FACTORS ASSOCIATED WITH THE UPTAKE OF COVID-19 VACCINES AMONG ADULT RESIDENTS OF SELECTED COMMUNITIES IN SOUTH-WEST, NIGERIA

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ABSTRACT

Background: The rate of uptake of COVID-19 vaccines varies from one region of Nigeria to another and is influenced by different factors.

Objective: The study assessed the level of knowledge regarding COVID-19 vaccine, and the pattern of its uptake among adult residents of selected communities of Osun state, Southwest Nigeria.

Methods: A descriptive cross-sectional study was carried out among adult residents of five selected communities in Osun State. A structured questionnaire was used to obtain data from 972 respondents who were recruited through a multi-stage random sampling technique. The data was analyzed using descriptive and inferential statistics.

Results: Respondents' age ranged from 18 to 98 years with a mean of 58.4 ± 17.5 years. Close to two-thirds (626, 64.4%) were females. About one quarter (249, 25.6%) had received at least one dose of the COVID-19 vaccine while 13.1% had received two doses. Among the 723 who had not been vaccinated, the commonest reason (40.1%) was a lack of information on how to obtain the vaccine. Lower vaccination rate was associated with the female gender ($P < 0.001$), lower educational status ($P = 0.003$) and being unemployed ($P = 0.001$).

Conclusion: The uptake of the vaccine was low. The prevailing lack of information regarding vaccination sites should be addressed. Health education should be intensified towards correcting wrong beliefs about the COVID-19 vaccine.

Keywords: COVID-19, vaccine, uptake, acceptance, Nigeria, factors, adults

Introduction

Coronavirus disease commonly known as "COVID-19" is a worldwide disease affecting several countries as a result of the viral outbreak in China. Since 2020, more than 6 million individuals have died as a result of the COVID-19 epidemic, which has afflicted over 450 million people worldwide.[1]

In order to prevent the spread of COVID-19, a number of preventive measures were put in place, including the use of face masks, maintaining a safe distance, lockdowns and regular washing of hands. Although these strategies have shown to be somewhat helpful in limiting the spread of the virus, there was a need for more permanent containment interventions. In view of the fact that there has been no widely available definitive treatment for the disease, vaccination remains the most effective option. This requires the implementation of effective vaccination campaigns throughout the world with the aim of achieving 70% global vaccination rate in order to achieve a potential worldwide eradication of the disease.[2,3] In 2021, the Nigerian government had the goal to immunize at least 40% of its more than 200 million citizens by the end of 2021 and intends to reach the 70% mark before the end of 2022.[3] The Nigerian government has made a concerted effort to make the vaccines available. However, without an adequate level of acceptance and

uptake of the vaccines by the general populace, the intended goals cannot be achieved. As of the end of 2021, the country had four brands of COVID-19 vaccines received from the COVAX facility and the African Union: the African Union: AstraZeneca, Moderna, Pfizer, and Johnson & Johnson vaccines.[3] However, the two most widely in circulation are the AstraZeneca and Pfizer vaccines. There is a need to take a critical look at the factors that affect the uptake of COVID-19 vaccine since successful herd immunity largely depends on vaccination coverage in the community.

The uptake of the vaccine in Nigeria has been said to be associated with a pervasive level of hesitancy.[4] Some of the reasons influencing COVID-19 apathy include erroneous beliefs and concerns about the short and long-term effects of the vaccines.[3,5] A significant number of people especially in rural communities with religious inclinations are said to believe that the COVID-19 vaccination program is an anti-religious conspiracy.[6]

Most COVID-19 vaccine-related studies conducted in the country to date focused on the anticipatory willingness to accept the vaccine, the factors that influenced the eventual uptake, or otherwise, need to be more adequately investigated across the different segments of the population. Furthermore, there may be regional differences in the factors influencing the adoption of the COVID-19 vaccination.[3] This study, therefore, assessed the level of knowledge and factors that determine the uptake of COVID-19 vaccine among adult residents of selected communities of Osun state, Southwest Nigeria.

Methods

This study was carried out among adult residents of five selected communities in the Osun East senatorial district, Osun State, Nigeria, between December 2021 and January 2022. Osun, located in the Southwest, is one of the 36 states of the country. There are three senatorial districts in Osun state i.e.; East, West, and Central districts. The Osun East senatorial district was purposively selected for the study.

The minimum sample size of 576 was calculated using Fisher's formula with the following assumptions: 95% confidence level, an estimated prevalence of the event under investigation = 50%, desired precision = 5%, and design effect = 1.5. However, all consenting adults who responded to the invitation to participate were recruited leading to a total of 972 adult respondents.

Using a multistage sampling technique, five LGAs (Oriade, Ilesha East, Ife Central, Ife East, and Ife South) were randomly selected out of the 10 LGAs in the Osun East senatorial district. In each of the five LGAs, one community was purposively chosen for the study; which are Iloko Ijesha (Oriade LG), Igando-Ilesha (Ilesha East), Enuwa-Ife (Ife central), Ogbon Oya (Ife East) and Garage Olode (Ife South). A health education and screening outreach was conducted in each of the selected communities. It was publicized through mass media, religious gatherings (churches, mosques), and communities' association meetings. All the adults that attended the outreach programs were invited to participate in the survey. In each community, the permission of the traditional rulers and leaders was obtained.

Ethical clearance was obtained from the Ethical and Research Committee of the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife (protocol number: ERC/2022/03/04). A written informed consent was obtained from each respondent.

A structured questionnaire was used to obtain respondents' demographic data, medical history, and specific information regarding the COVID-19 vaccines including their knowledge and vaccination status. The types of vaccines available in the study area, at the time of data collection, were the AstraZeneca and Pfizer vaccines. Based on the general protocol, full vaccination requires the uptake of 2 doses of any of the vaccines. The respondents' anthropometric measures were also recorded.

The knowledge regarding COVID-19 vaccination was assessed with a 10-item knowledge scale. The questions were adapted from previous studies.[5,7] The correct and incorrect responses were scored as '1' and '0' respectively yielding a total score of 10. This was dichotomized into adequate and inadequate knowledge by using the median score. The reliability test for the scale yielded a Cronbach alpha coefficient of 0.7.

Data Analysis

Data was analysed using SPSS Version 20 and relevant descriptive and inferential statistics were performed.

The level of COVID-19 vaccine-related knowledge was categorized as high or low using the median knowledge score. Those with scores higher than the median score were categorized as high level of knowledge. The Pearson chi-square was used to determine the association between categorical variables and the level of statistical significance was set at $P < 0.05$.

Results

There were 972 respondents with ages ranging from 18 to 98 years with a mean of 58.4 ± 17.5 years and 46.8 % of them were between 51 to 70 years. Close to two-thirds of respondents (627, 64.5%) were females. (Table 1)

Table 1. Sociodemographic Characteristics

Variables	Frequency (n)	Percentage (%)
Sex		
Male	345	35.5
Female	627	64.5
Age		
<30	61	6.3
31-50	238	24.5
51-70	454	46.8
71>	218	22.5
Marital Status		
Single	59	6.1
Married	445	46.0
Separated	55	5.7
Divorced	143	14.8
Widowed	265	27.4
Educational Status		
None/informal	194	20.2
Primary	299	31.1
Secondary	281	29.3
Tertiary	186	19.4
Occupational Status		
Employed	100	10.4
Self-employed	664	69.0
Unemployed	45	4.7
Student	25	2.6
Dependent	78	8.1
Retired	50	5.2
Religion		
Christianity	732	78.0
Islam	202	21.5
Others	5	0.5
Place of Residence		
Rural	365	37.9
Urban	597	62.1
Monthly Income (N)		
<30,000	517	60.5
30,000-100,000	265	31.0
>100,000	72	8.5
Race		
Igbo	13	1.4
Hausa	40	4.2
Yoruba	907	94.3
Others	2	0.2

The knowledge scores among respondents ranged from 3 to 10 with a Median of 9.0 (interquartile range – 1). Out of the 901 who had complete responses to the knowledge items, 693 (76.9%) had adequate knowledge while 23.1% were categorized as having inadequate knowledge. The frequencies of correct and incorrect responses to each of the knowledge line items are shown in table 2.

Table 2. Covid-19 vaccine knowledge line items

S/N	QUESTION	CORRECT (%)	WRONG (%)
1	There is a disease called covid-19	96.9	3.1
2	Previous infection gives enough immunity, no need for vaccination	92.2	7.8
3	There are vaccines against covid-19	89.2	10.8
4	Covid-19 vaccines should be avoided because of serious negative health effect	95.2	4.8
5	I know the vaccination centres in my town	67.4	32.6
6	Available covid-19 vaccines are effective	85.8	14.2
7	The benefits of the vaccines outweigh the risk	84.5	15.5
8	Evil people want to use the vaccine to harm our health	85.5	14.5
9	After vaccination, I must continue observing preventive measures	81.8	18.2
10	Covid-19 disease does not exist	98.4	1.6

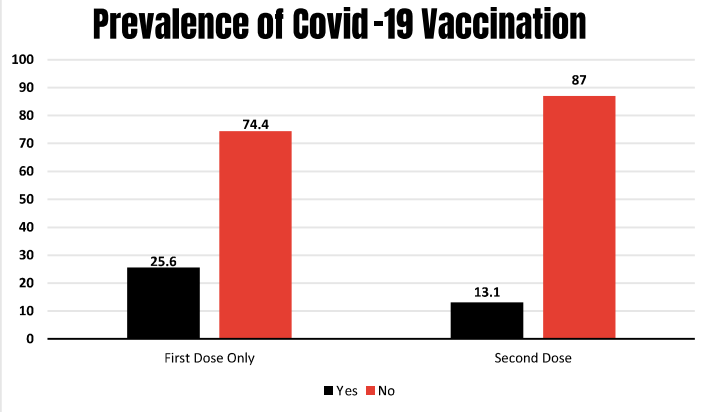

Figure 1. Prevalence of covid -19 vaccination among respondents

Figure 1 shows that about one quarter (249, 25.6%) had received at least one dose of the COVID-19 vaccine while 127 (13.1%) had received two doses. Among the 723 who had not been vaccinated, the commonest reason given (40.1%) was a lack of information on how and where to obtain the vaccine (Table 3).

Table 3. Reasons for Non -uptake of Vaccination Among respondents, (n=723)

Reasons	Frequency (n)	Percentage (%)
Side Effects		
Yes	25	3.5
No	698	96.5
Religious Belief		
Yes	22	3.0
No	701	97.0
I do not Believe Covid-19 Exists		
Yes	14	1.9
No	709	98.1
Immunity From Previous Covid-19 Infection		
Yes	5	0.7
No	718	99.3
Fear of Long-term Effect on My Health Such as Infertility, Shorter Life Expectancy		
Yes	41	5.7
No	682	94.3
I do not Know Where to Get it		
Yes	290	40.1
No	433	59.9

There was an association between the level of knowledge regarding COVID-19 vaccine and the uptake of the vaccine among the respondent (P < 0.001). (Table 4). About 98% of those who had low knowledge were yet to be vaccinated. Furthermore, based on sociodemographic factors, lower vaccination rate was associated with the female gender (P < 0.001), lower educational status (P = 0.003) and being unemployed (P = 0.001).

Table 4. Relationship Between Vaccination Status and Socio-Demographic Factors

Variables	Vaccination		Total	Statistical Test		
	Yes n (%)	No n (%)		X^2	df	P
Sex						
Male	114 (33.0)	231 (67.0)	345 (100)	15.368[a]	1	< 0.001
Female	135 (21.6)	492 (78.4)	627 (100)			
Marital Status						
Single	13(22.0)	46 (78.0)	59 (100)			
Married	127(28.5)	318 (71.5)	445 (100)			
Separated	15(27.3)	40 (72.7)	55 (100)	14.99[a]	4	0.005
Divorced	47(32.9)	96 (67.1)	143 (100)			
Widowed	47(17.7)	218 (82.3)	265 (100)			
Educational Level						
None/Informal	34(17.5)	160 (82.5)	194 (100)			
Primary	82(27.4)	217 (72.6)	299 (100)	13.895[a]	3	0.003
Secondary	69(24.6)	212 (75.4)	281 (100)			
Tertiary	63(33.9)	123 (66.1)	186 (100)			
Occupational Status						
Employed	39 (39.0)	61 (61.0)	100 (100)			
Self-Employed	159 (23.9)	505 (76.1)	664 (100)			
Student	15 (33.3)	30 (66.7)	45 (100)	21.054[a]	5	0.001
Unemployed	2 (8.0)	23 (92.0)	25 (100)			
Dependent	25 (32.1)	53 (67.9)	78 (100)			
Retired	7 (14.0)	43 (86.0)	50 (100)			
Religion						
Christianity	177 (23.0)	593 (77.0)	770 (100)	13.452[a]	1	0.000
Islam	72 (35.6)	130 (64.4)	202 (100)			
Hypertension (SBP≥ 140 and or DBP≥90)						
Yes	83 (25.5)	243 (74.5)	326 (100)	0.006[a]	1	0.936
No	166(25.7)	480(74.3)	646 (100)			
Diabetes Mellitus						
Yes	10 (19.2)	42 (80.8)	52 (100)	1.240[a]	1	0.265
No	239 (26.2)	674 (73.8)	913 (100)			
Obesity (BMI ≥ 25)						
Yes	131 (26.1)	371 (73.9)	502 (100)	1.325[a]	1	0.250
No	99 (29.7)	234 (70.3)	333 (100)			
Knowledge						
Low	4 (1.9)	204 (98.1)	208 (100)	54.28	1	<0.001
High	174 (25.1)	519 (74.9)	693 (100)			

Discussion

This study assessed the various factors affecting the uptake of covid-19 vaccines among residents of five communities in Osun State, Nigeria.

The prevalence of uptake of at least one dose of the COVID-19 vaccine in this study was 25.6% despite the availability of vaccines. This was very much higher than the national vaccination rate of about 17% as at the time of the study. This may be due to the fact that southwestern Nigeria, where the study was conducted, is the most advanced region of the country in terms of education and social enlightenment. In addition, vaccine hesitancy is historically lower in the southern region of Nigeria compared to the Northern.[8]

Even though the vaccine uptake in this study is higher than the national average, it is still abysmally low compared to the target set by the government to fully vaccinate at least 40% of its citizens against COVID-19 before the end of 2021, and 70% by the end of 2022.[3]

As had been previously reported [7], the findings showed a much lower uptake of the 2nd dose compared to the first dose. It is possible that some of the respondents were not due for the 2nd dose at the time of the study.

About three-quarters of the study participants were yet to be vaccinated. The commonest reason offered by these respondents was the lack of awareness of the processes put in place by the government, including information about the vaccination sites. This is essentially in consonance with findings from previous studies. [5,9]

It has been shown that access to information improves the acceptability of the vaccine.[10] This implies that a lot of effort is required toward public sensitization and dissemination of information regarding vaccination sites and processes in the country.

With regards to their general knowledge about COVID-19 vaccines, about one-quarter of the respondents were categorized as having inadequate knowledge. The potential impact of knowledge on acceptance and uptake of the vaccine is underscored by the fact that there was a significant association between COVID-19 vaccine-related knowledge and its uptake among the respondent in this study. There was a significantly greater level of uptake among the respondents with adequate knowledge. The importance of intensive public health education towards improving the knowledge of citizens regarding COVID-19 vaccines as a way of improving acceptance and uptake of the vaccine has been highlighted by previous authors, and cannot be overemphasized.[7,11]

Furthermore, findings also reveal that a lower vaccination rate was associated with the female gender, lower education status, and being unemployed. The lower rate of vaccination among females corroborates some reports from similar studies in Nigeria and other parts of the world.[7,11,12] The fact that a lower proportion of females received the COVID-19 vaccine could be a result of a more prevalent vaccine distrust, safety concerns, and fear of side effects on fertility, among women. [5,7]

With regards to the level of education, the lower uptake of the vaccine among those with low educational status has also been previously reported.[5] This may be because people with higher educational status may find it easier to understand and digest information regarding the vaccine with its importance and safety.

The findings from this study add to the emerging data on the uptake of COVID-19 vaccines in the country. However, even though the LGAs were randomly sampled, the specific communities and respondents used for the study were not randomly selected. This thus limits the ability to generalize the findings to the general population. Nevertheless, the study highlights important information that can guide further studies and appropriate interventions aimed at improving the COVID-19 vaccination rates.

Conclusion

The study showed that the uptake of the COVID-19 vaccine was low and the commonest reason for non-uptake was the lack of information regarding the vaccines and how to obtain them. This suggests the need for intensified public education. This must also be aimed at combating erroneous beliefs and fears.

Declaration of Conflicting Interests

The authors declare that there is no conflict of interest.

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