood that this disease is most dangerous in the elderly. 90.5% of the respondents in this study and 86.9% of the respondents in North-Central Nigeria understood fever as a symptom of COVID-19 along with the study done in Enugu where 94.7% of the respondents identified fever and dry cough as the main clinical manifestation (8, 9). The majority 87.0% use a face mask to prevent contracting and spreading of COVID-19 infection and they use it always (60.4%) as compared to the respondents in South Korea (48.8%) and Enugu (53.9%) (7, 8). The majority of the respondents in this study washed their hands to avoid spreading and contracting the disease which was higher than those in Enugu (78.9%) and in the study in Senegal, Guinea, Sierra Leone, Liberia, Cote d'Ivoire, Burkina Faso, Togo, and Benin republic, 92.6% of the respondents sanitized their hands with an alcohol-based sanitizer (8, 10). About a third of the respondents(36.7%) were vaccinated majorly with the AstraZeneca brand of vaccine which is higher than the study done in North-Central Nigeria where 29% of the respondents said they will accept the vaccine and in the study in Senegal, Guinea, Sierra Leone, Liberia, Cote d'Ivoire, Burkina Faso, Togo, and Benin republic, the 75.1% said they will receive the vaccine unlike the similar study done in Enugu where the majority (50%) said there were not taking the vaccine due to their indifference in the effective curing of the vaccine (8, 10). The reason for the low uptake of the vaccine was majorly due to the side effect of the vaccine, other reasons for low uptake include fear, non-availability of the vaccine, and religious, and cultural beliefs (the Antichrist). The overall level of good practice was poor. There was no association between the level of knowledge and the practice of COVID -19 prevention. This may be due to the less severity of the disease in this part of the world as compared to European countries. Also, there was some denial about the existence of the disease thus further influencing the low practice. Those who took the vaccine may also be reluctant to practice due to the immunity the vaccine covers.

Conclusion

The study showed that the majority of the students had good knowledge of COVID-19 with an average level of practice in COVID-19 prevention. There was no significant association between knowledge and practice of COVID-19 prevention which may be due to the low severity of the disease in this environment as compared to other parts of the world. Therefore, we recommend health promotion and myth debunking especially in places of influence e.g. churches, mosques, and schools, mass production of the vaccine to reduce the non-availability of the COVID-19 vaccine, and legislative measures are taken to ensure the proper use of face masks.

Declarations

Ethics approval, and Consent to Participate

Ethical approval was granted by the Babcock University Health Research Ethics Committee (BUHREC 878/21) for this study. Permission was also granted by the hall administrators and an informed consent to participate in the study was obtained from the respondents, who were assured

of strict confidentiality during and after the research.

Consent for publication
All the authors gave consent for the publication of the work under the creative commons Attribution-Non-Commercial 4.0 license.

Availability of data and materials
The data and materials associated with this research will be made available by the corresponding author upon reasonable request.

Competing interests
The authors declare that they have no competing interests.

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Authors' contributions
Conceptualization: BEF and OVC
Study design: BEF, SJK, OJO, OA & OVC
Data collection: OA, SOA, TAA & MIC
Data analysis: OVC, EPC, & NKW
Data interpretation: MIC, OVC, TAA & BEF
Drafting of the Manuscript: EPC, OVC & BEF
Manuscript review: SOA, SKJ, OVC & BEF

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