



Original Article

Covid-19 Vaccine Uptake: Awareness, Perception and Determinants of its Choice in a Semi-Urban Community in South-South Nigeria

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Abstract

Aim: The aim of this study is to assess the awareness, perception and determinants of choice of Covid-19 vaccine in a semi-urban community. **Methodology:** A cross-sectional analytical study was carried out among 323 residents of Okada Community, Edo state. Respondents were selected by cluster sampling technique. Okada has two wards (West and East) and Okada West was selected by simple random technique using computer generated random numbers. Enumeration area map of the selected ward was obtained and two of the three enumeration areas were selected using simple random sampling. Each of the two enumeration area formed a cluster and all the households in each of the selected clusters were listed. Structured, Pre tested, interviewed administered questionnaire was the tool used for data collection. Data was analyzed using IBM SPSS version 21.0 and level of significance was set at $P < 0.05$. **Results:** A total of 323 respondents participated in the study. Majority, 218(67.5%) of respondents believed in COVID-19 existence, 291(90.1%) were aware of the COVID-19 vaccine availability, 97(30.0%) believed COVID-19 vaccine was a biological weapon and 173(53.2%) were unwilling to take the vaccine however, 221(68.4%) of respondents were willing to take the vaccine if proven safe and effective. **Conclusion:** This study revealed the unwillingness of respondents to receive COVID-19 vaccine due to fear of death despite having good knowledge and perception on the COVID-19 vaccine. Government should increase awareness and health educates the people about the safety of covid-19 vaccine if COVID-19 is to be eradicated through vaccination.

Keywords: COVID-19, Awareness, Determinants, Perception, Vaccine, Okada.

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Introduction

COVID-19 is not only a global pandemic and public health crisis, it has severely affected the global economy and the financial markets, significant reductions in income, a rise in unemployment, disruptions in the transportation and services.¹⁻³ It is a highly transmissible and pathogenic viral infection caused by severe acute respiratory syndrome coronavirus 2 (SARS-Cov-2) formerly called 2019-n CoV which emerged in Wuhan, Hubei province in December, 2019 and has since spread around globally.^{2,4,5} Covid-19 is a zoonotic disease believed to have been passed from bats to other animals like snakes and pangolins and then to human.^{2,3} It spreads from person to person through infected air droplets that are projected during sneezing or coughing as well as through contact with contaminated surfaces or hands touching the face, mouth, nose or eyes.^{1,3,4} The SARS-CoV-2 is one of the three human coronaviruses causing severe forms of respiratory tract illness, with the other two being Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS).^{4,6,7}

Since its onset it has spread to distant countries with Italy being one of the worst hit and currently it affects over 219 countries and territories with the United States being the most affected country.^{8,9} There has been a rapid increase in the number of cases worldwide since the discovery of the disease such that there are over 107,403,870 cases currently recorded and still counting, with 2,350,983 deaths, and 79,310,412 recoveries as of 10th of February, 2021.^{4,5,9} On 14th February, 2020, the first African case was reported in Egypt and by April, 2020, Covid-19 had already affected 10,000 people in 52 African countries.^{4,9,10} In Nigeria, the Federal Ministry of Health (FMOH) in collaboration with the Nigeria Centre for Disease Control (NCDC) confirmed the first case of COVID-19 in Lagos state, on the 27th of February, 2020.^{4,8,9} By 9th of March, 2020, a second case of the viral disease was reported in Ewekoro, Ogun state and was described as a citizen who had contact with the index case.^{4,8} Since then, the disease spread has been on a tremendous increase, multiplying the number of confirmed cases to 141,447 with 23,998 active cases and still counting, 115,755 recoveries and 1,694 deaths as of 10th of February, 2021.^{8,9}

There is no specific cure yet for COVID-19, however, there are many on-going clinical trials to test various potential antivirals.^{9,10} Researchers around the world are working at record speed to find the best ways to treat and prevent COVID-19, from investigating the possibility of repurposing existing drugs to searching for novel therapies against the virus.^{3,7} Thus far, approaches to COVID-19 therapies generally include antivirals, immune modulators and other potential therapies which act in a different way or via multiple mechanisms.¹⁰⁻¹³ Among the antivirals, 'remdesivir' was initially approved by the Food and Drug Administration (FDA) and European Union (EU) for the treatment of Covid-19 in adults and adolescents with pneumonia requiring supplemental oxygen.¹⁴⁻¹⁶ However, on 20th November, 2020, the WHO issued a conditional recommendation against the use of 'remdesivir' in hospitalized patients, regardless of the disease severity as there is currently no evidence that it improves survival in patients.^{15,16} Other drugs like 'Ivermectin' an anti-parasitic agent with antiviral activity have been shown to have potentials in the treatment of Covid-19 and some countries in Latin America have authorized its use in the management of patients with Covid-19 even in the absence of solid evidence, however, several other countries are conducting clinical trials to this effect.^{14,15} Hydroxychloroquine an anti-malarial drug also used in the treatment of autoimmune disorders was initially given an emergency use authorization (EUA) by the FDA when clinical trials were not feasible.⁹ However, on 15th June, 2020, the FDA revoked its EUA for treatment of Covid-19 based on a large scientific study showing no benefits to patients treated with this drug and due to other safety issues.^{11,12} Studies suggest that antibodies generated through vaccination with the authorized vaccines do recognize these SARS variants,^{12,13} hence the importance of vaccination. Vaccines are known to save millions of lives each year as they prepare the immune system to recognize and fight off viruses and bacteria which they target within the body.^{11,12} As of 18th February, 2021, at least seven different vaccines across three platforms had been rolled out in different countries with vulnerable populations in all countries given

the highest priority for vaccination.¹³⁻¹⁵ A number of Covid-19 vaccines have been approved for general or emergency use in the Middle East and North Africa (MENA). However, the four main types of vaccines based on the method of exposure to the viral particles include the inactivated whole virus vaccine which are 'sinopharm' and 'sinovac', the mRNA vaccine which include 'pfizer-BioNTech' and 'moderna', the non-replicating viral vector which are 'Oxford-AstraZeneca', and 'Sputnik V' and the protein subunit type which is 'Novavax'; all requiring two doses of intramuscular injections.^{16,17} On 15th February, 2021, the WHO listed the Oxford-AstraZeneca COVID-19 vaccine for both emergency use and distribution via the COVAX facility.^{14,17} The African Regulatory Taskforce subsequently endorsed the WHO emergency use listing for this vaccine and the first shipments to Africa were initiated from the COVAX facility.^{15,16}

The approved vaccines are considered safe and effective as they have undergone the most intensive safety monitoring in the history of the United States.^{1,4,5} Some side effects may occur after the vaccination such as chills or tiredness, but the Centre for Disease Control (CDC) assures that these are normal signs of the body building protection and the effects should wear off in a few days.^{11,12} Africa is facing significant challenges in securing access to the Covid-19 vaccines needed to achieve the goal of vaccinating at least 60.0% of the continent's population.^{15,16} As of 15th March 2021, 23.6 million doses of vaccine were distributed in the continent, corresponding to a coverage of only 1.7% of the population and the Oxford-AstraZeneca vaccine allocated principally via the COVAX facility, accounts for 20.5 million (87.0%) doses out of the total and is thus the main vaccine used in Africa.¹⁶ As at the time of distribution of this vaccine to Africa, six European countries had already suspended the use of the Oxford-AstraZeneca vaccine (batch no. ABV5300) and 11 countries paused their AstraZeneca vaccination campaigns entirely.^{10,15,16} This was due to reports of blood clots and bleeding disorders following the use of this vaccine.^{10,16} On the 2nd of March, 2021, Nigeria received a part of the first wave of arrivals of the vaccine as 3.94 million doses of the Oxford-AstraZeneca COVID-19 vaccine, were shipped via the COVAX Facility.^{10,15} This was in a bid to meet up with the goal of equitable distribution of the COVID-19 vaccines globally as COVAX Facility intends to deliver at least two billion doses of COVID-19 vaccines globally with 600 million doses delivered to the African region by the end of 2021 covering only 20% of the population.^{10,15} The Nigerian government plans to vaccinate 40% of its populace by the end of year 2021 and 30% in the following year.^{1,2,4} However, adequate supplies of the vaccine poses as one of the challenges to be tackled, as the 3.94 million doses of the vaccine supplied would cover only about 1.95% of Nigeria's population.^{15,17}

Other limitations to the achievement of this goal of vaccination are rooted in the willingness of the populace to agree to be vaccinated.^{18,19} This may be influenced by the people's concerns about the possible short term and supposed long term adverse effects attributed to the reception of the COVID-19 vaccine such as the information that the vaccines cause blood clots, modify one's DNA/RNA, or it is a biological weapon and some of the other information propagated by the social media may hinder uptake despite the effort of the government to vaccinate the population against the COVID-19 disease.^{14,16,20,21} As this pandemic continues to ravage the world, the safety practices put in place to curb its spread do not appear to bring a lasting solution to this menace. A vaccine however, provides the best hope for a permanent solution in the control of the pandemic but the people's confidence in the transparency of the government in ensuring procurement of authorized and effective vaccines, potential risks, skepticism and concerns for safety of the vaccine, may affect the acceptance.^{19,20,22} Hence, the study to assess the awareness, perception and determinants of choice of COVID-19 vaccine will serve as factors that influence the willingness to accept the vaccine as a formidable tool in the eradication of this pandemic.

Methodology

A cross-sectional analytic study was carried out among 323 residents of Okada Community, Edo state. Respondents were selected by cluster sampling technique based on the wards and enumeration areas. Okada community has two wards (Okada West and East) and Okada West was selected by simple random technique using computer generated random numbers. The enumeration area map of the selected ward was obtained from the National Population Commission and two of the three enumeration areas of Okada West were selected using simple random sampling by balloting. Each of the two enumeration area formed a cluster and all the households in each of the selected clusters were listed.

Data was collected with the aid of an interviewer administered questionnaire in Okada community. The data was assessed for completeness, serialized, coded and entered into SPSS version 21.0 for analysis. The results were presented in frequency tables, charts and prose. Means were compared using t-test and bivariate analysis was done using chi-squared test. A $p < 0.05$ was considered statistically significant. The information obtained was based on self-reporting and therefore subject to information bias. Ethical clearance was obtained from the Ethic and Research Committee of Igbinedion University Teaching Hospital, Okada, Edo State (Ethic clearance number: IUTH/R.24/VOL.1/34C) and permission from the district head before administration of the questionnaire. Confidentiality was assured by informing respondents that personal information would not be divulged. Written and informed consent was obtained from all respondents. All data in hard and soft copies were stored safe, sealed away and passworded.

Structured, Pre tested, interviewer administered questionnaire was the tool used for data collection. Data was analyzed using IBM SPSS version 21.0 and level of significance was set at $P < 0.05$.

Limitation to study: No further diagnostic or confirmatory tools were used to confirm or refute the crude findings generated from the used General Health Questionnaire and as such, the awareness, perception and utilization of virtual learning may be over or underreported.

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Conflicts of interest: There are no conflicts of interest.

Result

Table 1: Awareness Of Covid-19 Vaccines Among Respondents

Variables	Frequency	Percent (%)
Awareness of Covid-19 vaccine	n = 323	
Yes	291	90.1
No	32	9.9
Source of information of Covid-19 vaccine*	n = 291	
Radio/TV	171	53.0
Internet/Online	77	24.0
Health Workers	26	8.0
Social Media	22	6.8
Family/Friends	17	5.2

School	10	3.0
Awareness of Covid-19 vaccine in Nigeria		
Yes	211	72.4
No	80	27.6
Knowledge of individual that received Covid-19 vaccine		
Yes	180	61.9
No	111	38.1
Received Covid-19 vaccine		
Yes	79	27.2
No	212	72.8
Reason for not received Covid-19 vaccine*		
Fear of Death	56	23.8
Busy schedule	54	23.0
Do not belief existence	42	17.9
Insincerity of Government	38	16.2
Side Effect	29	12.3
Contraction of Virus After Vaccination	16	6.8
Belief Covid-19 vaccine is safe and effective against Covid-19		
Yes	153	52.6
No	138	47.4
Knowledge of side effect of Covid-19 vaccine		
Yes	131	44.9
No	160	55.1
Side effect of Covid-19 vaccine*		
Fever	48	14.9
Headache	45	13.9
Body Pains	19	5.9
Body Weakness	16	5.0
Infertility	5	1.5

Blood Clotting	4	1.2
Fatigue	4	1.2
Death	4	1.2

***Multiple Responses**

Most, 291(90.1%) of the respondents were aware of the COVID-19 vaccine, 171(53.0%) of the respondents' sources of information about COVID-19 vaccine were Radio/Television, 211(72.4%) knew COVID-19 vaccine was available in Nigeria, 180(61.9%) knew individuals who had received COVID-19 vaccine and only 79(27.2%) of the respondents had received the COVID-19 vaccine. Higher proportion 56(23.8%) of the respondents had not received the COVID-19 vaccine as a result fear of Death, 54(23.0%) due to their busy schedule, 42(17.9%) did not believe existence of the disease, 38(16.2%) insincerity of government and 8(6.8%) of the respondents did not receive the vaccine due to fear of contracting the virus after the vaccination.

Over half, 153(52.6%) of respondents believed COVID-19 vaccine was safe and effective against COVID-19, 160(52.6%) had no knowledge of side effects of COVID-19 vaccine while fever 48(14.9%) headache 45(13.9%) were the major side effects of Covid-19 vaccine.

Table 2: Perception Of Covid-19 Vaccine Among Respondents

Variables	Frequency (n = 323)	Percent (%)
Belief that an individual can be infected from reception of the COVID-19 vaccine		
Yes	107	33.1
No	216	66.9
Belief that COVID-19 vaccine causes Infertility or Miscarriage		
Yes	64	19.8
No	259	80.2
Belief that COVID-19 vaccine can alter DNA or Genetic make up		
Yes	63	19.5
No	260	80.5
Belief that COVID-19 vaccine contains Microchips or Tracking Devices that control the body		
Yes	81	25.1

No	242	74.9
Belief that COVID-19 vaccine is a biological weapon made by China to kill Africans		
Yes	97	30.0
No	226	70.0

Majority, 241(74.6% of the respondents had a good perception of the COVID-19 vaccine, 107 (33.1%) believed that an individual can be infected with COVID-19 from reception of Covid-19 vaccine, 64(19.8%) believed that COVID-19 vaccine can cause infertility or miscarriage and 63(19.5%) believed that COVID-19 vaccine can alter their DNA or genetic makeup.

Above a fourth 81(25.1%) of respondents believed that COVID-19 vaccine contains microchips or tracking devices that control the body while 97(30.0%) of respondents believed that COVID-19 vaccine is a biological weapon made to kill Africans.

Table 3: Socio-Demographic Characteristics Of Respondents And Intake Of Covid-19 Vaccine

Variable	Yes (%)	No (%)
Age		
18 - 25 years	42(44.7)	52(55.3)
26 -35 years	25(19.8)	101(80.2)
36 - 45 years	8(14.5)	47(85.5)
46 - 55 years	9(29.0)	22(71.0)
> 55 years	4(23.5)	13(76.5)
	$X^2=22.545$	$p = 0.001^*$
Sex of Respondents		
Male	51(30.2)	118(69.8)
Female	37(24.0)	117(76.0)
	$X^2=1.538$	$p = 0.215$
Level of Education		
No Formal Education	0(0.0)	9(100.0)
Primary School	4(8.3)	44(91.7)
Secondary School	8(10.1)	71(89.9)
Tertiary	76(37.4)	111(62.6)
	$X^2=42.549$	$p = 0.001^*$

Religion of Respondents

Christianity	62(24.8)	118(75.2)
Islam	26(55.3)	21(44.7)
African Traditional Religion	0(0.0)	26(100.0)
	$X^2=29.179$	$p = 0.001^*$

Occupation of Respondents

Doctor	17(81.0)	4(19.0)
Pharmacist	9(69.2)	4(30.8)
Nurse	4(50.0)	4(50.0)
Student	25(30.5)	57(69.5)
Security Agent	8(29.6)	19(70.4)
Civil Servant	17(16.0)	46(84.0)
Trader	8(12.7)	55(87.3)
Artisan	0(0.0)	4(100.0)
Farmer	0(0.0)	32(100.0)
	$X^2=105.045$	$p = 0.001^*$

***Statistically Significant**

Higher proportion 42(44.7%) of the respondents who had received Covid-19 vaccine were within the age group of 18-25years, the Covid-19 vaccine intake decreased with age and this association was statistically ($p = 0.001$). More 51(30.2%) of male of the respondents had received the COVID-19 vaccine than 37(24.0%) the females and it was not statistically significant ($p = 0.215$). Majority 26(55.3%) of the Muslims had received the COVID-19 and the association was statistically significant ($p = 0.001$). Higher proportion 46(37.4%) of respondents with tertiary level of education had received the vaccine and the intake of Covid-19 vaccine increased with educational level of the respondents and most 17(81.0%) of the respondents who were medical doctors had received Covid-19 vaccine and the intake of the vaccine was higher among the healthcare workers and the least were traders, artisans and farmers. These associations were statistically significant ($p = 0.001$).

Table 4: Socio-Demographic Characteristics Of Respondents And Willingness To Take The Covid-19 Vaccine If It's Safe And Effective

Variable	Yes (%)	No (%)
Age		
18 - 25 years	65(69.1)	29(30.9)
26 -35 years	95(75.4)	31(24.6)

36 - 45 years	30(54.5)	25(45.5)
46 - 55 years	23(74.2)	8(25.8)
> 55 years	8(47.1)	9(52.9)
	$X^2=11.830$	$p = 0.019^*$
Sex		
Male	117(69.2)	52(30.8)
Female	104(67.5)	50(32.5)
	$X^2=0.108$	$p = 0.743$
Level of Education		
No Formal Education	0(0.0)	9(100.0)
Primary School	18(37.5)	30(62.5)
Secondary School	42(53.2)	37(46.8)
Tertiary	161(86.1)	26(13.9)
	$X^2=76.290$	$p = 0.001^*$
Religion		
Christianity	175(70.0)	75(30.0)
Islam	42(89.4)	5(10.6)
African Traditional Religion	4(15.4)	22(84.6)
	$X^2=43.675$	$p = 0.001^*$
Occupation of Respondents		
Doctor	21(100.0)	0(0.0)
Pharmacist	13(100.0)	0(0.0)
Nurse	8(100.0)	0(0.0)
Student	70(85.4)	12(14.6)
Security Agent	17(80.6)	4(19.4)
Civil Servant	46(69.7)	20(48.0)
Trader	28(44.4)	35(55.6)
Artisan	0(0.0)	4(100.0)

Farmer	5(15.6)	27(84.4)
	$X^2=123.860$	$p = 0.001^*$

***Statistically Significant**

Majority 95(75.4%) of the respondents in the age group of 26-35years were willing to take the COVID-19 vaccine if it was safe and effective against COVID-19, more 117(69.2) of the male respondents were willing to take the COVID-19 vaccine if it was safe and effective against COVID-19 than the female respondents and the association was not statistically significant ($p = 0.743$). Most 42(89.4%) of Muslims were willing to take the COVID-19 vaccine if it was safe and effective against COVID-19 and the association was statistically significant ($p = 0.001$). Most 106(86.2%) of the respondents with tertiary level of education were willing to take the COVID-19 vaccine if it was safe and effective against COVID-19 and the willingness to take the COVID-19 vaccine if it was safe and effective against COVID-19 increases with increasing level of education and this association was statistically significant ($p = 0.001$). All the healthcare workers, doctors 21(100%) pharmacists 13(100%) and nurses 8(100%) of nurses were willing to take the COVID-19 vaccine if it was safe and effective against COVID-19 than the non-healthcare workers in this study and the association was statistically significant ($p = 0.001$).

Table 5: Socio-Demographics And Willingness To Take The Covid-19 Vaccine If Assured Of Its Safety And Effectiveness By Friends And Neighbours Who Had Taken The Vaccine

	Yes (%)	No (%)
Age		
18 - 25 years	69(73.4)	25(26.6)
26 -35 years	83(65.9)	43(34.1)
36 - 45 years	26(47.3)	29(52.7)
46 - 55 years	31(100.0)	0(0.0)
> 55 years	8(47.1)	9(52.9)
	$X^2=29.903$	$p = 0.001^*$
Sex		
Male	105(62.1)	64(37.9)
Female	112(72.7)	42(27.3)
	$X^2=4.104$	$p = 0.043^*$
Level of Education		
No Formal Education	0(0.0)	9(100.0)
Primary School	27(56.3)	21(43.8)
Secondary School	46(58.2)	33(41.8)
Tertiary	144(77.0)	43(23.0)

	$X^2=37.799$	$p = 0.001^*$
Religion		
Christianity	171(68.4)	79(31.6)
Islam	38(80.9)	9(19.1)
African Traditional Religion	8(30.8)	18(69.2)
	$X^2=19.787$	$p = 0.001^*$
Occupation		
Doctor	8(38.1)	13(61.9)
Pharmacist	13(100.0)	0(0.0)
Nurse	8(100.0)	0(0.0)
Student	78(95.1)	4(4.9)
Security Agent	13(61.9)	8(38.1)
Civil Servant	42(63.6)	24(34.4)
Trader	33(52.4)	30(47.6)
Artisan	0(0.0)	4(100.0)
Farmer	5(15.6)	27(84.4)
	$X^2=114.643$	$p = 0.001^*$

***Statistically Significant**

All 31(100%) of the respondents in the age group of 46-55years were willing to take the vaccine if family/friends/neighbours who had taken the vaccine against Covid-19 assured them of its safety and effectiveness, more 112(72.7%) female respondents were willing to take the vaccine if family/friends/neighbours who had taken the vaccine against Covid-19 assured them of its safety and effectiveness and majority 38(80.9%) of Muslims were willing to take the vaccine if family/friends/neighbours who had taken the vaccine against Covid-19 assured them of its safety and effectiveness. Majority 102(82.9%) respondents with tertiary level of education were willing to take the vaccine if Family/Friends/Neighbours assured them of its safety and effectiveness and willingness to take the vaccine if family/friends/neighbours who had taken the vaccine against Covid-19 assured its safety and effectiveness increases with increasing level of education and this was found to be statistically significant ($p = 0.001$). All pharmacists 13(100%) and nurses 8(100%) 78 (95.1%) were willing to take the vaccine if family/friends/neighbours who had taken the vaccine against Covid-19 assured them of its safety and effectiveness and the association was statistically significant ($p = 0.001$).

Table 6: Socio-Demographics And Willingness To Take The Covid-19 Vaccine If Assured Of Its Safety And Effectiveness By Religious Leaders

	Yes (%)	No (%)
Age		
18 - 25 years	65(69.1)	29(30.9)
26 -35 years	60(47.6)	66(52.4)
36 - 45 years	31(56.4)	24(43.6)
46 - 55 years	27(87.1)	4(12.9)
> 55 years	13(76.5)	4(23.5)
	$X^2=23.108$	$p = 0.001^*$
Sex		
Male	97(57.4)	72(42.6)
Female	99(64.3)	55(35.7)
	$X^2=1.603$	$p = 0.205$
Religion		
Christianity	135(54.0)	115(46.0)
Islam	43(91.5)	4(8.5)
African Traditional Religion	18(69.2)	8(30.8)
	$X^2=24.171$	$p = 0.001^*$
Level of Education		
No Formal Education	9(100.0)	0(0.0)
Primary School	32(66.7)	16(33.3)
Secondary School	51(64.6)	28(35.4)
Tertiary	104(55.6)	83(44.4)
	$X^2=9.096$	$p = 0.059$
Occupation		
Doctor	4(19.0)	17(81.0)
Pharmacist	3(23.1)	10(76.9)
Nurse	3(37.5)	5(62.5)
Security Agent	13(61.9)	8(30.9)

Civil Servant	31(39.2)	48(60.8)
Student	20(24.4)	62(75.6)
Trader	51(81.0)	12(19.0)
Artisan	4(100.0)	0(0.0)
Farmer	23(71.9)	9(28.1)
	$X^2=71.464$	$p = 0.001^*$

***Statistically Significant**

Majority 27(87.1%) of the respondents within the age group of 46 – 55years were willing to take the vaccine if their religious leader assured them of its safety and effectiveness, more 99(64.3%) females were willing to receive than the males 97(57.4%) and it was statistically significant ($p = 0.205$) and most 43(91.5%) Muslims were willing to receive the Vaccine if their religious leader assured them of its safety and effectiveness and the association was statistically significant ($p = 0.001$). All 9(100.0%) of respondents with no Formal Education were willing to take the Vaccine if their religious leader assured them of its safety and effectiveness and the willingness to take the vaccine if their religious leader assured them of its safety and effectiveness decreases with increasing level of education, however, this finding was not statistically significant ($p = 0.059$).

All 4(100.0%) of the artisans and other non-medical respondents, trader 51(81.0%) and farmer 23(71.9%) were willing to take the Vaccine if their religious leaders assured them of its safety and effectiveness than the medical respondents and the association was found to be statistically significant ($p = 0.001$).

Discussion

The need to study awareness, perception and determinants of choice of Covid-19 vaccine uptake cannot be overemphasized. An understanding of the determinants of uptake will guide government in prioritizing effective communication channels, addressing the concerns of the citizens, and ensuring easy access to vaccines. Majority of the respondents were aware of Covid-19. This finding was similar to a study conducted in Sudan and Nigeria where a higher proportion of the respondents were aware of Covid-19 vaccine.²³⁻²⁶ The source of information on Covid-19 in this study were from the mass media, internet, family/friends and social media. This level of awareness is remarkable and elucidates the huge role played by the mass media in keeping the society abreast with the onset and evolutionary trends of the Covid-19 pandemic. This is consistent with the earlier findings across some West Africa countries where they reported that important information sources were mass media, internet, family and friends.^{27,28} But differs from a study conducted in North Central Nigeria and Zambia where their main source of information on Covid-19 vaccine were through social media and lesser proportion through mass media such as television and radio.^{21,24} In addition, healthcare workers and government sources are more likely to provide reliable information on vaccines to the general public, especially in this era of pandemic-related misinformation. Having more exposure to information on the Covid-19 vaccines from credible sources makes individuals more likely to get vaccinated.^{29,30}

Majority of the respondents were aware of the COVID-19 vaccine and also knew that it was available in Nigeria. This knowledge was to a large extent attributed to the mass media especially the radio and television.^{17,20} This may be because, earlier-on in the course of the pandemic, there was a halt in regular

activities such as those involving commerce, social gathering, travelling, visitation and others during the period of the lockdown. This took its own toll on the people but on a positive note, it piqued the interest of the people towards paying close attention for any information on Covid-19 as well as anticipates the arrival of a permanent solution to the pandemic.^{17,20,24,28} This probably accounts for the higher proportion of those who were up-to-date on the availability of the Covid-19 vaccine in Nigeria. This finding was in agreement with similar studies done in Nigeria, Zambia, Bangladesh, Ethiopia, Kuwait, Saudi Arabia and India where most of the respondents were aware of the availability of Covid-19 vaccines.^{21,29-32}

Below a third of the respondents had not received the Covid-19 vaccine yet but above half of the respondents believed that the Covid-19 vaccine was safe and effective against Covid-19. This finding was inconsistent with studies conducted in Nigeria and Senegal that showed that about two-thirds of the respondents had not obtain the Covid-19 vaccine and 9% out rightly refused the vaccine.^{33,34} Empirical evidence showed a low vaccination rate in Nigeria compared with other countries. For instance, the most recent report by “Our World in Data” revealed that only 4.5% of Nigerians had received one dose while a lower proportion (2.1%) had been fully immunized as of 27th December 2021.¹⁶ In comparison, full immunization rates were 26.6% in South Africa, 1.7% in Mali, 5.3% in Senegal, and 7.3% in Kenya.¹⁶ The low levels of COVID-19 vaccine uptake may hamper pandemic control efforts in Nigeria more so the country missed the 70% vaccine coverage targeted June, 2022 by the WHO.¹⁶ The reasons for the low Covid-19 vaccination rate observed in this study and perhaps in Nigeria overall are multi-factorial which include fear of death from intake of the vaccine, fear of contracting the disease from intake of vaccine, fear of its possible side effects, lack of awareness on availability of the vaccine and having a very busy schedule. Additionally, the low uptake could be due to the existing and widely circulated conspiracy theories regarding Covid-19 causation in Nigeria.^{20,22,28} Many Nigerians are still doubtful of the existence of the disease, as they believe that the virus is caused by 5G technology and cannot survive in the hot Nigerian weather.^{26,27} Many believed that Covid-19 is being promoted by political leaders to give them the platform to further loot the national treasury.^{26,27} Also, some prominent Nigerian religious and political leaders have openly condemned Covid-19 vaccination acceptance. The religious leaders believe the vaccine is a mark of the anti-Christ and so warn their followers against acceptance.^{26,27} Generally, the uptake of the Covid-19 vaccine can be linked to the awareness level, information sources, perception of individuals and the refusal of the people to receive the Covid-19 vaccine may serve as a deterrent to the attainment of good health and well-being for all which is a fundamental part of the sustainable development goal 3.^{33,34} A high proportion of the respondents had no knowledge of the side effects of Covid-19 vaccines however, most of them reported fever, headache, body pain, body weakness and blood clots as the side effects of Covid-19 vaccine. Earlier on, there had been reports of blood clots and bleeding disorders following the use of Covid-19 vaccine in the European countries.^{16,19,35,36} However, the CDC assured that the known potential benefits of this vaccine outweighed its potential risks for those recommended to receive it.¹⁶ Most vaccines usually produce side effects in a small number of people and just like most vaccines, the common side effects of Covid-19 vaccines are usually mild including fatigue, nausea, headache, soreness, fever or chills and usually last for a short period of time or like a few others, may cause severe anaphylactic reactions but the CDC suggests that this type of reaction only occurs in two to five people per million vaccinated.¹⁶ This misinformation regarding the side effects of Covid-19 vaccine among the respondents, may be as a result of the novelty of Covid-19 and the rapidity which with the Covid-19 vaccines were produced.^{35,36} This may influence the people’s intentions towards possible vaccination as well as the Nigerian government’s plans to vaccinate almost half of its populace by the end of year 2021 and some more in the following year¹³ which is in line with the sustainable development goals on providing good health and well-being and reducing inequalities, SDG 3 and SDG 10 respectively.

Persons aged 60 years or more maybe more likely to be vaccinated against COVID-19 and this could be linked to the fact that older persons were more likely to have severe symptoms if they contract the disease.^{17,21,22} Hence, they may appreciate the urgent need to get vaccinated. However, more respondents who had received Covid-19 vaccine were within the age group of 18-25years, the Covid-19 vaccine intake decreased with age and this association was statistically ($p = 0.001$). This finding was inconsistent with the findings of many other studies which reported that younger people were less keen to take the vaccine as compared to older persons.^{17,24,25} A higher proportion of males had received the Covid-19 vaccine compared to the females. This finding differed from a study conducted in United States where more than half of the proportion of those who had received the first dose of the vaccine were women.¹¹ Most of the respondents did not believe that Covid-19 vaccine can alter their DNA or genetic makeup while a few others believed that Covid-19 vaccine can alter their DNA or genetic makeup. It has been reported that Covid-19 vaccines do not in any way interact with our DNA.¹⁴ Few respondents believed that Covid-19 vaccine contains Microchips or Tracking Devices that control the body. The illiteracy level in this population may attribute to the poor perception of the Covid-19 vaccine in this population hence the need for the Government/community leaders to implement the SDG-4 by providing quality education in an attempt to raise the literacy level which would impact on the reception of the vaccine as a measure in halting the spread of the Covid-19 pandemic. Majority of the respondents did not believe that Covid-19 vaccine was a biological weapon to kill Africans, although most of the respondents with no formal education, respondents within the age group 55 years and above, females, Christians and Muslims believed that Covid-19 vaccine was a biological weapon made to kill Africans. This may be due to misinformation that may have influenced the people's confidence and intentions towards possible vaccination.^{18,19,27,33,36} However, the government and public health experts must take the necessary measures according to the local culture to achieve higher vaccination acceptance and encourage positive intention toward Covid-19 vaccination. Education was a significant factor associated with vaccine uptake in this study as educated respondents were more likely to be vaccinated. This is not unexpected as education has been reported as a significant predictor of Covid-19 vaccination in some past studies.^{34,37,38} In addition education is a major social determinant of health since it influences individuals' perception of risk, health seeking behavior and utilization of health services.^{27,33,36} An educational framework must also be produced for the general population conveying the risks of vaccine delay or avoidance as it can then reduce governmental efforts to control the pandemic. Ultimately, a transparent educational and social campaign portraying social benefits of vaccination is critical to alleviate the detrimental pandemic effects.^{27,30,31} This would go a long way in actualizing quality education for all (SDG-4). Over two thirds of the respondents were willing to take the Covid-19 vaccine if it is safe and effective. This showed that respondents are willing to take the vaccine if proven safe and effective. This finding was similar to studies conducted in Nigeria and some Africa countries where majority of respondents were willing to take the Covid-19 vaccine.^{3,21,25,28,31} Majority of the respondents were willing to take the vaccine if family/friends/neighbours who had taken the Covid-19 vaccine assured them of the safety and effectiveness of the vaccine and almost same proportion of the respondents were willing to receive the Vaccine if their religious leaders assured them of the safety and effectiveness of the vaccine. This finding was similar to a study conducted in Indonesia that showed almost all the respondents were willing to accept Covid-19 vaccine good efficacy (95.0%), recommended by family members (67.0%) and recommended by religious leaders (50.0%) of the efficacy.³⁹ This showed that in order for this nation to increase uptake of the Covid-19 vaccine and ensured fulfilment of good health and wellbeing (SDG3), it may need to engage the community leaders, stakeholders in various sectors, Churches, Mosques and the entertainment industries if the government will be successful in the fight against Covid-19 through vaccination.

Conclusion

Majority of the respondents in this study had a good knowledge on COVID-19, its vaccine and the availability of the vaccine in Nigeria. A higher proportion of the respondents had good perception of the COVID-19 vaccine as majority of them did not believe that COVID-19 vaccine was a biological weapon made by China to kill Africans, however, over two thirds of respondents were yet to receive the COVID-19 vaccine because they believed that taking the vaccine could result in death. Age, Sex, Religion, Level of Education, Safety and Effectiveness of the vaccine were found to be determinants in the choice of receiving COVID-19 vaccine.

Recommendation

It is imperative to the government with other respective stakeholders to invest resources to promote vaccination uptake and target all the vaccine misconceptions and fears. Furthermore, the government should have to play a key role in implementing vaccination by making a compulsory vaccination policy.

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