

Willingness, Hesitancy and Uptake of COVID-19 Vaccine among Undergraduate Students of University of Port Harcourt, Port Harcourt, Nigeria

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Abstract

Background: The development of an effective and safe vaccine against COVID-19 is crucial to eradicating or eliminating the disease. With global widespread perspectives on COVID-19 vaccine development and safety and the heavy burden of the pandemic, guaranteeing vaccine acceptability and uptake is necessary. The aim of this study was to determine the willingness, hesitancy, and uptake of COVID-19 vaccination among University of Port Harcourt students.

Methods: A descriptive cross-sectional study design with multi-stage sampling was employed and an online self-administered semi-structured questionnaire was used to collect information from registered undergraduate students of the University. Data collected was analyzed using Statistical Product and Service Solutions IBM version 26.

Results: A total of 473 students were administered the questionnaire, with a mean age of 21±3.0 years. Females outnumbered males by 245 to 228 (51.8% to 48.2%). A total of 458 students (96.8%) were aware of the COVID-19 vaccine, 363 (76.7%) were hesitant, 50 (10.6%) had received the vaccine and 423 (89.4%) had not. Concern about getting the disease (COVID-19), vaccine safety and preferred location to get vaccinated all had statistically significant associations with vaccine hesitancy (p-values=0.000).

Conclusion: From the study, majority of students interviewed were aware of the COVID-19 vaccine but had not received the vaccine, with concern about getting the disease and vaccine safety majorly influencing hesitancy. Based on the findings from this study, adoption of modern and efficient methods of disseminating information about the COVID-19 vaccines, as well as the establishment of new vaccination points on university campuses are recommended.

Keywords: COVID-19 vaccine, Willingness, Hesitancy and Uptake.

Introduction

Following the World Health Organization's (WHO) declaration of Coronavirus disease 2019 (COVID-19) as a pandemic in January 2020, many steps have been put in place to control and prevent its spread, one of which is the development and administration of the COVID-19 vaccine. According to the WHO, at least 13 different vaccines have been produced. These include but are not limited to Inactivated vaccines (Sinopharm), protein-based vaccines (Novavax), viral vector vaccines (AstraZeneca and Janssen) as well as RNA and DNA vaccines (Moderna and Pfizer/BioNTech Comirnaty).^{1, 2} The vaccines are administered via intramuscular injections; their dosing and frequency depend on the type of vaccine received.

The speed at which they were developed, however, has raised concerns among scientists and the global community regarding their safety and efficacy. Furthermore, conspiracy theories about the vaccine have grown in popularity.¹⁻⁴ These, together with the emergence of novel variants, the relaxation of non-pharmaceutical preventive measures and the recent spike in the COVID-19 wave in some parts of the world emphasize the need for research in averting future occurrences.

Despite the availability of COVID-19 vaccines in Nigeria, the uptake of these vaccines has been relatively low.³ In particular, vaccine hesitancy and unwillingness have been identified as significant barriers to achieving herd immunity and controlling the spread of the virus. The undergraduate student population of the University of Port-Harcourt is a key demographic group.⁴ Therefore, understanding their willingness, hesitancy, and uptake of

COVID-19 vaccines can provide valuable insights into the factors driving vaccine acceptance or refusal in the larger society. This information can inform the development of targeted interventions to address vaccine hesitancy ultimately leading to increased vaccine uptake and improved control of the COVID-19 pandemic. Additionally, given the paucity of data in this region, information obtained may help establish a baseline that forms the basis for loco-regional and national studies involving other institutions and aid formulation of informative curricula to impart skills and behavioural change communication intervention for university students as peer educators. Thus, this study determined the willingness, hesitancy and uptake of COVID-19 vaccine among undergraduate students of the University of Port-Harcourt, Port-Harcourt, Nigeria.

Methodology

Study Area: The study was carried out in the University of Port-Harcourt, a tertiary institution located in Choba, Rivers State, South-South geopolitical zone, Nigeria. It has 13 undergraduate faculties and a School of Graduate Studies with a total student population of about 54,500.⁵

Study Design: A descriptive cross-sectional study design was employed for this study.

Study Population: The population for this study included undergraduate students of the University of Port-Harcourt from 100-600 level.

Inclusion Criteria: registered undergraduate students of the University of Port Harcourt.

Exclusion Criteria: undergraduate students who undergo virtual learning and undergraduate students who were not present during data collection.

Sample Size Determination: The minimum sample size for the study was derived using the formula for quantitative

studies.⁶

$n = \frac{z^2 p \cdot q}{d^2}$ Where n = the desired minimum sample size.

z = the standard normal deviate set at 1.96 which correspond to a 95% confidence level.

p = the estimated percentage or prevalence of the COVID-19 vaccine willingness that is present in the population as obtained from a previous study. (58.2%).⁷

q = 1 – p (1 – 0.582 = 0.418)

d = degree of accuracy desired, set at 0.05.

$n = \frac{1.96^2 \times 0.582 \times 0.418}{0.05^2}$

$n = \frac{0.9346}{0.0025}$

n=374

Allowance for non-response of 10% = $\frac{n}{1 - \text{non-reponse}}$

Where n=minimum sample size (374)

Non-response = 10% (0.1),

Thus, adjusted sample size = 416

Sampling Technique: A multistage sampling method was employed for this study.

Stage 1: Eight out of thirteen undergraduate faculties were selected by simple random sampling (balloting): Faculties of Science, Engineering, Science Laboratory Technology, Management Sciences, Pharmaceutical Science, Law, Basic Medical Science and Clinical science.

Stage 2: One department out of each of the 8 selected faculties was selected by simple random sampling (balloting): Departments of Animal and Environmental Biology, Geology and Mining Technology, Electrical/Electronic Engineering, Hospitality Management and Tourism, Pharmacy, Law, Human Physiology and Medicine and Surgery.

Stage 3: A level was selected from each chosen department by simple random sampling (balloting): Departments of Animal and Environmental Biology (100 level), Geology and Mining Technology

(400 level), Electrical/Electronic Engineering (300 level), Hospitality Management and Tourism (300 level), Pharmacy (200 level), Law (100 level), Human Physiology (300 level) and Medicine and Surgery (400 level).

Stage 4: At least fifty-two (52) respondents were selected from each level by simple random sampling (balloting).

Study Instruments: A semi-structured self-administered questionnaire was used for this study. The questionnaire was divided into five sections plus a consent form page. It was adapted from the Centres for Disease Control and Prevention, World Health Organization and Multidisciplinary Digital Publishing Institute Vaccine Assessment guides^{8,9,10} The questions in the various sections were tailored to ascertain the socio-demographic characteristics of the respondents, their level of awareness, willingness, hesitancy, and uptake of the COVID-19 vaccine.

Study Procedure and Data collection: The questionnaire was designed using Microsoft forms and distributed online. Before distribution, a pilot study was done. Adequate explanations of the aim of the research and how to fill in the required details were given at the lecture halls of the respondents and via messages sent on their WhatsApp class pages, after which the link to the questionnaire was shared to the respondents via WhatsApp. The total number of responses gotten from the Microsoft forms link was 473, after which the link was deactivated.

Data Analysis: Data obtained were directly uploaded into a Microsoft Excel spread sheet and analysis was done using Statistical Product and Service Solutions (SPSS) IBM version 26. Tables were used for data presentation. Inferential statistics were done using Chi-square (significance level set at 0.05).

Ethical Considerations: The study followed all ethical principles guiding

research and posed no harm to the participants. Approval for the study was obtained from review board of the Department of Preventive and Social Medicine, University of Port Harcourt (Reference no : U2014/4710082;U2014/4710001). Informed consent was obtained from the respondents and participation was voluntary. Anonymity was maintained by using research numbers rather than names. Data obtained were held in absolute confidentiality in keeping with ethical principles.

Results

The questionnaire was shared online via Microsoft forms and 473 were returned. All were considered fit for analysis, giving a response rate of 100%. The highest number of respondents, 236 (55.0%) were aged between 16 to 26years with a mean age of 21±3.0 years. Two hundred and forty five (51.8%) respondents were females, and 228 (48.2%) respondents were males. Up to 442 (93.4%) of the respondents were Christians. A total of 462 (97.7%) respondents were single. Table 1. As many as 458 (96.8%) respondents were aware of the covid-19 vaccine while 9 (1.9%) were not. The most trusted sources of information regarding the covid-19 vaccine were NCDC; 299 (32.7%) and news sources; 217 (23.8%). Table 2. Fifty

(10.6%) respondents had received the COVID-19 vaccine with 18 (36.0%) each receiving Moderna and AstraZeneca, and 14 (28.0%) not remembering the vaccine they received. Table 3.

Out of the 423 (89.4%) who had not received the vaccine, 183 (43.0%) respondents were willing to take the vaccine while 241 (57.0%) were unwilling. Table 4. No socio-demographic characteristic had any statistically significant relationship with hesitancy. Table 5. Concerns about getting COVID-19 and safety concerns of COVID-19 vaccine had a statistically significant relationship with hesitancy, p-values =0.001. Those who were unconcerned about getting COVID-19 and those who thought the COVID-19 vaccines are unsafe were hesitant. Table 6.

Table 7 shows that preferred location to get vaccinated and trust in public health agencies had a statistically significant relationship with hesitancy (p values =0.0001*). Those who were not sure about their preferred location to get vaccinated and who did not trust public health agencies were hesitant. Knowledge of adverse reaction among vaccine recipients showed no statistically significant relationship with hesitancy (p=0.234).

Table 1: Socio-demographic characteristics of students of the University of Port Harcourt, Nigeria

Variable	Frequency (n=473)	Percentage (%)
Age group		
16-26	426	90.1
27-37	45	9.5
38-48	1	0.2
=49	1	0.2
Mean ± standard deviation	21±3.0	
Sex		
Female	245	51.8
Male	228	48.2
Religion		
Christianity	443	93.7
Islam	15	3.2
Atheism	11	2.3
Others(Judaism, pantheism,Eckankar)	4	0.8
Marital status		
Single	462	97.7
Married	10	2.1
Divorced	1	0.2

Table 2: COVID-19 Vaccine Awareness among students of the University of Port Harcourt, Nigeria

Variable	Frequency (n=473)	Percentage (%)
Awareness about COVID-19 vaccine		
Yes	458	96.8
No	9	1.9
Not sure	6	1.3
Source(s) of information		
NCDC	299	32.7
News sources	217	23.8
Social media	144	15.7
Family and friends	121	13.3
Health facilities/personnel	104	11.4
Religious centers	17	1.9
Others	11	1.2

Key: NCDC (Nigeria Center for Disease Control)

Table 3. Uptake of COVID-19 Vaccine by students of the University of Port Harcourt, Nigeria

Variable		Frequency (n=473)	Percentage (%)
Received the COVID-19 vaccine	No	423	89.4
	Yes	50	10.6
Type of vaccine received	AstraZeneca	18	36.0
	Moderna	18	36.0
	Do not remember	14	28.0
Number of doses received	One dose	27	54.0
	Two doses	23	46.0

Table 4: Willingness of students of the University of Port Harcourt to receive the COVID-19 vaccine

Variable	Frequency (n)	Percentage (%)
Willing to receive COVID-19 vaccine		
No	241	57.0
Yes	182	43.0

Table 5: Relationship between socio-demographics and vaccine hesitancy

Characteristics	Vaccine hesitancy		df	X ²	p-value
	Hesitant No (%)	Non-hesitant No (%)			
Age group (years)					
16-26	327 (76.8)	99 (23.2)	3	3.630	0.304
27-37	35 (77.8)	10 (22.2)			
≥49	0 (0)	1 (100)			
38-48	1 (100)	0 (0)			
Sex					
Female	191 (77.9)	54 (22.1)	1	0.420	0.517
Male	172 (75.5)	56 (24.5)			
Presence of close family members older than 70 years					
No	306 (81.7)	89 (18.3)	2	3.527	0.171
Yes	57 (73.1)	21 (26.9)			

Key: No=number

Table 6: Relationship between perceived vulnerability and vaccine safety, and vaccine hesitancy

Variable	Vaccine hesitancy		Df	X ²	p-value
	Hesitant No (%)	Non-hesitant No (%)			
Concerned about getting COVID-19					
Very concerned	51 (47.2)	57 (52.8)	4	96.594	0.000*
Somewhat concerned	98 (70.5)	41 (29.5)			
Neither concerned nor unconcerned	98 (94.2)	6 (5.8)			
Somewhat unconcerned	52 (94.5)	3 (5.5)			
Very unconcerned	64 (95.5)	3 (4.5)			
Perceived safety of COVID-19 vaccine					
Very safe	15 (21.4)	55 (78.5)	4	178.558	0.000*
Somewhat safe	112 (70.4)	47 (29.6)			
Neither safe nor unsafe	129 (95.5)	6 (4.5)			
Somewhat unsafe	56 (100)	0 (0)			
Very unsafe	51 (96.2)	2 (3.8)			

Key: No=Number

Table 7: Relationship between preferred location for Vaccination, trust in public health agencies, knowledge of adverse vaccine effects and hesitancy

Variable	Vaccine hesitancy		Df	X ²	p-value
	Hesitant Number (%)	Non-hesitant Number (%)			
Preferred place to get the COVID-19 vaccine					
School clinic	102 (71.3)	41(28.7)	3	39.350	0.000*
Other clinics, health centers, or other medically related places	57 (60.6)	37 (39.4)			
Not sure	129 (94.2)	8 (5.8)			
Degree of trust in public health agencies					
Very much	11 (37.9)	18 (62.1)	3	60.418	0.000*
Moderately	107 (65.2)	57 (34.8)			
A little	122 (81.8)	27 (18.2)			
Not at all	123 (93.9)	8 (6.1)			
Knowledge of adverse vaccine effects					
No	229 (74.4)	79 (25.6)	2	2.905	0.234
Yes	74 (80.4)	18 (19.6)			
Not sure	60 (82.2)	13 (17.8)			

Discussion

This study examined the willingness, hesitancy and uptake of COVID-19 vaccine among students of the University of Port Harcourt. The respondents had a high degree of awareness about the COVID-19 vaccination, with the main sources of information being the Nigeria Centre for Disease Control (NCDC) and news media such as television, the Internet, and radio stations. This is consistent with earlier studies conducted in Nigeria, which found a high level of awareness of the COVID-19 vaccine.^{11, 12} Ethiopia, Oman, and China all reported similar outcomes.^{13, 14, 15} It may then be deduced that a large proportion of university undergraduates are aware of the COVID-19 vaccine.

The proportion of students willing to receive the COVID-19 vaccine was found to be low, which was consistent with previous research in Enugu, Nigeria, and a Nigerian national survey involving all thirty-six states of the Federation, which revealed 61.0% and 58.2%, respectively.^{7,16} Although the Middle East and Russia had low levels of COVID-19 vaccine willingness,^{24, 25,26} other parts of Europe, North America, and Asia (excluding the middle east) had high levels.¹⁷⁻²³ The low proportion found could be attributed to issues such as vaccine safety concerns, a lack of information on how and where to obtain the vaccine, and the simplicity of obtaining the vaccine, which is consistent with prior study findings.^{11, 26, 17-24} This implies that the issues associated with the willingness to accept the COVID-19 vaccine are similar to those experienced in national immunization programs, such as insufficient information and vaccine safety/efficacy, and are not unique to the COVID-19 vaccine.²⁷⁻³²

The prevalence of COVID-19 vaccine hesitancy was found to be high, which is

consistent with earliest data from Egypt, Portugal, and the United States, all of which showed high vaccine hesitancy.^{32,33-35}

However, in India, there was a low prevalence of vaccine hesitancy, which was ascribed to increased risk awareness of developing the COVID-19 disease.³⁶

The "5C Model of the Drivers of Vaccine Hesitancy" (Confidence, Complacency, Convenience (or Constraints), Risk Calculation, and Collective Responsibility) significantly contributed to the high prevalence of COVID-19 vaccine hesitancy observed among respondents. Issues regarding the paucity of data on vaccine long/short term effects (Risk Calculations), vaccine safety/efficacy (Confidence), ease of getting the vaccine/long waiting time (Convenience) and the motivation to safeguard one's own and family members' health (collective responsibility) were identified as barriers to COVID-19 vaccination among the study population, which is consistent with studies conducted in Egypt, Portugal, and the United States of America.^{37,38} As in other studies, there was no statistically significant association between socio-demographic characteristics and hesitancy.^{24,34,39}

However, a statistically significant relationship was observed between concerns about getting COVID-19, vaccine safety/efficacy, Convenience (ease of getting the vaccine, preferred location, trust in public health agencies) and vaccine hesitancy, which is consistent with previous research.^{35,37,38,40} This implies that COVID-19 vaccine hesitancy is majorly person dependent as the barriers observed were not necessarily dependent on the vaccine itself but individual-related factors.

Therefore, in order to increase vaccine uptake, these problems should be addressed in the COVID-19 immunization campaign in order to lessen their impact. The vaccine uptake was found to be low as

the majority of respondents had not got the vaccine. This is comparable to studies conducted in Lagos State, Nigeria and the United States. However, Jordan had a higher vaccination uptake.^{26, 41-43} This means that, despite the study population's high level of vaccine awareness, it had no positive effect on vaccine uptake, which is consistent with the hypothesis that awareness does not always translate to uptake.^{44,45} Therefore, although awareness of the vaccine is critical to managing and ending the pandemic, it is also dire to ensure vaccine acceptability so as to improve vaccine uptake. These findings are significant for public health in vaccine programme development and its implementation. Also, they should guide public health initiatives such as health advocacy to promote vaccine willingness and uptake. The online method of data collection posed a limitation to the study, as there was little control as to the number of times it can be filled by a single individual.

Conclusion

From the study, majority of students interviewed were aware of the COVID-19 vaccine but had not received the vaccine. About two thirds of respondents were hesitant with concern about getting the disease and vaccine safety majorly influencing hesitancy. Based on the findings from this study, it is hereby recommended that there be creation of vaccination points within the university campus and improved health education of the University community about COVID-19 vaccination.

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