

Determinants for Acceptance of COVID-19 Vaccine among Nigerians

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Abstract

Aim

To assess the degree and determinants of COVID-19 Vaccine among Nigerians

Materials and methods

Following appropriate ethical protocol, a population-based cross-sectional study conducted from November 2020 to January 2021 using a pretested, self-administered questionnaire from a previous study adapted to suit the Nigeria setting and distributed among Nigerians aged 18 years and above. The country was grouped in to three regions: East, North and West representing the major ethnic groups in Nigeria. Participants were recruited based on six different catchments: residential, marketplace recreational areas, cooperate organizations, schools, and Faith-based organizations. Information obtained include socio-demographics, medical history related pertinent to COVID-19, level of knowledge, risk perception, and attitudes towards of COVID-19 and the vaccine amongst others. Descriptive and inferential statistics were done on the variables and results were summarized into percentages and associations noted.

Results

A total of 358 responses were obtained out of the 120 questionnaires distributed in each of the three regions of which. The mean age of respondents was 32years ($\pm 11.2SD$). Igbo and Yoruba were the major ethnic groups comprising 38% and 31% of study participants respectively. Three-quarter had tertiary education, 43% of them were civil servants and professionals, 34% of them were unemployed, and 8.9% of them were roadside traders. Majority (66.2%) were willing to accept the approved vaccine with male gender, identifying as Christian, Hausa ethnicity and living in the northern Nigeria had a significant positive association with COVID-19 vaccine uptake.

Conclusion

two out of three Nigerian adults indicated interest in accepting the corona virus vaccine. This calls with critical stakeholders and leaders at all levels to be involved in public education based on sound evidence and the discouragement of the spread of conspiracy theories to eliminate the negative associated factors will reduce vaccine hesitancy and increase COVID-19 vaccination rates in Nigeria.

Introduction

The coronavirus disease (COVID-19) was first reported in Wuhan province of China in December 2019 and had spread rapidly throughout the globe and has since attained pandemic status. It was first reported in Nigeria on February 27, 2020. Around the same period experts projected that Nigeria will likely become the pandemic's epicentre in Africa.¹ Contrary to these projections, the disease ran a relatively less severe course in countries south of latitude 35⁰ north, within which the whole of sub-Saharan Africa falls.² This

has been true even for Nigeria as the case fatality rate remained low. As at March 2020, the World Health Organization published a CFR of 3–4%. In the West African sub-region, the average CFR is 3.9%.³ Nigeria has CFR of 2.8% at the same date. This is likely much lower if testing was more widespread.³ Despite the wide speculations that Africa will be worst hit by this virus due to its weak healthcare systems and relatively higher population density, the predicted catastrophe never occurred.⁴ With the second wave of the COVID-19 pandemic, the CFR in Nigeria has further decreased to 1.2% as at Feb 2021.⁵ In Nigeria, a little over 1.6 million tests (0.8% of the population) have been conducted with about 10% confirmed positive.⁴

A recent study by Lawal et al explored the reasons the fatality of COVID-19 in Africa is ironically lower than that of other advanced countries which have better healthcare systems.⁶ He observed that factors such as low pre-COVID-19 era '65yr + mortality %', population median age, and relatively lower life expectancy in Africa were associated with lower fatality.

Unfortunately, in spite of the daily exponential increases in recorded cases in Nigeria, there is a growing body of anecdotal evidence that many Nigerians do not believe in the existence of the pandemic. This is due in part from low trust levels in government and a plethora of conspiracy theories surrounding the virus and vaccine development by influential Nigerian political and religious leaders.⁷ The surprisingly low CFR has also contributed to the attitude of Nigerians and Africa at large towards the existence of this virus.⁵

A vaccine is a live or attenuated antigen used to stimulate antibody production to provide immunity against disease causing pathogens like bacteria and viruses. Vaccination is considered to be one of the most potent preventive strategies against infectious diseases.⁸ However, acceptance and coverage are vital determinants for a successful immunization or vaccination program.⁹ Globally, with the approval and rollout of several efficacious and safe vaccines against SARS-Cov-2, there have been an attendant epidemic of misleading information surrounding potential vaccines candidates. This is not limited to Nigeria alone, several media reports suggests distrust in the United States and some countries in the European Union has become a major obstacle to wider vaccine coverage.^{10–12} Researchers at Yale University found that only 67% of the Americans they surveyed are willing to be vaccinated against COVID-19 prior to any vaccine was approved.⁹ However in Nigeria, there is mixed feeling, so much distrust, apathy and disbelief in the course of the evolution of this pandemic also same with vaccine related issues.^{7,13} Despite these reactions, an online survey in Nigeria conducted just before the first ever vaccine was approved reported that 58.2% of respondents would receive the vaccine once available while 19.2% and 22.6% respectively were not willing to accept and indecisive.¹⁴ Male gender and favourable perception towards the vaccine positive determinant for uptake in the study.

The purpose of this study is to assess the degree of acceptance of a vaccine among Nigerians, provide education on the scientific basis of a coronavirus vaccine and guide policy makers and other stakeholders as the work towards vaccinating their population.

Methods

We conducted a cross-sectional study across three regions Eastern, Northern and Western Nigeria over a period of three months, October to December 2020. The study participants were adults aged 18 years and above. We used the Open Epi^R software (Emory)¹⁵ to generate the required minimum sample size of 340 for a population of one million and above.

Our data collection instrument was a pretested, self-administered questionnaire from a previous study adapted to suit the Nigeria settings. The questionnaire was divided into five sections comprising participants' socio-demographics, medical history, knowledge of COVID-19, risk perception on COVID-19 and personal attitudes to COVID-19 vaccine.

We recruited 120 participants from each zone. We made efforts to obtain our data from catchment areas such as residential, hospital environment, work place, recreational areas, worship centres and local markets.

Scales of Measurement

Three multiple choice questions (totalling 10 options) were asked to assess respondents' knowledge about transmission of the COVID-19 virus. The scale was called the viral transmission knowledge scale (Cronbach alpha = 0.62). A maximum score of 10 was achievable. These responses had reverse meaning; higher scores reflected poorer knowledge of viral transmission.

We assessed the knowledge of participants about the 11 common symptoms and signs of COVID-19 as publicly available on the Nigeria Centre for Disease Control (NCDC) website as well as 8 additional symptoms documented in literature. This formed the Symptom Knowledge Scale (Cronbach alpha = 0.86) A maximum score of 19 was attainable and higher scores depicted better knowledge of features of the disease.

Universally acceptable measures to prevent contracting or spreading COVID-19 was also examined in the study. Questions included handwashing, use of hand sanitizers, physical distancing, healthy diet etc. This scale was termed Preventive Measures Knowledge Scale (Cronbach alpha = 0.61). Correct responses had a score of 1 while incorrect responses had 0 to make a total score of 19 with regards to knowledge of preventive measures.

A previous study had assessed COVID 19 risk perception among Adults in the United States having developed a perceived risk scale (Cronbach's alpha =0.72).⁹This risk scale was validated for the study and locally adapted. Thereafter, respondents completed the validated perceived risk scale (Cronbach's alpha =0.63) which had 10 survey items (5-point Likert Scale: 0 = strongly disagree/ disagree/neutral; 1 = agree/strongly agree). The scoring of the perceived risk perception scale, which ranges from 0 to 10, was calculated by summing the participants' responses of "Agree" and "Strongly Agree" to 10 survey-items. The greater the number a participant receives on this scale, the greater their perceived risk of COVID-19.

Data Analysis

The Statistical Package for Social Sciences (SPSS inc. Chicago Illinois USA) version 22 was used for data analysis. We reviewed and cleaned the data before the analysis. Variables were summarized using simple frequencies, proportions and percentages. Inferential statistics (chi square test) and bivariate regression analysis were used to test factors associated with acceptance of COVID 19 vaccine. A 95% confidence interval was adopted and level of significance set at $p < 0.05$.

The study was approved by the Ethical Committee of the Research and Statistics Department of Kastina State Ministry of Health, Nigeria and the study protocol code was MOH/ADM/SUB/1152/1/16.

Results

A total of 358 out of 360 participants completed the survey, giving a completion rate of 99.4 percent. Participants were made up of 169 (47%) males and 189 (53%) females with a mean age of 32years ($\pm 11.2SD$). Igbo and Yoruba were the major ethnic groups comprising 38% and 31% of study participants respectively. Most of them (75%) attained tertiary level of education with 8.9% of them being roadside traders, 34 % of them were unemployed, of those employed 43% were civil servants and professionals in white collar jobs. Most of the respondents live in the northern and western regions of the country. The mean risk perception score for COVID-19 was 5.1 ($\pm 2.2SD$) with a possible maximum of 10 while the mean COVID-19 symptom knowledge score was 8.6 ($\pm 4.1 SD$) with a maximum score of 19. The mean preventive measure knowledge score was 10.8 ($\pm 2.0SD$) with a maximum score of 14. Table 1

shows the socio-demographic characteristics of the survey participants.

Table 1
Socio-demographic characteristics of respondents

Variable	Frequency (N = 358)	Percentage (%)
Sex		
Male	169	47
Female	189	53
Age group(years)		
</=30	189	52.8
31–45	123	34.4
46–60	39	10.9
60+	7	1.9
Tribe		
Hausa	55	15.4
Igbo	136	38.0
Yoruba	111	31.0
Others	56	15.6
Level of Education		
No formal education	14	3.9
Primary	8	2.2
Junior Secondary	6	1.7
Senior Secondary	62	17.3
Tertiary	268	74.9
Region of Residence		
West	128	35.8
East	111	31.0
North	119	33.2
Religion		
Christianity	284	78.3
Islam	73	20.4
Others	1	0.3

Of all the participants surveyed, 237(66.2%) people said they will take the COVID-19 vaccine if it is recommended by healthcare workers or health agencies like World Health Organization (WHO), Nigerian Centers for Disease Control (NCDC) or the National Primary Healthcare Development Agency (NPHCDA), while only 71 people (19.8%) said they will take the vaccine regardless of who recommends it. About 203(56.7%) said they will recommend the vaccine to other people.

There was association between gender and COVID-19 acceptance if recommended by a health worker or agency being higher in males (73.9%) when compared to females (62.9%). We noted a statistically significant difference in acceptance of the vaccine among the major ethnic groups of Nigeria with vaccine acceptance being highest among Hausas (84.9%) and lowest among Igbos (59%). There was an association between recommendation of COVID-19 vaccine to others and tribe of respondents. Both COVID-19 vaccine acceptance and Recommendation of COVID-19 vaccine to others were associated with region of residence as seen in Table 2.

Table 2

Association between selected demographic variables, COVID-19 vaccine acceptance, and Recommending COVID-19 vaccine to others

Variable	I will take COVID-19 vaccine if recommended by a health worker or health agency		I will recommend COVID-19 vaccine to others	
	No n(%)	Yes n(%)	No n(%)	Yes n(%)
Gender				
Female (183)	68 (37.1)	115(62.9)	84 (45.9)	99 (54.9)
Male (165)	43 (26.1)	122 (73.9)	61 (37)	104 (73)
	$\chi^2 = 4.920$	P-value = 0.027*	$\chi^2 = 2.848$ = 0.091	P-value
Level of Education				
No formal education	6 (46.2)	7 (53.8)	7 (53.8)	6 (46.2)
Primary	2 (28.6)	5 (71.4)	6 (85.7)	1 (14.3)
Junior Secondary	0 (0)	6 (100)	1 (16.7)	5 (83.3)
Senior Secondary	21 (35)	39 (65)	27 (45)	33 (55)
Tertiary	83 (31.6)	180 (68.4)	105 (39.9)	158 (60.1)
	$\chi^2 = 4.322$	P-value = 0.364	$\chi^2 = 8.513$ = 0.074	P-value
Ethnic Group				
Hausa	8 (15.9)	45 (84.1)	16 (30.2)	37 (69.8)
Igbo	54 (40.9)	78 (59.1)	65 (49.2)	67 (50.8)
Yoruba	32 (29.4)	77 (70.6)	50 (45.9)	59 (54.1)
Others	18 (32.7)	37 (67.3)	15 (27.3)	40 (72.7)
	$\chi^2 = 12.119$	P-value = 0.007*	$\chi^2 = 11.454$ 0.01*	P-value =
Religion				
Christianity	101 (36.2)	178 (63.8)	123 (44.1)	156 (65.9)
*Significant at P < 0.05				

Variable	I will take COVID-19 vaccine if recommended by a health worker or health agency		I will recommend COVID-19 vaccine to others	
Islam	11 (16)	58 (84)	23 (33.3)	46 (66.7)
Others	0 (0)	1 (100)	0 (0)	1 (100)
	$\chi^2 = 10.892$ P-value = 0.004*		$\chi^2 = 3.350$ P-value = 0.187	
Region of Residence				
West	42 (36.2)	74 (63.8)	61 (53.0)	54 (47)
East	44 (43.1)	58 (56.9)	51 (49.5)	52 (50.5)
North	20 (17.2)	96 (82.8)	30 (25.6)	87 (74.4)
	$\chi^2 = 18.440$ P-value = 0.001*		$\chi^2 = 20.926$ P-value = 0.001*	
*Significant at P < 0.05				

Discussion

Majority (66.2%) of respondents were willing to take the COVID-19 vaccine if recommended by authorised professionals. This was similar to 67% figure reported by Malik et al. in Yale but higher than 58.2% earlier reported in Nigeria by Olomofe et al.^{9,14} The figure from our study and Malik et al. were lower compared to the findings by Abdulhafiz et al in Egypt where 73% were looking forward to get the COVID-19 vaccine when available (this was done prior to the first vaccine approval).^{9,16} Since the ultimate aim of vaccination is to achieve herd immunity, the figure from our study and the one reported by Olomofe et al. fell short of the minimum 75% vaccination rate needed to achieve the herd immunity among the population. This is with the assumption that there is going to enough vaccine doses procured to vaccinate 150 million Nigerians. Additionally, given the efficacy of vaccines approved so far range between 62 to 95%, at least 75 to 95% vaccination coverage is required to achieve herd immunity.¹⁷ Care should equally be taken in interpreting the estimated acceptance rate as they do not automatically translate to actual average vaccination rates as many other factors not considered in this work influence the actual vaccination. This figure is however an important pointer that critical stakeholders need to do more in terms of vaccine awareness and education to improve the uptake as it is being rolled out, including teasing out sensational news on perceived side effects from hard scientific evidence. A distinct picture from this study is the fact that even though an overall 86% of our participant indicated they would take the vaccine the majority of them would do so on the recommendation of respected individuals or institutions like healthcare workers or health agencies. This can be correlated to the fact that healthcare workers have shown to have better knowledge and understanding of the COVID-19 infection.¹⁸ As reported by Malik et al. Potential vaccine takers have highest confidence in healthcare professionals and their personal physician and health institutions like the CDC and WHO.⁹ Vaccine education, by those with

better understanding of the net benefits of vaccination against SARS-Cov-2 is extremely important in combating the hesitancy that may be seen in the general population. These tasks should not be left to healthcare providers alone, it must also come from the cross-section of religious, traditional, and political leaders who are revered and respected in society.¹⁹

Three-quarter (75%) of participants in this survey had a minimum of tertiary education. The majority of those in this category indicated that they will take the vaccine either through recommendation or not. From this study, any level of education is positively associated with increased vaccine uptake, and this was similar to the findings among the US population that showed that acceptance of COVID-19 vaccine increases with increasing years of education and similar finding was reported in a systematic review on the determinant of the 2009 pandemic A/H1N1 influenza vaccination.^{20,21} This present study and the a similar report here in Nigeria are consistent with the fact that level of education had no significant association with uptake of COVID-19 vaccine.¹⁴ The positive association between the level of education and vaccine uptake found in this study is consistent with what was reported in a previous study on polio vaccine uptake by mothers for their children. There was a higher odd among women with no education of their child not being vaccinated for polio.²² According to a multinational European survey on influenza vaccination uptake, the effects of education varied from one country to another. In Australia and Poland, influenza vaccination was higher among educated people whereas a contrary trend was observed among educated persons in Germany and Finland.²³ This further validates the earlier suggestion that there are other factors that influence vaccine uptake.

Our study is consistent with the influence of education on vaccine uptake in comparison to Olomofe et al. and Malik et al. studies, in that, even though our data collection methods differs from theirs, we still obtained similar educational representation among the study participants.^{9,14} By default, online surveys will naturally exclude people who do not have access to the internet which is more than half of the Nigerian population as the estimated internet penetration in Nigeria is 46.6%.²⁴ This potential source of selection bias had already been eliminated the traditional method of data collection.

There was a significant association between vaccine acceptance or uptake and male gender, tribe/ethnicity, religion and place of residence. Olomofe et al. reported similar finding of significant male influence of potential uptake of COVID-19 vaccine.¹⁴ The interplay of multiple socio-economic status on acceptance of COVID-19 vaccine in this study mirrors what others have reported both in Nigeria and other climes.^{9,14,16,18} As with our study, Malik et al. reported a significant relation between vaccine acceptance and race/ethnicity, with being Black/African American and American Indian as independent predictors.⁹

Conclusion

Covid-19 vaccine rollout was commenced in later March 2021 in Nigeria among priority frontline and essential workers. The vaccination hesitancy remains a potential obstacle against the prompt distribution and administration among the citizens. Our study has shown that being male, Christianity, Hausa and

living in the northern part of the Country all have significant positive association with COVID-19 vaccine uptake. This should guide the policy makers and all stakeholders in their awareness campaign strategies.

Declarations

Ethics approval and consent to participate

The study was approved by the Katsina State Ministry of Health, and a consent was obtained from all study participants.

Consent for publication

Not applicable

Availability of data and materials

The original dataset generated for this manuscript is available on request to the corresponding author, Dr. Ugochukwu Eze.

Competing interests

The authors have no competing interests.\

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Authors' Contributions

Dr. Kingsley I. Ndoh: Concept, study design and overall manuscript editing

Dr. Ugochukwu A. Eze: Design of data collection tools, ethical review application, overall research management

Dr. Babalola A. Ibbisola: Data analysis

Dr. Chinemerem D. Onwuliri: Interviews with participants and manuscript writing.

Dr. Adenakan Osiyemi: Data analysis

Dr. Nnamdi Ude: Interviews

Dr. Amalachukwu A. Chime: Interviews with participants

Dr. Eric O Ogbor: Interviews with participants

Dr. Adegboyega O. Alao: Interviews with participants

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