



Acceptance and hesitancy of COVID-19 vaccine among university community members of Otukpo, Nigeria: a cross-sectional study

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Abstract

Coronavirus disease (COVID-19) is a global public health problem that has had a detrimental influence on the economy of countries of the world, including Nigeria: (1) Background: The study aimed to assess COVID-19 vaccine acceptance and hesitancy among staff and students at Federal University of Health Sciences Otukpo, Benue State, Nigeria, while exploring the factors influencing these attitudes; (2) Methods: A web-based cross-sectional survey was conducted between November 2021 and April 2022, with data analyzed using descriptive and inferential statistics; (3) Results: Of the hundred and fifty (150) completed and analysed questionnaires the mean age of the respondents was 34.8 ± 8.64 years, of which majority of them 80.0% (122) ranging between 16 and 45 years. The majority of the respondents 77.3% (116) have been tested for the virus to know their status. In total, 51.2% of trial participants indicated hesitancy to get the COVID-19 vaccine. The two most frequent reasons for hesitation were scepticism about the vaccination due to fast production and rollout (32.2%) and fear of vaccine side effects due to social media movements (23.3%). The most often cited reasons for not receiving the COVID-19 vaccination included uncertainty about its efficacy, a lack of knowledge about the vaccine, a preference for another kind of protection, and unreliability of the vaccine (due to its rapid development). Staff category (Academics, non-academics, students, and health workers), age, and religion were the significant associated factors influencing vaccine acceptance and hesitancy ($P < 0.05$); (4) Conclusions: The university community has a high level of awareness of COVID-19 pandemic but vaccine acceptance is low resulting high levels of vaccine hesitancy. These findings suggest that there is a need for further information and education on the COVID-19 vaccine, particularly in communities where vaccine hesitancy is prevalent. This can be achieved through targeted outreach programs, community engagement initiatives, and effective communication strategies that address the concerns and questions of individuals who are hesitant about receiving the vaccine.

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Keywords Acceptance · COVID-19 · Cross-sectional study · Federal University of Health Sciences Otuokpo · Vaccine hesitancy · Nigeria

1 Introduction

The emergence of Coronavirus Disease 2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has led to a global health crisis [1]. Since its first detection in Wuhan, China, in December 2019, the virus has rapidly spread worldwide, prompting the World Health Organization (WHO) to declare it a pandemic on March 11, 2020 [1, 2]. The devastating impact of COVID-19 has overwhelmed healthcare systems, disrupted economies, and led to significant loss of life [2, 3]. Nigeria, like many other countries, has faced substantial challenges in managing the pandemic [4, 5]. With the WHO identifying Nigeria among the 13 high-risk African countries for COVID-19 transmission, the country's healthcare system has been under immense strain [6–9]. The importance of widespread vaccination to combat the pandemic cannot be overstated [10]. Vaccination plays a crucial role in preventing and controlling infectious disease outbreaks, and it is considered a fundamental human right and a key component of primary health care [11].

Nigeria recorded its COVID-19 index case which was imported from Italy, on February 27 [12, 13]. This raised concerns about the effectiveness of airport surveillance and, by extension, the country's general preparedness. The index case had visited some other states of the federation before testing positive for COVID-19. The pre-COVID-19 preparedness was grossly inadequate. From one imported index case, many countries as well as Nigeria faced tremendous health challenges with multiple cases and deaths. Since the first index case in Nigeria, there was a rapid increase in COVID-19 incidence but due to the government's proactive response and public health intervention, Nigeria is currently experiencing a drastic decrease in the pandemic [5].

Vaccines are also critical to the prevention and control of infectious disease outbreaks. They underpin global health security and will be a vital tool in the battle against antimicrobial resistance [14]. Despite the tremendous progress, a lot of people around the world have insufficient access to vaccines [15, 16]. In some countries, progress has stalled or even reversed, and there is a real risk that complacency will undermine past achievements [17]. Data on global vaccination coverage shows that the proportion of the world's children who receive recommended vaccines has remained the same over the past few years [8, 18]. Vaccines have proven to be a remarkable achievement in global health and development, as they have saved millions of lives annually by preventing the spread of infectious diseases. Creating safe and effective COVID-19 vaccination is critical for resuming normal human social interactions. Hence, getting vaccinated helps prevent the risks of contracting COVID-19 disease since the vaccines work with the body's immune system to build protection against the disease. Currently, a lot of vaccines such as AstraZeneca, Moderna, Pfizer, Sinovac, and Sinopharm are available for different age groups and are used to prevent life-threatening diseases including COVID-19, Zika virus and others [19]. Vaccines are also important in the prevention and control of infectious disease outbreaks. They are the foundation of global health security and will be a critical tool in the fight against the scourge of global pandemics that endanger human life. WHO mandated that Immunization becomes a key component of primary health care and as well as one of the fundamental human rights.

The pandemic has had detrimental effects on academic activities leading to school closures, authorities must create a long-term strategy for sustaining educational activities amidst any eventuality because the educational system is crucial to the development of a nation [20]. Although the economies of nations were also damaged, there has been a slow rebound from the pandemic's devastation. A health-related behaviour called vaccine hesitancy poses obstacles to the successful uptake and distribution of vaccines [21–23]. There is an unequal distribution of vaccines globally which has to be eliminated and countries must adopt a multi-sectorial approach that engages key stakeholders to determine which specific factors are viewed as compelling arguments for and against vaccination and develop new strategies to influence those who are unsure [24, 25]. According to WHO and others, creative methods must be searched out to engage groups that are at risk, address insensitivity, and advance tactics based on respectful discourse and cultural sensitivity [23].

Country-specific remedies are required because the causes of the low rates of COVID-19 vaccination and resistance to the vaccine vary across Sub-Saharan Africa [26, 27]. There has been a plea for compassionate, culturally appropriate public health intervention that acknowledges the role of historical, structural, and other system dynamics. To achieve these goals, nations should base their national corrective action plans on the measures that WHO has recommended for fostering healthy behaviour. Innovation and task shifting away from traditionally relied-upon types of health informatics as well as engagement to increase health literacy and achieve health equity via action are examples of measures of demonstrated value that are pertinent to COVID-19 vaccination uptake [27].

According to studies, there is a low percentage of COVID-19 immunization and resistance in Africa for a variety of regionally specific reasons [28, 29]. Equitable access to safe and effective vaccines is critical to ending the COVID-19 pandemic, so it is hugely encouraging to see so many vaccines proving and going into development [16]. To manage the global COVID-19 pandemic, the COVID-19 vaccination has a higher impact in countries with the highest adoption rates. The major obstacle, though, is vaccine hesitancy. WHO had identified COVID-19 vaccine hesitancy as a global concern, particularly in low- and middle-income countries [30]. In Nigeria, as in many other nations, vaccine acceptance and hesitancy have emerged as critical factors influencing the success of vaccination programs. Nigeria has identified COVID-19 vaccine hesitancy, as primarily driven by distrust in the government, leading to concerns about vaccine safety and side effects [31]. This highlights the need to address public perceptions and build trust in government-led vaccination efforts. A study among Nigerian youths, particularly students in Southwestern Nigeria, revealed a communication gap with health authorities, necessitating targeted health promotion campaigns to enhance vaccine acceptance [32]. Vaccination hesitancy was more prevalent among males and younger respondents in Nigeria [33]. The present study aims to assess the acceptance and hesitancy of COVID-19 vaccines among university community members in Otukpo, Benue State, Nigeria, with a focus on the Federal University of Health Sciences Otukpo. By understanding the associated factors of vaccine acceptance and hesitancy in this specific setting, our research seeks to inform evidence-based strategies that promote vaccine acceptance, combat hesitancy, and contribute to the broader efforts of controlling the COVID-19 pandemic. Investigating vaccine acceptance and hesitancy among university community members in Nigeria is of utmost importance to ensure the success of vaccination efforts. The student population's perspectives and behaviors have far-reaching implications for the nation's health and economic viability. Our research strives to fill this knowledge gap and contribute to the development of targeted and effective vaccination interventions, ultimately advancing public health and mitigating the impact of COVID-19 within the university community and beyond and also contribute to the collective efforts in addressing this critical issue and mitigating the impact of the pandemic on public health and society.

2 Materials and methods

2.1 Study setting

The federal university of health sciences in Otukpo, Benue State, Nigeria, has over 800 staff members, and 500 students as of 2022 [34]. It is a tertiary entity in charge of undergraduate and graduate education. It is Nigeria's first government university for the health sciences. It is located at the heart of the Otukpo local government area of Benue State with a population density of close to 2 million people, serving as the site of this study.

2.2 Study design, period and materials

The research design adopted for this study is an 'Observational Cross-Sectional Study,' specifically selected to provide a momentary snapshot of COVID-19 vaccine acceptance and hesitancy attitudes among university community members within a defined timeframe. Conducted between November 2021 and April 2022, this investigation was executed at the Federal University of Health Sciences, Otukpo, Benue State, Nigeria. The primary aim was to gain insights into the factors influencing the acceptance and hesitancy of COVID-19 vaccination within this specific academic community. In adherence to the non-experimental observational approach, an online cross-sectional survey was deployed. The survey methodology was constructed based on the Vaccine Hesitancy Determinants Matrix as established by MacDonald et al. [35]. This comprehensive matrix encompasses a spectrum of influential factors, including vaccine safety, efficacy, religious convictions, and confidence in healthcare providers and government bodies. Survey questions were meticulously crafted to delve into these factors, meticulously assessing their influence on vaccine acceptance and hesitancy among the university community members in Otukpo, Nigeria. The cross-sectional survey methodology facilitated the collection of data within a defined period, enabling a thorough examination of the prevailing attitudes. The online questionnaire was extensively distributed among a targeted sample of university community members. The amassed data underwent meticulous statistical analysis to unveil patterns and correlations between vaccine hesitancy and the determinants as delineated in the aforementioned matrix. This observational cross-sectional study design underscores our objective to comprehend the multifaceted aspects shaping vaccine acceptance and hesitancy within the university community. It allows us to effectively dissect the interplay of factors at a specific juncture, contributing valuable insights to inform future interventions and public health strategies.

2.3 Inclusion and exclusion criteria

The responses included people who had valid forms of identification and were both employed and students. Exclusion criteria included not being employed by the university or not being admitted as a student throughout the data collecting period.

2.4 Sample size determination and sampling techniques

Using the sample size formula of [36], a university study's acceptance rate for the COVID-19 vaccination was found to be 27.7%, with 10% attrition. Using a single population proportion calculation, the sample size ($n=150$) was calculated by adding the 62.7% acceptance rate, 50% vaccine hesitancy, 5% margin of error, and 95% confidence range [37]. The link to the online survey was supplied by data collectors with the intention of the study and a consent form after five faculties/colleges in the university was purposefully chosen. If there were visits while data collection was taking place, only those who fit the inclusion requirements were chosen to avoid information saturation.

2.5 Data collection tool and procedures

Data were gathered using a structured survey that was created using Google Forms platforms after a thorough literature review with the assistance of the designated data collectors, respondents were surveyed online [26]. Trained research assistants, totaling five, are the data collectors in this study. Despite using Google Forms for the questionnaire, data collectors were chosen to ensure consistent and unbiased data collection, clarifying respondent doubts for accurate responses. The Google Forms were created using the lead researchers' (Prof. Joseph Anejo-Okopi and Suleiman Zakari) Google accounts, chosen for security, privacy, and centralized data access for analysis and confidentiality. There are a total of 27 items in the questionnaire, which were divided into 4 sections: sociodemographic, general COVID-19 and personal health questions, COVID-19 vaccination-related questions, and attitude and perspective questions about COVID-19 and its vaccine. The questionnaire was shared via WhatsApp and official emails to ensure wide distribution. For WhatsApp users, the Google Form link was directly shared in relevant university groups. Official emails were sent to university staff, faculty, and students, providing a personalized link. The questionnaire was designed to be user-friendly for the literate population. Respondents had access to their smartphones and official emails, allowing them to respond at their convenience without data collectors' involvement.

2.6 Data quality assurance

The survey questionnaire was written in English, which is Nigeria's official language, to improve public engagement and comprehension. About 15% of the sample size underwent a pre-test. Before the start of data collection, the pre-test called for any necessary adjustments. Data collectors received instructions on using Google Forms platform questionnaires, making questions understandable, and interacting with study participants. To maintain the integrity of the data, regular monitoring, supervision, and reviews of the completed questionnaire were conducted.

2.7 Statistical analysis

The data entry and analysis were performed using IBM SPSS software version 2.0. Descriptive statistics and inferential statistics were used to determine frequencies and percentages of levels of knowledge and awareness of the COVID-19 vaccine among subjects with socio-demographic variables. Similarly, the chi-square test for independence was used to compare participants' socio-demographics for potentially associated factors with acceptance and hesitation to COVID-19 Vaccination.

3 Results

3.1 Respondents' socio-demographic characteristics

Respondents' thoughts were gathered after the link to the questionnaires was distributed. A response rate of 33.3% (150) was noted. Most (64%, 96/150) respondents were postgraduates (people with educational qualification above first degree), of the respondents Christian faith has the majority (80%, 132/150). The proportion of responders for each

study population in the institution (academics, non-academics, healthcare professionals, and tertiary students). Of the 150 respondents in all, 96 of whom were men (64%) took part in the study. Students made up 32% ($n = 48$) of the respondents, followed by academics (23.3%) ($n = 35$), then non-academics (23.7%) ($n = 41$) and lastly health professionals with (17.3%) ($n = 26$), in terms of occupations/job descriptions. The majority 120 (80.0%) of the respondents were aged 16–45 years (Table 1). The table also shows the association between various socio-demographic factors and tests for COVID-19 among the respondents. There were significant associations ($p < 0.05$) between testing for COVID-19 infection and some socio-demographics. Respondent's category and age had significant differences in the test for COVID-19 while the other factors showed no significant statistical association ($p > 0.05$).

There were no significant ($p > 0.05$) levels of vaccinated people at the institution, however there were significant positive relationships ($p < 0.05$) between COVID-19 immunisation and employment type, religion, and educational level (Table 1). Overall, socio-demographic variables were not significant ($p > 0.05$), with the exception of work category variability, which demonstrates a significant difference in COVID-19 test and vaccination.

3.2 Knowledge, attitude and practices towards COVID-19 and vaccination

The majority of the respondents 116 (77.3%) have been tested for the virus to know their status. Among the 34 that have not been tested few are willing (45%) to be tested showing a high level of hesitancy towards tests and vaccination. Only 1.3% of the respondents had tested positive for COVID-19 with most 98.7% confirmed not to have had based on negative test results. Most 74.7% have not been exposed to a positive case recently. Other details, as well as information on the exposure of the respondents to people confirmed to have contracted COVID-19 or died of the disease, are shown in Fig. 1.

Table 1 Association between socio-demographic characteristics of the respondents

Test variable	Percentage (%)	χ^2 -value	P-value
Test and vaccination against COVID-19			
Gender			
Male	64	2.968	0.085
Female	36		
Marital status			
Married	4.29	0.0600	0.741
Single	57.1		
Divorced	0		
Age			
16–30	30.7	1.766	0.414
31–45	60.0		
46–60	9.3		
Respondent's category			
Academic	32.2	8.365	0.039
Non-academic	17.3		
Student	27.3		
Health workers	23.1		
Education			
Secondary	5.3	1.635	0.651
ND/NCE	8.0		
Graduate	22.7		
Postgraduate	64.0		
Religion			
Christians	88.0	0.777	0.678
Muslims	10.7		
Others	1.3		

3.3 COVID-19 vaccine availability, accessibility, acceptance, and hesitancy

Only (41.6%) of the respondents accepted to take the vaccine mainly because of the world health organization’s public advice on the importance of the vaccine (Fig. 2). In total, 58.4% (87) of trial participants indicated hesitancy to get the COVID-19 vaccine. On the high side also are the unvaccinated members of the university community (51.3%) followed by others who took because of the influence of family members and friends and confidence in the Nigerian healthcare system, in contrast, few (4.5%) based theirs on the reputation of vaccine manufacturers.

Most (72.7%) respondents reported that WHO-approved COVID-19 vaccines were available for use in their locality but only 48.7% of those surveyed were vaccinated (Fig. 3). The unvaccinated population is on the high side with 53.1%. Respondents agreed that the vaccine is available and they are willing to take it.

It was also observed that AstraZeneca/ Oxford vaccine was the most used based on data collected on the type of vaccine respondents who got vaccinated received (Fig. 4). Details on vaccine brands received and the proportion of each vaccine are presented in Fig. 4.

The majority of the respondents, 37 (41.6%) accepted to take the vaccine mainly because of the world health organization’s public advice on the importance of the vaccine. A few others took because of the influence of family members and friends 9%, important political, community and religious leaders 6.7%, similarly 4.5% based theirs on the reputation of vaccine manufacturers.

The study found that the percentage of unvaccinated people was higher than those who have been vaccinated. Figure 3 below shows 52.5% of the university community members are not vaccinated however 47.5% indicated affirmative to have taken the vaccine. The major reason that informed COVID-19 vaccinated respondents on the safety and efficiency of the vaccine was the WHO public health advice on the vaccine (48%) (Fig. 5). Further probing reveals that the majority 26% and 24% as shown below were not vaccinated because they were having bad feelings towards the vaccine due to conspiracy theories surrounding the vaccine as heard from social media and internet sources, also suspicious of the safety concern in hatsful manufacturing of the vaccines.

3.4 Associated factors of COVID-19 vaccine hesitancy

There was a significant difference ($p < 0.05$) in testing and vaccination among the different categories of members of the university community (Academics, Non-academics, Students and Health workers). When given the COVID-19 vaccination, the responders claimed several reasons why they did not want to take it. These comprised: Skepticism about the vaccine due to hasty production/roll out 48 (32.0%), Bad feelings towards the vaccines due to negative social media reports/rumours 35 (23.3%), Influence from anti-COVID-19-vaccine movements 22 (14.7%) were found to significant percentage influence on reasons for vaccine hesitancy among respondents.

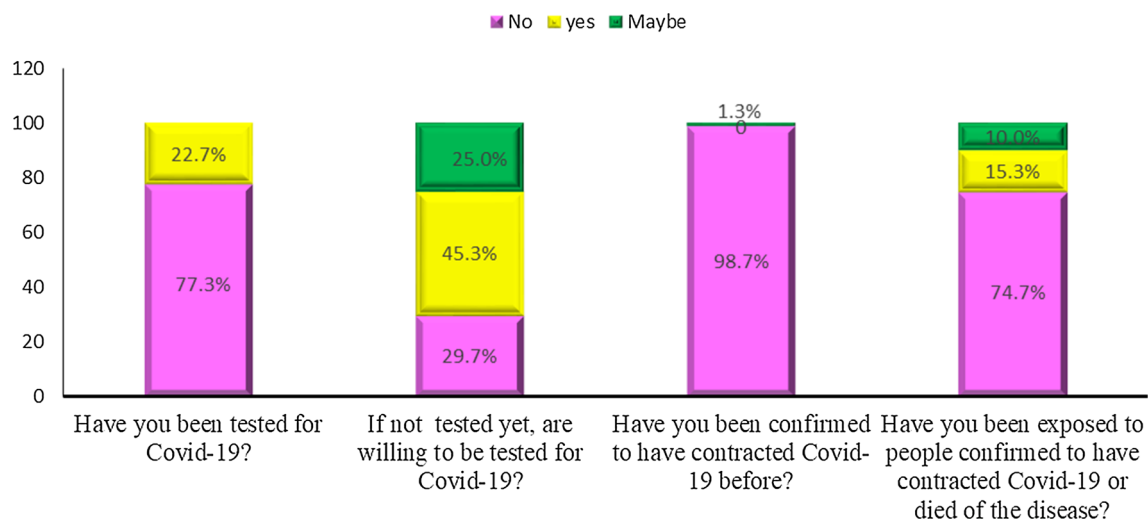


Fig. 1 COVID-19 testing and infection status of respondents (n = 150)

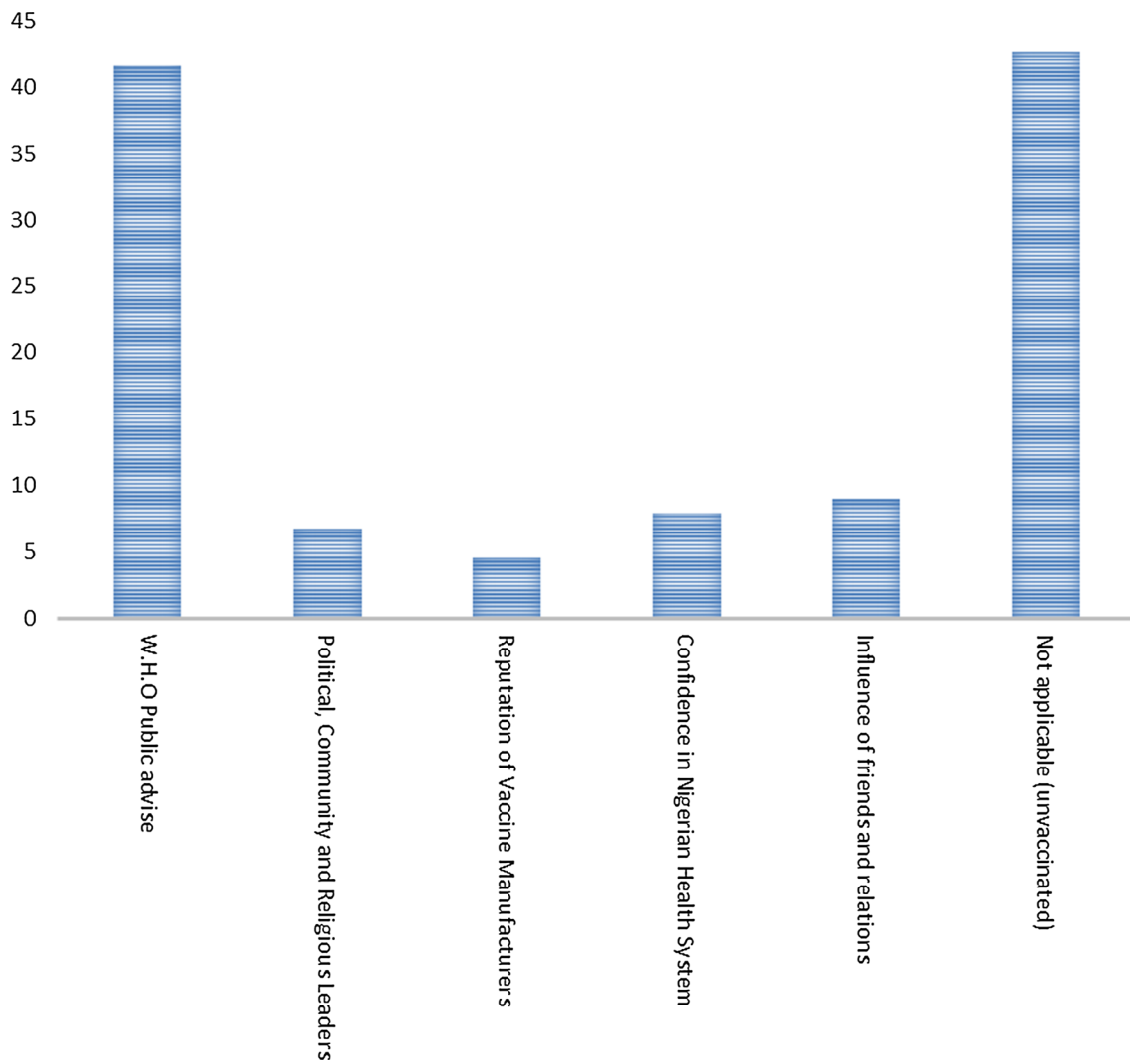


Fig. 2 Reasons for accepting to receive COVID-19 vaccine

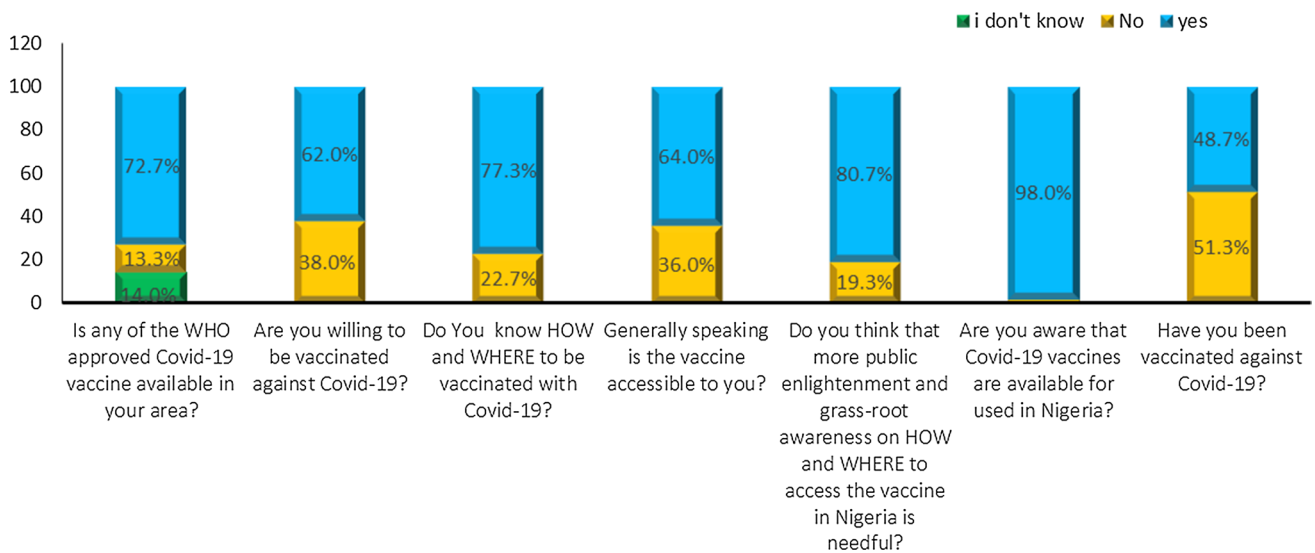


Fig. 3 COVID-19 vaccine availability, accessibility, and acceptance

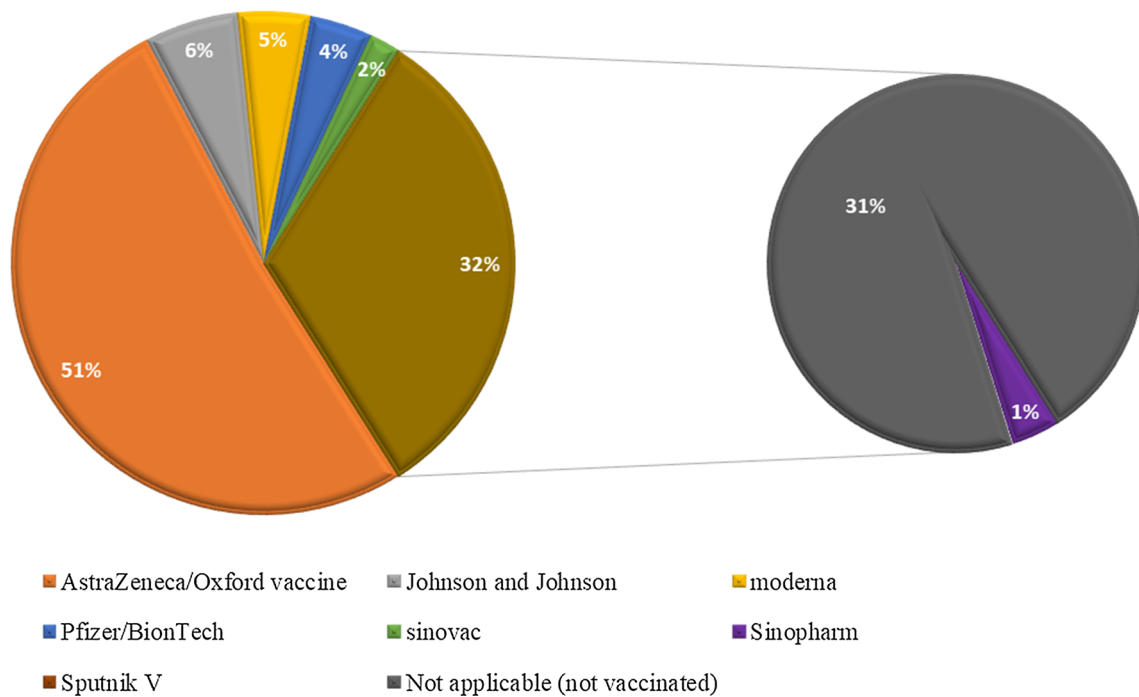


Fig. 4 Distribution of COVID-19 vaccine brands received by vaccinated respondents

Fig. 5 Reasons that informed the confidence of COVID-19 vaccinated respondents on the safety and efficacy of the vaccine

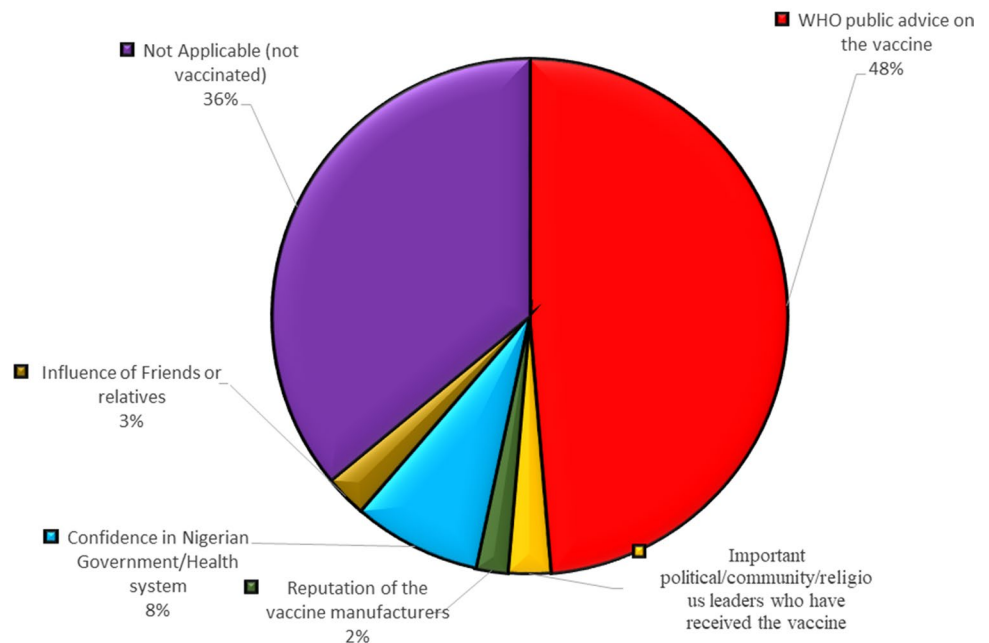


Table 2 provides insightful responses from participants regarding their hesitancy towards COVID-19 vaccines and potential ways to enhance their acceptance. The responses reveal a diverse range of concerns and beliefs that contribute to vaccine hesitancy among the studied population. Among the reasons highlighted, the most prevalent factors include skepticism about the vaccine’s hasty production and rollout, with a substantial response rate of 32.0%. This suggests that many individuals harbor reservations about the rapid development of COVID-19 vaccines, potentially due to concerns about safety and efficacy. The influence of anti-COVID-19-vaccine movements is another significant contributor to vaccine hesitancy, with a response rate of 14.7%. This highlights the role of misinformation and influential campaigns that dissuade people from getting vaccinated. Negative social media reports and rumors also play a noteworthy role,

as indicated by a response rate of 23.3%. This suggests the powerful impact of social media on public perception and willingness to receive the vaccine.

Interestingly, beliefs in herbal medicines or home remedies for managing COVID-19 were indicated by a smaller percentage (1.3%), which could indicate some individuals' preference for traditional approaches over vaccination. Several participants (12.7%) expressed doubts about the safety of novel vaccines, emphasizing the importance of addressing concerns about vaccine side effects and long-term health impacts. Relatively fewer respondents mentioned factors like the difficulty of COVID-19 vaccine registration protocol (4.0%), the unavailability of vaccines in their locality (4.0%), and the perception of COVID-19 as a hoax (3.3%). It's notable that none of the respondents cited religious beliefs or personal ideology as reasons for vaccine hesitancy. This could indicate that, within the studied population, these factors may not be significant barriers to vaccine acceptance.

4 Discussion

In a university community in Otukpo, Benue State, Nigeria, we evaluated the COVID-19 vaccine and the socio-demographic factors that influence vaccine acceptance and reluctance. Since it was declared a global pandemic, the COVID-19 pandemic has posed a significant challenge, and numerous preventive measures have been tried to stop it. One of the most effective ways to stop the spread of the COVID-19 epidemic was vaccination. Recent research suggested that 60–70% of society needs to receive vaccinations to limit the COVID-19 pandemic's spread and build herd immunity [30]. A total of 150 questionnaires were distributed using a web-based cross-sectional survey to academics, non-academics, students, and health professionals who served as the research's data sources. To encourage COVID-19 immunization, it is important to understand whether people are willing to receive the vaccine, why they are or are not, and which sources of information they trust the most. Our study used a standard set of survey questions to analyse the acceptance of the COVID-19 vaccine and its determinants in higher education settings. Our results showed that vaccine acceptance was rated as low to moderate among the survey respondents. Among the 150 respondents, 132(88%) agreed that the disease is real as such a global public health threat. Only 47.5% of those who said they knew where to get the COVID-19 vaccine have received it showing high hesitancy towards the vaccine uptake. The acceptance rate in our study was similar to that reported by Njoga [36, 38]. The low vaccine acceptance is predicted by misconceptions regarding the vaccine; also fear from the social conspiracy theories about COVID-19 infection is a predictor of low level of testing and vaccination among the respondents. Being vaccinated or having a positive attitude towards the vaccine plays a role as a predictor of high vaccine acceptance. Creating public awareness using people with previous disease experience may increase

Table 2 Reasons for COVID-19 vaccine hesitancy and measures to improve the vaccine availability and acceptance

S/no.	Reasons for COVID-19 vaccine hesitancy and measures to improve the vaccine acceptance (%)	
	COVID-19 vaccine registration protocol is difficult	6 (4.0)
	Suspicion/doubts about the safety of novel vaccines	19 (12.7)
	Herbal medicines/home remedies are effective for cure/management of COVID-19	2 (1.3)
	COVID-19 is a hoax	5 (3.3)
	The vaccines are not available/accessible in my locality	6 (4.0)
	Influence from anti-COVID-19-vaccine movements	22 (14.7)
	Vaccination is against my religious beliefs or personal ideology	0 (0)
	Concerns about long-term health/side effects	4 (2.7)
	Scepticism about the vaccine due to hasty production/rollout	48 (32.0)
	Preventive measures are enough to protect against COVID-19	3 (2.0)
	Bad feeling due to negative social media reports/rumours	35 (23.3)
2	Some health concerns that prevented respondents from getting vaccinated	
	Allergic reaction	37 (24.7)
	Blood clot issues among women	2 (1.3)
	New or worsening muscle/joint pains	0 (0)
	Innate immunity problems/misconceptions	16 (10.7)
	Not applicable ^a	95 (63.3)

^aThose without health challenges

vaccination uptake as we noted that participants were unsure or unwilling to get a COVID-19 vaccine when available. The study's findings of vaccine hesitancy among university community members in Otukpo may align with previous studies conducted in Nigeria and other countries facing similar challenges. Past literature has shown that vaccine hesitancy can be influenced by factors such as misinformation, fear of side effects, lack of trust in government or health authorities, and religious or cultural beliefs [31]. These factors might have contributed to the hesitancy observed in this study, which is consistent with findings from similar settings. This trend has been observed in previous research from Nigeria and other regions. University community members, with their higher levels of education, tend to have better access to information and may be more inclined to accept vaccinations due to their awareness of their benefits and safety [32]. The world health organization web hosting COVID-19 information indicated that the total vaccine doses administered and persons fully vaccinated per 100 populations in Nigeria, were only nine and three, respectively [39]. This number of persons fully vaccinated per 100 population is extremely low compared to the global average of 52 persons [39]. Since the respondents are predominantly highly educated individuals and in the university community, one would have expected a high level of awareness translates into a high level of vaccine acceptance and vaccine uptake but a different pattern was observed as the level of awareness about COVID-19 was high but does not translate into high testing rate and vaccination rate. However, we found out that a lot of determinants such as fear of the unknown, and social media conspiracy contribute to low vaccination. Since few respondents have been tested for COVID-19, they are likely to be reluctant to take the vaccine. Previous studies have shown that people who consider a disease terrifying are more likely to demand a vaccine against the disease [40].

Nigerians were receiving COVID-19 vaccines in response to the continuing pandemic [41]. On March 5, 2021, vaccinations started. 17,914,944 individuals had gotten their first dose of the COVID-19 vaccination as of February 28, 2022 [1]. By the end of April, 14.9 million people had received all three vaccine doses, totalling 38.4 million [13]. The most common vaccine taken was AstraZeneca/Oxford 42.2%, followed by Moderna 6%, with a minute number of respondents taking Johnson and Johnson, Pfizer/biotech, Sinovac, Sinopharm and 41% of unvaccinated people. The study reveals that, of the 150 respondents, 88% agreed that the disease is a genuine global public health concern. Only 47.5% of those who said they knew where to get the COVID-19 vaccine have received it. The job description/category, religion, age and level of education were strongly associated with COVID-19 vaccine acceptance and hesitancy. Furthermore, this study's hesitation rate is consistent with [40, 42] findings of moderately high hesitancy among nations, making it difficult to get the necessary vaccinations (60–70%) to halt the COVID-19 pandemic's spread. The perception spread by social media that the COVID-19 virus was created by humans may be to blame for the poor level of vaccination uptake. This conspiracy theory has permeated people's perspectives on the COVID-19 outbreak all around the world. People hold false beliefs about the history of vaccines as well as their potential safety and effectiveness. While past literature may have shown cultural and religious beliefs as significant determinants of vaccine hesitancy, this study might find that such factors play a lesser role among university community members in Otukpo. The educational environment of the university setting might encourage open-mindedness and scientific understanding, which could outweigh certain cultural or religious concerns regarding vaccination. The Nigerian government's proactive response to the COVID-19 pandemic, including vaccination campaigns and public health messaging, may have positively influenced vaccine awareness among university community members [33]. The study's findings might reflect the impact of such efforts in building trust and confidence in the vaccination program. With strong community engagement and awareness programs to be jointly conducted by local authorities and university institutions could have contribute to higher vaccine acceptance rates and low hesitancy. This study can be used by the government and those in the education industry to provide targeted training and interventions to increase vaccine uptake and, as a result, compliance with national guidelines. Vaccine hesitancy is a complex global public health issue that differs across cultures, time, locations, and vaccine types [43]. Nonetheless, it is influenced by factors such as complacency, convenience, and overconfidence [40]. Scepticism about the vaccine due to fear of unknown conspiracy theories, negative feelings toward vaccines due to negative social media reports/rumours, and the influence of anti-COVID-19 vaccine movements all had a significant impact on vaccine acceptance in this study.

5 Conclusion

The findings of this study conducted at the Federal University of Health Sciences Otukpo, Nigeria, highlight the prevailing COVID-19 vaccine hesitancy among university community members. Although a substantial number of respondents (77.3%) were aware of the COVID-19 pandemic and vaccine availability, vaccine uptake compliance was low (41.6%), leading to a high level of vaccine hesitancy (51.3%). This indicates the urgent need for intensified awareness campaigns

on the importance and availability of the COVID-19 vaccine for effective prevention and control of the pandemic within university communities in Nigeria. The study's results have important implications for health policy in Nigeria. Firstly, they underscore the significance of addressing vaccine hesitancy to enhance vaccine acceptance and uptake among university community members. Health policymakers and authorities should prioritize the implementation of targeted outreach programs and community engagement initiatives to educate individuals and address their concerns regarding vaccine safety and efficacy. Effective communication strategies should be employed to disseminate accurate and evidence-based information, helping to dispel misinformation and myths about the vaccine. Additionally, educational institutions, including the Federal University of Health Sciences Otuokpo, should play a proactive role in promoting infection prevention and control. Regular seminars and campaigns on infection prevention, which include specific focus on COVID-19 vaccination, should be organized within the university community. Furthermore, having a written infection control guideline placed strategically on university premises can serve as a constant reminder and reinforcement of the importance of adhering to vaccination and other preventive measures.

6 Limitations

Despite the valuable insights obtained from this study, certain limitations would be acknowledged. Firstly, the study's cross-sectional design provides a snapshot of vaccine acceptance and hesitancy at a particular point in time. Longitudinal studies are warranted to monitor changes in vaccine attitudes and behaviors over time and assess the effectiveness of intervention strategies. Secondly, the study was conducted at a single university, limiting the generalizability of the findings to other Nigerian universities or broader populations. Replication of the study in diverse settings would strengthen the external validity of the results. Lastly, data were collected through self-reporting, which might be influenced by social desirability bias or recall bias. Future studies could employ a combination of self-reporting and objective measures to validate the findings.

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Data availability All data generated or analysed during this study are included in this published article.

Declarations

Ethics approval and consent to participate The study was carried out in accordance with the Declaration of Helsinki and Oviedo Convention, and the institutional Health Research Ethics Committee (HREC) waived the requirement for ethical approval because it posed little risk (Waiver No. NOUHRC/A021/43). Before taking part in the trial, each subject gave verbal informed consent. The questionnaire was made voluntary, and it was designed in a way that respects participants' identity and confidentiality. The study participants were notified that the information they gave would be handled with absolute confidentiality. Informed consent was obtained from all participants involved in the study.

Competing interests The authors declare that no competing interests.

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