

NIGERIA PHARMACY STUDENTS' READINESS TO RECEIVE AND RECOMMEND THE COVID-19 VACCINES

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njcpt.com.ng/101.1.2.15

Abstract

Background: The vaccines for coronavirus disease 2019 (COVID-19) are expected to prevent infection and transmission while protecting against severe disease and death. However, these benefits can only be seen if people get vaccinated.

Objectives: To assess pharmacy students in Nigeria's knowledge about COVID-19 vaccines and their readiness to receive and recommend them.

Methods: An online, 11-item self-administered questionnaire was used for this cross-sectional survey of pharmacy students between July and August 2021. The questionnaires were made available online via Google Forms. In addition, a link to the questionnaire was sent to individuals and pharmacy class groups in different universities in Nigeria via WhatsApp. Data were analysed with SPSS (IBM version 20.0). Descriptive data were used to present data. Chi-square/Fisher's exact tests were used to determine associations between variables. $P < 0.05$ was used to indicate statistical significance. Ethical approval was obtained from the University of Uyo Teaching Hospital, Akwa Ibom State, Nigeria.

Results: A total of 448 participants completed the survey. About 30% and 43% of the participants were undoubtedly and probably likely to receive the COVID-19 vaccines, respectively. One hundred and twenty-eight (28.6%) indicated that they were not likely to recommend the vaccines to others. A majority (57.1%) of the participants were most comfortable with the Pfizer vaccine; the most frequently reported reason for vaccine preference was effectiveness (58.9%). Almost half (46.4%) of the respondents were more concerned about the adverse effects following immunisations. The respondent's age (0.001), year of study (0.000), and geopolitical zone of the respondent's institution (0.032) were significantly associated with their readiness to receive the COVID-19 vaccines.

Conclusion: Most Nigeria pharmacy students were willing to receive the COVID-19 vaccines and recommend them to others. However, there is a need to allay the fears and concerns expressed about the COVID-19 vaccines/vaccination among pharmacy undergraduates in Nigeria, paying particular attention to their socio-demographic factors.

Keywords: COVID-19 vaccine, Pharmacy students, Readiness, Vaccine hesitancy.

Introduction

Since the first case was reported from Wuhan, China, the coronavirus disease 2019 (COVID-19) has been threatening and claiming the lives of millions globally.^[1] COVID-19 is a highly transmittable infection caused by a pathogenic virus known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Several variants of SARS-CoV-2 have been identified in global populations, including the alpha, beta, lambda, delta, gamma, and omicron variants.^[2] These variants are broadly categorised as variants of interest (VOI) and variants of concern (VOC). In addition to having differing susceptibilities to the currently available COVID-19 vaccines, they also produce illnesses of varying severity and have varying levels of transmissibility.^[3] A variant is considered a VOI if it is circulating widely and possesses mutations known/suspected to cause significant alterations. A VOI becomes a VOC if it is known to spread more quickly, cause more severe disease, evade the body's immune response, alter clinical disease presentation, or reduce the effectiveness of established tools such as public health, social measures, diagnostics, therapies and vaccines.^[2] Omicron is currently the dominant variant circulating

globally.^[2] The disease, declared a global pandemic by the World Health Organization (WHO) on March 11, 2020, has crippled economies and brought untold hardship to the general population globally.^[4] Preventive measures such as wearing nose masks, keeping social distance, frequent hand washing, use of hand sanitisers, good ventilation, avoiding crowded places or closed settings and others are essential to controlling the spread of the disease.^[3] Nevertheless, vaccination with safe and effective COVID-19 vaccines to confer immunity against the virus is considered the best approach for curbing the disease.^[5;6] At the time of this study, COVID-19 vaccines approved for use included Astrazeneca/Oxford vaccine, Moderna (mRNA-1273) vaccine, and Pfizer BioNTech vaccine (BNT162b2). COVID-19 vaccines appear to confer high levels of protection against severe disease and death associated with the circulating variants, including the Omicron variant.^[7]

To ensure the sustained success of vaccination against COVID-19, it is essential that the acceptance of the vaccines and the readiness of the general public towards receiving them be assessed. University and college students form an essential part of every society. They are seen as highly knowledgeable adults responsive to public health issues.^[8;9] Additionally, although university students are at low risk of developing complications associated with COVID-19, they are at high risk of transmitting SARS-CoV-2 due to the crowded environment of campuses as well as the high mobility of the students.^[10;11] Pharmacy students could play a significant role in educating the public and other students about the COVID-19 vaccines. This will help dispel myths about the vaccines and the reluctance or unwillingness to get vaccinated (vaccine hesitancy).

Further, pharmacy students are future pharmacists and will have a role to play in advising, educating and, when certified, actively immunising clients in future. Pharmacy students play a crucial role in COVID-19 mass vaccinations. According to Gregory^[12], pharmacy students who are certified immunisers can work as volunteers for COVID-19 immunisation efforts.

Assessing pharmacy students' knowledge and perception of COVID-19 vaccines and their readiness to receive them might help pinpoint knowledge gaps. This will, in turn, serve as the basis for interventions aiming at enhancing awareness, lowering or overcoming vaccine hesitancy, and ultimately increasing the acceptance of the COVID-19 vaccines, particularly among students. However, to our knowledge, such studies are sparse, particularly in Nigeria. Therefore, this study aimed to assess Nigeria pharmacy students' readiness to receive and recommend COVID-19 vaccines. Additionally, the study sought to assess the student's knowledge and perceptions of these vaccines.

Methods

Study design, setting and participants

This was a descriptive cross-sectional online survey of pharmacy undergraduates in Nigerian universities. Nigeria is divided into six geopolitical zones – North-Central, North-East, North-West, South-South, South-East and South-West. At the time of data collection, about 21 universities in Nigeria were accredited for undergraduate pharmacy programmes. At the time, most universities offered a 5-year programme; just one offered a 6-year one. The study included students in the pharmacy degree programme at any of these universities who gave informed consent to participate in the survey. First-year students were excluded.

Using an online Raosoft sample size calculator,^[13] the minimum sample size required was calculated to be 377. This calculation was under the assumptions of a 95% confidence interval, a 5% margin of error, and a 0.5 proportion of respondents willing to receive the vaccine (since no comparable study was available at the time of data collection). However, 440 respondents were targeted to enhance the power of the statistical analysis.

Instrument for data collection

A previous questionnaire^[14] was adapted for use in this study. Content validity of the 11-item self-administered questionnaire was established by lecturers in the Department of Clinical Pharmacy and Biopharmacy, University of Uyo, Nigeria and the Department of Clinical Pharmacy and Pharmacy Management, University of Nigeria, Nsukka. The questionnaire showed respondents' knowledge of the available COVID-19 vaccines, their readiness to receive and recommend the vaccines, and their perception of the vaccines and vaccination policies. In addition, demographic information, such as age, year of study and others, was collected. The questionnaires were made available online via Google Forms. In addition, a link to the questionnaire was sent to individuals and pharmacy class groups in different universities via WhatsApp. Reminders were sent every week until adequate responses were obtained. Data collection was done between July and August 2021.

Data analysis

Data were analysed with SPSS version 20.0. Descriptive statistics (frequencies, percentages, means and standard deviations) were used to summarise patients' demographic data and responses to questionnaire items. In addition, Chi-square/Fisher's exact tests were conducted to examine associations between respondent variables/likelihood

of recommending the COVID-19 vaccines and their readiness to receive the vaccines. The significance level for all analyses was set at $p < 0.05$.

Ethical considerations

Approval for this study was obtained from the Health Research Ethical Committee of the University of Uyo Teaching Hospital (UUTH/AD/S/96/VOL.XXI/577). Informed consent was obtained by requiring potential participants to give a 'yes' or 'no' response to the question, 'Are you willing to participate in the survey?' An affirmative response was taken as informed consent to participate.

Results

A total of 448 responses to the survey were returned. The number of males and females who participated in this study was 223 (49.8%) and 225 (50.2%), respectively. The majority (69.9%) were in the age range of 21-25 years. One hundred and seventy-three (38.6%) were in their 5th year of study; only 17 (3.8%) attended universities located in the North-East geopolitical zone of the country (Table 1).

Table 1: Demographic variables of respondents (N = 448)

Variable	Frequency	Per cent
Gender		
Male	223	49.8
Female	225	50.2
Age (years)		
≤ 20	87	19.4
21-25	313	69.9
26-30	40	8.9
≥ 30	8	1.8
Year of Study		
2	39	8.7
3	152	33.9
4	72	16.1
5	173	38.6
6	12	2.7
Geopolitical zone of school		
North-Central	50	11.2
North-East	17	3.8
North-West	35	7.8
South-South	167	37.3
South-East	143	31.9
South-West	36	8.0

Readiness to receive the COVID-19 vaccine

One hundred and thirty-six (30.4%) of the respondents were sure about receiving the COVID-19 vaccine, while 120 (26.8%) were not ready to receive the vaccine (Figure 1).

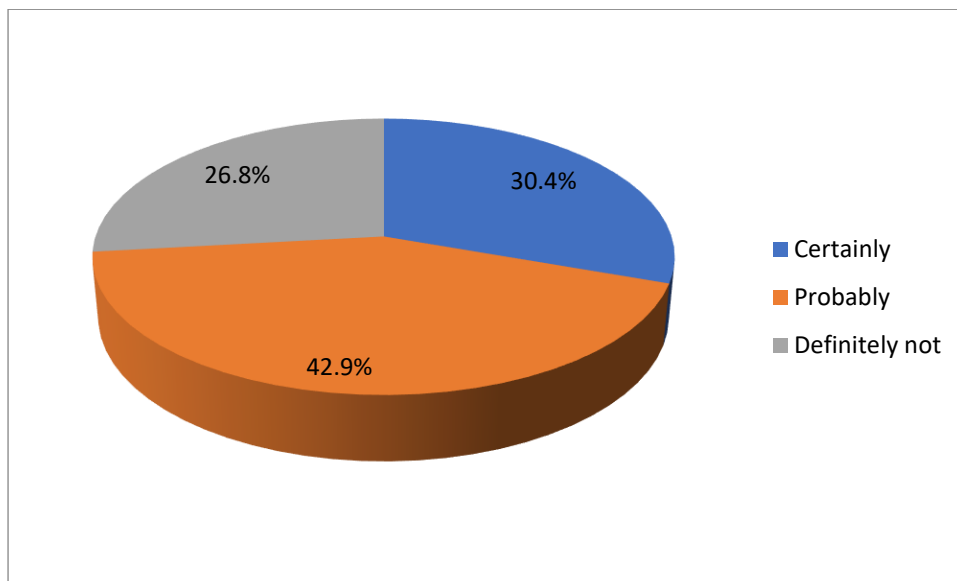


Figure 1: Respondents' readiness to receive the COVID-19 vaccine.

Knowledge about COVID-19 vaccines

Only 119 students (26.6%) were confident that they had much knowledge about the available COVID-19 vaccines; 208 (46.4%) indicated that they probably had much information about the available COVID-19 vaccines. One hundred and ninety-two students (42.9%) were not satisfied with their level of knowledge of the currently available COVID-19 vaccines. In contrast, 96 (21.4%) were satisfied with their knowledge of the vaccines (Table 2).

Readiness to recommend the COVID-19 vaccines

One hundred and seventy-six students (39.3%) indicated that they were probably likely to recommend the COVID-19 vaccines to family members; 128 (28.6%) were not likely to recommend the COVID-19 vaccines to their family members. One hundred and sixty-one students (35.9%) were undoubtedly likely to recommend the COVID-19 vaccines to their friends; 128 (28.6%) indicated that they were not likely to recommend the COVID-19 vaccines to other students (Table 2).

Table 2: Respondents' knowledge level and readiness to recommend the COVID-19 vaccines

Item	Frequency	Per cent
Do you have much information about the currently available COVID-19 vaccines?		
Definitely not	121	27.0
Probably	208	46.4
Certainly	119	26.6
Are you satisfied with your current knowledge of the currently available COVID-19 vaccines?		
Definitely not	192	42.9
Probably	160	35.7
Certainly	96	21.4
Are you likely to recommend currently available COVID-19 vaccines to your family members?		
Definitely not	128	28.6

Probably	176	36.7
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Table 2: Respondents' knowledge level and readiness to recommend the COVID-19 vaccines (continued)

Certainly	144	32.1
Are you likely to recommend currently available COVID-19 vaccines to your friends?		
Definitely not	128	28.6
Probably	159	35.5
Certainly	161	35.9
Are you likely to recommend currently available COVID-19 vaccines to other students?		
Definitely not	128	28.6
Probably	160	35.7
Certainly	160	35.7

Respondent's perception of COVID-19 vaccines and vaccination policies

A majority (57.1%) of the respondents indicated they were most comfortable with the Pfizer BioNTech (BNT162b2) vaccine. The most frequently reported reason for their choice was vaccine effectiveness. As to the preferred order to adopt in prioritising vaccination against COVID-19 (from most important to the least important), over two-thirds (71.4%) of the respondents indicated the order: healthcare professionals > elderly > general populace > children. Only 24 (5.4%) indicated that the Government should prioritise vaccination in the order: elderly > general populace > children > healthcare professionals. More than half (60.9%) of the respondents indicated that they would not like the Government to enforce COVID-19 vaccination for all students as a prerequisite for admission to tertiary institutions (Table 3).

Table 3: Pharmacy students' perception of COVID-19 vaccines and vaccination policies

Item	Frequency	Per cent
Which of these COVID-19 vaccines are you most comfortable with?		
Pfizer BioNTech (BNT162b2)	256	57.1
Moderna (mRNA-1273)	80	17.9
AstraZeneca/Oxford	112	25.0
What is your main reason for selecting the above vaccine?		
Effectiveness	264	58.9
Storage temperature	56	12.5
Cost	56	12.5
Other (produced by a famous company, trust in the company)	72	16.1
Choose the preferred order you would advise governments to adopt in prioritising vaccination against COVID-19?		
Healthcare professionals > Elderly > General populace > Children	320	71.4
Elderly > Healthcare professionals > General populace > Children	48	10.7
Elderly > General populace > Children > Healthcare professionals	24	5.4
Children > Elderly > Healthcare professionals > General populace	56	12.5
Would you like the Government to enforce COVID-19 vaccination as compulsory for all students and a prerequisite for admissions?		
Definitely not	273	60.9
Probably	143	31.9
Certainly	32	7.1

Concerns about the COVID-19 vaccines

Almost half of the respondents (46.4%) were concerned about the adverse effects following immunisations with a COVID-19 vaccine, while 56 (12.5%) were concerned that standard scientific protocols were not followed in the manufacture of the vaccines (Figure 2).

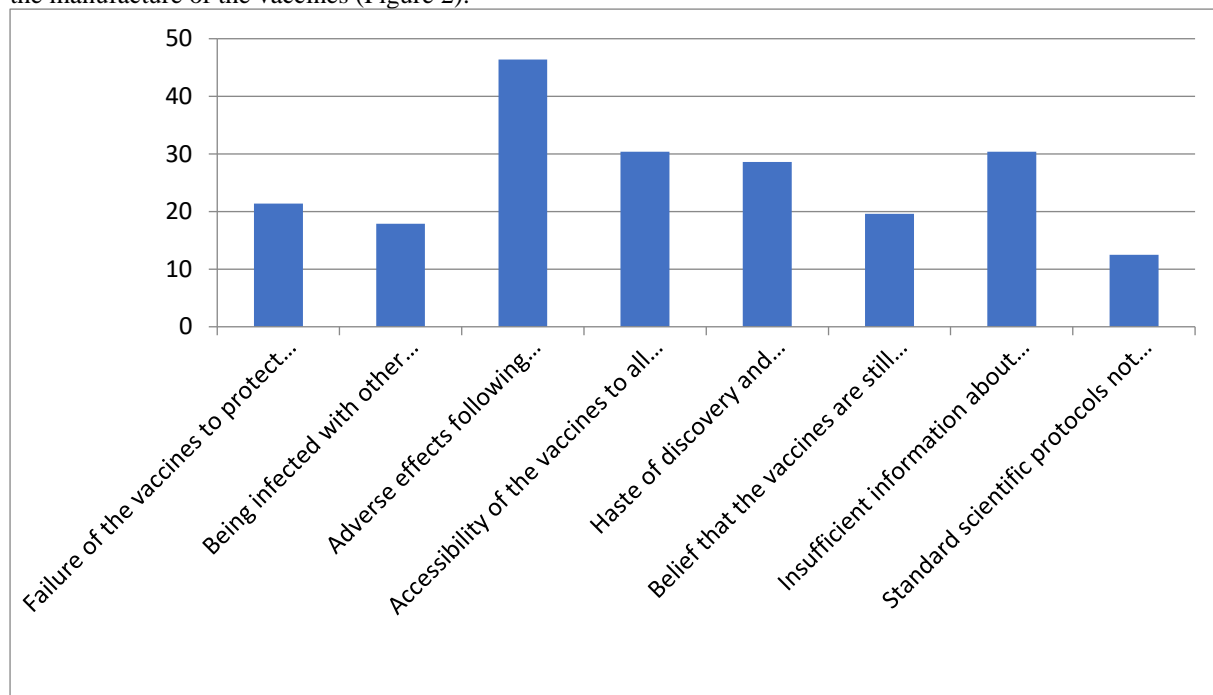


Figure 2: Concerns about the COVID-19 vaccines

Association between respondent variables and their readiness to receive the COVID-19 vaccines

Results of Chi-square/Fisher's exact tests indicated that the respondent's age (0.001), year of study (0.000) and geopolitical zone of the respondent's institution (0.032) were significantly associated with their readiness to receive the COVID-19 vaccines. While 38 (43.7%) of respondents younger than 20 were sure about receiving the vaccine, none of the respondents older than 30 were sure about receiving it. Only 8 (20.5%) respondents in their second year of study were sure about receiving the COVID-19 vaccine; 88 (57.9%) in their third year were not ready to receive the vaccine (Table 4).

Table 4 Association between respondent variables and their readiness to receive the COVID-19 vaccines

Variable	Readiness to receive the COVID-19 vaccines			Test statistic	R	P
	Definitely not	Probably	Certainly			
Gender						
Male	55 (24.7%)	104 (46.6%)	64 (28.7%)	2.63	0.006	0.269
Female	65 (28.9%)	88 (39.1%)	72 (32.0%)			
Age (years)						
< 20	17 (19.5%)	32 (36.8%)	38 (43.7%)	22.61	-0.099	0.001
21 – 25	95 (30.4%)	128 (40.9%)	90 (28.8%)			
26 – 30	8 (20.0%)	24 (60.0%)	8 (20.0%)			
>30	0 (0.0%)	8 (100.0%)	0 (0.0%)			
Year of Study						
2	7 (17.9%)	24 (61.5%)	8 (20.5%)	175.74	0.423	0.000
3	88 (57.9%)	40 (26.3%)	24 (15.8%)			
4	24 (33.3%)	32 (44.4%)	16 (22.2%)			
5	1 (0.6%)	89 (51.4%)	83 (48.0%)			
6	0 (0.0%)	7 (58.5%)	5 (41.7%)			
Geopolitical zone of school						
North-Central	10 (20.0%)	29 (58.0%)	11 (22.0%)	19.28	0.065	0.032
North-East	9 (52.9%)	4 (23.5%)	4 (23.5%)			
North-West	8 (22.9%)	22 (62.9%)	5 (14.3%)			

South-South	47 (28.1%)	62 (37.1%)	58 (34.7%)			
South-East	38 (26.6%)	60 (42.0%)	45 (31.5%)			
South-West	8 (22.2%)	15 (41.7%)	13 (36.1%)			

Note. Bold values indicate statistical significance at $p < 0.05$

Association between respondents' likelihood of recommending the COVID-19 vaccines and their readiness to receive the vaccines

As shown in Table 5, the likelihood of recommending the COVID-19 vaccines to family members ($p < 0.001$), friends ($p < 0.001$), and other students ($p < 0.001$) were significantly associated with the respondents' readiness to receive the vaccines. These associations had effect sizes that ranged from -0.22 to 0.82 (Table 5).

Table 5 Association between respondents' likelihood of recommending the COVID-19 vaccines and their readiness to receive the vaccines

Variable	Readiness to receive the COVID-19 vaccines			Test statistic	R	P
	Definitely not	Probably	Certainly			
Likelihood of recommending COVID-19 vaccines to family members						
Definitely not	104 (81.2%)	16 (12.5%)	8 (6.2%)	501.83	0.818	0.000
Probably	16 (9.1%)	152 (86.4%)	8 (4.5%)			
Certainly	0 (0.0%)	24 (16.7%)	120 (83.3%)			
Likelihood of recommending COVID-19 vaccines to friends						
Definitely not	26 (20.3%)	48 (37.5%)	54 (42.2%)	28.03	-0.215	0.000
Probably	31 (19.5%)	80 (50.3%)	48 (30.2%)			
Certainly	63 (39.1%)	64 (39.8%)	34 (21.1%)			
Likelihood of recommending COVID-19 vaccines to students						
Definitely not	104 (81.2%)	16 (12.5%)	8 (6.2%)	433.36	0.736	0.000
Probably	8 (5.0%)	136 (85.0%)	16 (10.0%)			
Certainly	8 (5.0%)	40 (25.0%)	112 (70.0%)			

Note. Bold values indicate statistical significance at $p < 0.05$

Discussion

This study assessed Nigeria pharmacy students' readiness to receive and recommend the available COVID-19 vaccines, their knowledge and perceptions of these vaccines and vaccination policies, and the associations between respondents' socio-demographic variables/their likelihood of recommending the vaccine and their readiness to receive the vaccines. Our results indicated that about two-thirds of the students surveyed were ready to receive the COVID-19 vaccine and recommend it to family, friends and other students. Most respondents indicated they had much knowledge about the available COVID-19 vaccines and were satisfied with their current knowledge. The majority of the respondents indicated that they were most comfortable with the Pfizer BioNTech (BNT162b2) vaccine, the most frequently reported reason for their choice being vaccine effectiveness. Adverse effects following immunisations was the most frequently reported reason for COVID-19 vaccine hesitancy. The respondent's age, year of study, and geopolitical zone of the respondent's institution were significantly associated with their readiness to receive the COVID-19 vaccines. Additionally, the likelihood of recommending the COVID-19 vaccines to family members, friends, and other students was significantly associated with the respondents' readiness to receive the vaccines.

The proportion of students willing to accept COVID-19 vaccination in our study was lower than those reported in earlier studies among university students.^[9;10] However, similar to Mant et al.,^[15] the most frequently reported concern about the COVID-19 vaccines was fear of adverse effects following immunisation. Similar results have been reported in the literature.^[15;17] Concerns regarding safety or fear of adverse reactions associated with COVID-19 vaccination could be related to the speed at which the COVID-19 vaccines were being produced, tested and approved.^[15]

Most respondents reported being most comfortable with the Pfizer BioNTech COVID-19 vaccine, with the most frequently reported reason for their preference being effectiveness. Other reasons included the popularity and trust in the company (Pfizer). It stands to reason that when people are confident that the vaccines developed against COVID-19 are effective, other things being equal, they would be willing to get vaccinated.^[18]

As to the preferred order to adopt in prioritising vaccination (from most important to least important), most respondents indicated that healthcare professionals are given the highest priority; this should be followed by the elderly, the general populace, and children. A similar finding was reported among pharmacists in Nigeria.^[14] This is in line with the recommendations of WHO, which state that priority should be given to vaccinating high-risk groups to maximise global protection against new variants and minimise the risk of transmission.^[19] Healthcare professionals, especially those on the front line of providing care to people who have (or may have) the disease, are the most at-risk group for contracting the disease. Prioritising vaccination for this group will ensure a healthy and fit workforce to provide health services to the people at all times.^[14]

A clear majority of the respondents indicated that they would not like the Government to enforce COVID-19 vaccination for all students and make it a prerequisite for admission to tertiary institutions. Likely, this perception was influenced mainly by most respondents' fear of adverse effects following immunisation. However, public health authorities should continue to provide accurate, up-to-date information with compelling evidence of the COVID-19 vaccines' efficacy and safety to promote vaccine uptake among this population. This study also indicated that age, year of study of respondents, and the geopolitical zone of the respondent's institution, were significantly associated with their readiness to receive the COVID-19 vaccines.

Younger respondents were more certain about getting the vaccine than older respondents were. In other words, as the respondents' age increased, their readiness to receive the vaccine decreased. Additionally, most respondents in their second year of study said they would probably get vaccinated. In contrast, more than half of those in their third year said they would definitely not get the vaccination. Compared to respondents who attended schools in the northern region (i.e. North-Central, North-East, and North-West), more students who attended schools in the southern region (i.e. South-South, South-East, and South-West) were sure about receiving the vaccines. In particular, about half of respondents who attended schools in the North-East geopolitical zone indicated that they would not receive the COVID-19 vaccines. Misinformation and knowledge gaps causing vaccine hesitancy might be valid reasons for these findings.

Furthermore, the respondents' readiness to receive the COVID-19 vaccines was significantly associated with their likelihood of recommending them to family, friends, and other students. In other words, the likelihood of recommending the COVID-19 vaccines was based on their readiness or willingness to be vaccinated. Hence, most respondents who were not ready to receive the vaccines were likewise not likely to recommend the vaccines. Similarly, respondents who were sure about receiving the vaccines were equally certain about recommending them. Although the association between respondents' readiness to be vaccinated and the likelihood of recommending the vaccines to friends was weak, those between readiness to get vaccinated and the likelihood of recommending the vaccines to family and other students were strong.

Limitations

This study has some limitations. Being an online survey, potential respondents who were offline/out of data during data collection could not participate. Hence, selection bias cannot be ruled out. Also, only undergraduate students enrolled in the pharmacy degree programme were surveyed. Nevertheless, the results could be generalised to pharmacy students in Nigeria since the study was nationwide, involving tertiary institutions from all six geopolitical zones of the country. Further, the influence of the media regarding the COVID-19 vaccine trials and safety concerns at the time of data collection could have influenced the responses obtained in this study.

Conclusion

Most pharmacy students in Nigeria were willing to receive the COVID-19 vaccine and recommend it to friends, family members and other students. However, the primary concern about the COVID-19 vaccines was the adverse effect following immunisation. The findings of this study suggest the need to allay the fears and concerns associated with COVID-19 vaccines/vaccination among pharmacy undergraduates in Nigeria, paying particular attention to their socio-demographic characteristics. Furthermore, providing these students with clear, consistent and up-to-date vaccine information will reduce vaccine hesitancy and guarantee broader vaccination coverage by enhancing their willingness to receive and recommend the vaccines to others.

Acknowledgements

The authors acknowledge all the students who responded to the survey.

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