Determinants of Uptake of COVID 19 Vaccine Among Health Workers in Tertiary Institutions in Anambra State

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Abstract

BACKGROUND

The coronavirus disease 2019 (COVID-19) pandemic led to the development of various vaccine candidates at a speed never seen before in global health as such that Pfizer-BioNTech's COVID-19 vaccine was approved by the United States FDA within nine months. While these advances were ongoing, there was an alarming rate of disinformation about the virus and the vaccines being circulated around which affected people's view and eagerness to get vaccinated, this was seen more in minority groups. In Nigeria, the wave of vaccination hesitancy was happening against the backdrop of landmark pharmaceutical litigations such as the 2007 Pfizer trovafloxacin lawsuit in the country.

AIM: Assessing the determining factors of the COVID-19 vaccine's acceptability among Nigerians.

MATERIALS AND METHODS: Employing the use of an adapted pretested questionnaire designed by Amyn Malik and colleagues, a cross-sectional study based on population was conducted from 10th November 2021 to 20th November 2021 adapting a similar study carried out at the Yale University School of Public Health by Amyn Malik and co. The participants were selected through random selection from corporate and community sites obtained from Google Maps in the three regional zones of Nigeria (two Tertiary Institution in Anambra State). The Information obtained includes; medical history related to COVID-19 and attitudes toward COVID-19 and the vaccines, socio-demographics, level of knowledge and risk perception. Descriptive and inferential statistics were carried out, and the results were summarized into associations and percentages. The level of statistical significance was set at a p-value of <0.05. Using the open EpiR package (Emory), a minimum of 720 participants for 80% statistical power was determined.

RESULT: From two Tertiary Institution in Anambra State, a total of 716 responses were obtained of which 378 (53%) were females. The percentage (66.2%) of the participants who would take the approved vaccination was higher. The mean COVID-19 symptom knowledge score of the participants was 8.6 (±4.1 SD) out of 19 while the participants score for the mean risk perception score for COVID-19 was 5.1 (±2.2 SD) out of 10. Variables such as being male, identifying as Christian, Igbo ethnicity, and living in Urban Town of Anambra, Nigeria had a statistically significant relationship with the willingness to get vaccinated.

Keywords: COVID 19 VACCINE, HEALTH WORKERS, TERTIARY INSTITUTIONS

Introduction

The coronavirus disease 2019 (COVID 19) was first reported in the Wuhan province of china in December 2019 before it spread rapidly through the globe but it was first reported in Nigeria on February 2020[1]. During that period, experts speculated that Nigeria will more likely become the pandemics epicenter in Africa[1,2] but contrary to these speculations, the pandemics had a relatively less severe run in Nigeria and in most sub-Saharan African countries which falls in the South of latitude 35^0 north[1,2]. By March of 2020, the World Health Organization (WHO) released a case fatality rate (CFR) of 3-4%. In the West African sub-region, the average CFR is 3-9%[1-3]. In February 2021, Suleiman et al estimated the CFR in Nigeria using polynomial regression models to be 3.0%

(95% CL: 2023-3.4%)[4]. This estimate could have been lower if there was widespread testing[1,4]. Despite the projections that African countries would be hit the worst hit by the disease ascribing to its poor healthcare systems and relatively higher population density, the projected disaster is yet to happen[5]. As of September 24th, 2021, about 3 million (1.5% of the populations) COVID-19 tests were conducted, confirming about 6% to be positive[6]. Similarly, uptake of the COVID-19 vaccine remained relatively low as about 1.58 million (0.8%) people have been fully vaccinated as of September 24th, 2021[6]. Despite the duly exponential increase in recorded cases of the pandemic in Nigeria, it can be noted that many Nigerians doubt the existence of the disease. The attitude of Nigerians and Africans at large towards the existence of this virus can be attributed to lack of trust in the government and the surprising low CFR[7].

A vaccine is live or attenuated antigen used to stimulate antibody production to provide immunity against pathogens like bacteria and virus[1]. Vaccination has been proven to be one of the most effective preventive measures against infectious diseases[8]. However, the determining factors for a vaccination program to be successful is acceptance and coverage[9]. Following the approval and distribution of some safe and efficient vaccines against severe acute respiratory syndrome coronavirus (SARS-Cov-2), multiple waves of misleading information about the approved COVID-19 vaccines has been spreading[1]. However, this misleading information is not limited to Nigeria alone[1], there has been several reports from the media insinuating that there is growing distrust in European countries and United States which has been a major challenge in achieving wider vaccine coverage[10-12].

Malik et al. at Yale University found that only 67% of the Americans they surveyed showed willingness to take the COVID-19 once it was approved[10-12]. This proportion has seen improvement since then[9,13]. Surveys conducted by Geo Poll showed that vaccine hesitancy has decreased following the roll out of vaccines in a number of African countries[14].

As of 2021, the percentage of vaccinated Nigerians was about 1.5%[7]. There are different thoughts about the facts established on the evolution of the pandemic and the safety and efficacy of the vaccine [15].

Regardless of the reactions of Nigerians to pandemics and vaccines, 58.2% of respondents from an online survey conducted before the approval of first ever vaccine were willing to be vaccinated when it was rolled out while 19.2% and 26.6% of the respondents[16] were unwilling or indecisive respectively

The purpose of this study is to determine the rate of acceptance of the approved COVID-19 vaccinations among Nigerians, and the determining factors that influence the decision to get vaccinated. The findings of this study are intended to support health policymakers, donor agencies, and other critical stakeholders to implement evidence-based strategies that are likely to be effective in encouraging people to get vaccinated and to ultimately increase vaccine uptake as more doses become available in Nigeria.

Materials and Methods

Study Area

Anambra State is in the South East of Nigeria and one of 36 States in Nigeria. The estimated population of Nigeria is 206 million people[17].

Study design and participants

We conducted a cross-sectional study across two tertiary institutions, Chukwuemeka Odimegwu Ojukwu Teaching Hospital (COOUTH) and Nnamdi Azikiwe University Teaching Hospital over 10 days from November 10, 2021 till 20th November 2021. We used the open Epir package (Emory) to generate the required minimum sample size of 680 for a population of one million and above[18].

We recruited 720 participants in total, 360 from each institution. In the institutions, the human resources or desk officer were contacted to grant permission to grant access to visit the eligible participants and interview them in the institution.

Health workers include all persons working in tertiary Institutions they were partitioned into three: Junior Civil Servant, Intermediate and Senior Civil Servants.

Study participants include health workers who were aged 18 years and older at the time of data collection. The study criteria for excluding participants were health workers who were below 18years, and those who had difficulty understanding the scope for the study after explanations were made. Twenty medical students were recruited and trained to distribute and interpret the questionnaires, 10 for each institution.

Study Tool

The tool for the data collection was a pretested questionnaire designed for a similar study in the US adapted to suit Nigerian setting [10]. The pretested questionnaire was split into five sections including the participants demographic, socio-demographic, behavioral and personal attitudes to the measurement scale, knowledge of COVID-19, medical history, risk perception on contracting COVID-19.

To assess the respondent's knowledge on the transmission of the coronavirus disease, questions with three multiple-choice (totaling 10 option) were asked. The scale was called the viral transmission knowledge scale (Cronbach's alpha =0.62). The maximum score to be achieved was 10. The responses have a reverse meaning; getting higher scores reflected the participant had poorer knowledge of viral transmission.

The participants were assessed on the knowledge of the 11 common symptoms and signs of COVID-19 culled from the Nigeria Centre for Disease Control (MCDC)[6]. This formed the knowledge scale (Cronbach's alpha = 0.86). The maximum score attainable was 19 and getting higher scores reflected better knowledge of the disease.

Universally accepted measures of prevention, contraction and spread of the COVID-19 were assessed. The questions included healthy dieting, using sanitizers, maintaining physical distance and hand washing and others. This scale was termed the preventive measures knowledge scale (Cronbach's alpha = 0.61). In regards to the knowledge of preventive measures, correct responses had the score of 1 while the score for incorrect response was 0 giving a total score of 19.

A perceived risk perception scale (Cronbach's alpha = 0.72)[9] was developed and used for a previous study that assessed the pandemic risk perception of adults in the US. The risk scale was validated and adapted for local use. Afterwards, the respondents completed the adapted perceived risk perception scale (Cronbach's alpha = 0.63), which had 10 survey items (five-point Likert scale: 0 = strongly disagree/disagree/neutral; 1= agree/strongly agreed). The scoring of the perceived risk perception scale, which ranges from 0 to 10, was calculated by summing the participant, responses of "Agree and strongly Agree to 10 survey items. The higher the score a participant attained on the scale, the higher their perceived risk of COVID-19.

Data Analysis

For data analysis, the social sciences statistical package, version 22 (IBM SPSS Statistics, Armonk, NY) was used. The data was cleaned and reviewed before it was analyzed. Simple frequencies, proportions and percentages inferential statistics (Chi-square Test) were used to obtain summarized variables and factors associated with acceptance of COVID-19 vaccine were tested with bivariate analysis. A significance level set a PL 0.05 and 95% confidence interval were adopted.

Results

A total of 716 out of 720 participants completed the survey, giving a completion rate of 99.4%.

Variable	Frequency	Percentage
	(N = 716)	(%)
Sex		
Male	338	47
Female	378	53
Age group (years)		
<30	342	47.8
31–40	200	27.9
41–50	100	14
51–60	54	7.5
>60	20	2.8
Tribe		
Ibo	704	84.4
Others	112	15.6
Level of education		
No formal education	28	3.9
Primary	16	2.2
Junior secondary	12	1.7
Senior secondary	124	17.3
Tertiary	536	74.9
Occupation		
Junior Civil servant	356	49.4
Intermediate Civil Servant	58	8.1
Senior Civil servant	302	42.2
Religion		
Christianity	714	98.7
Others	1	0.3

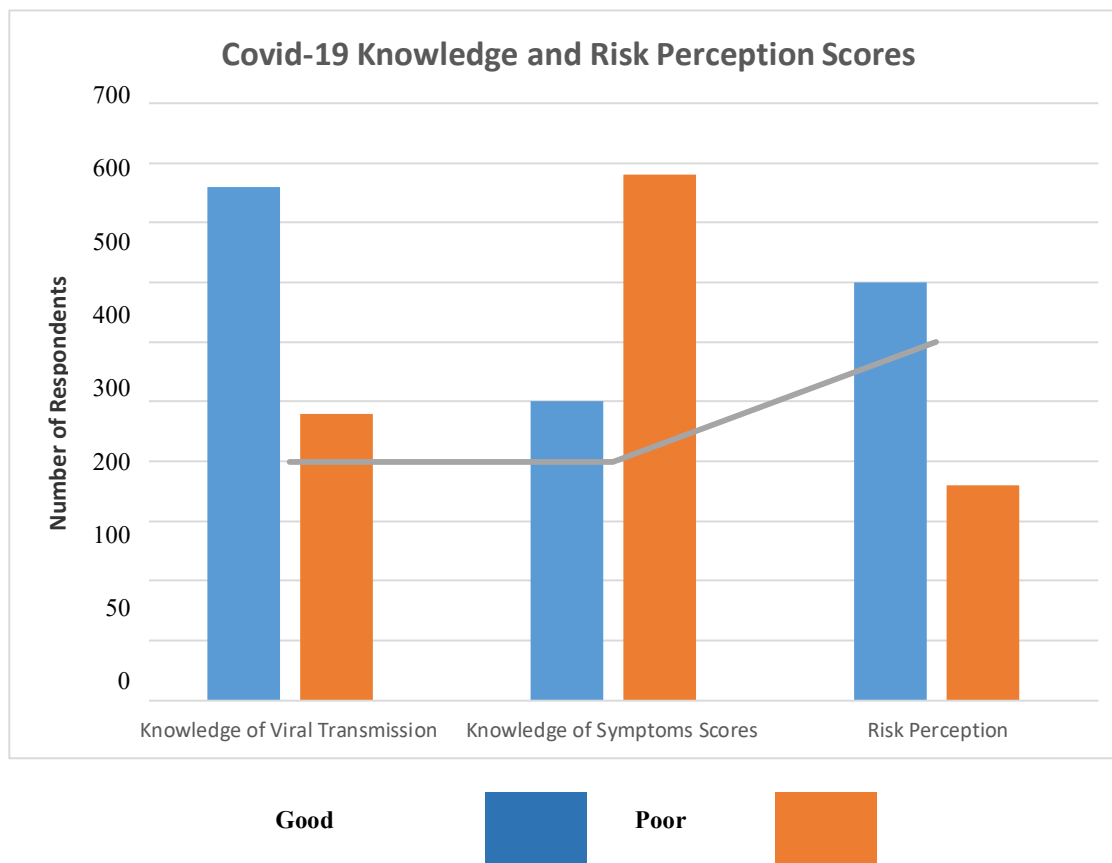**Table 1: Sociodemographic Characteristics of Respondents**

Fig 1: Knowledge of Viral Transmission, Symptoms Score and Risk Perception Score

Of all the participant surveyed, two of them reported they would take the COVID-19 vaccine if it is recommended by health care workers or health agencies like WHO, MCDC, or the National Primary Healthcare Development Agency (NPHCDA). In contrast, only 142 people (19.8%) said that they will take the vaccine regardless of who recommends it. About 406 (56.7%) of the participant said they will recommend the vaccine to other people.

There was a statistically significant association between male gender and COVID-19 acceptance if recommended by health worker (73.9%, P-value 0.027) similarly, we noted that participants of Igbo were more likely to take to take the vaccine if recommended by a health worker (84.9%, P-value = 0.007). The recommendation of COVID-19 vaccine by a health work on senior grade level.

And the 2 tertiary institutions where we recruited our participants were associated with vaccine acceptance as summarized in Table 2

Variable	I will take the COVID-19 vaccine if recommended by a health worker or health agency		I will recommend the COVID-19 vaccine to others	
	No	Yes	No	Yes
	n (%)	n (%)	n (%)	n (%)
Sex				
Female (366)	136 (37.1)	230 (62.9)	168 (45.9)	198 (54.9)
Male (230)	86 (26.1)	244 (73.9)	122 (37)	208 (73)
	$\chi^2 = 4.920$	P-value = 0.027*	$\chi^2 = 2.848$	P-value = 0.91
Level of education				
No formal education	6 (46.2)	14 (53.8)	14 (53.8)	12 (46.2)
Primary	4 (28.6)	10 (71.4)	12 (85.7)	2 (14.3)
Junior secondary	0 (0)	12 (100)	2 (16.7)	10 (83.3)
Senior secondary	42 (35)	78 (65)	54 (45)	66 (55)
Tertiary	166 (31.6)	360 (68.4)	210 (39.9)	316 (60.1)
	$\chi^2 = 4.322$	P-value = 0.364	$\chi^2 = 8.513$	P-value = 0.074

Table 2: Association between selected demographic variables, COVID-19 vaccine acceptance, and recommending COVID-19 vaccine to others.

P-values less than 0.05 are statistically significant.

Discussion

There are similarities in the percentage of people that are not hesitant to uptake the vaccinations for COVID-19 in this study and the study conducted by Malik et al at Yale which it was reported to be 67%, it is higher than the percentage reported earlier in Nigeria which is at 58.2% by Olumofe et al.[10,17]. The percentage from this study and that of Malik et al. when compared to the percentage from the study by Abdelhafiz et al. in Egypt are lower. In Egypt, 73% were looking forward to getting the vaccinations for COVID-19 when it's made available (this data was collected before the approval of the first vaccine)[10,19]. Achieving a herd immunity is the ultimate aim of vaccination therefore the estimate from this study and the study reported by Olumofe et al. didn't meet the minimum 75% vaccination rate required in achieving herd immunity among the population. This is with the projections that there will be enough vaccine doses available to vaccinate at least 150 million Nigerians. Also, to achieve a herd immunity, a percentage of 75-95 people is required to receive the vaccination given that the efficacy rate of the approved vaccines is (62-94.5%)[20]. It should be noted when reporting the estimated acceptance rate and interpreting the rate that they do not reflect the actual average vaccination coverage. Factors that could affect the average vaccination coverage are; availability of vaccines, cost of going to vaccination site and the proximity. In terms of increasing vaccine awareness and sensitization, the data acquired from this study can be used as important indicator that there's need for vital stakeholders to do more for improvement of the vaccination as it is being distributed which could include releasing sensational news on assumed side effects from factual scientific evidence. A clear picture that can be noted from this study is the fact that even though an overall 66.2% of our participants indicated they are willing to receive the vaccination, many of them would do so on the recommendation of respected figures like the health agencies and healthcare workers[21]. As reported by Malik et al., people who would likely take the vaccine are assured by the information from the healthcare professionals, physicians, and health institutions like the CDC and WHO[10]. This goes to show that vaccine education passed by individuals perceived to have better understanding of the net benefits of vaccination against SARS-Cov-2 is very beneficial in combating the unwillingness that may be seen in the general Nigerian population. These sensitizations should not be done by healthcare providers alone, it should also come from the cross-section of religious, traditional, and political leaders who are revered and respected in society[22,23].

Vaccine uptake has also been shown to be affected by the educational status of the population. Data from a systematic review on the determining factors of the 2009 pandemic A/H1N1 influenza vaccination were consistent with this study and similar studies done elsewhere[24,25]. The positivity in the association between the levels of education and willingness to receive vaccinations also share similarities studies done on the unwillingness to receive polio vaccinations. Different studies have shown that women with no educational

background were less likely to vaccinate their child for polio[26]. According to a study on influenza vaccination in European countries, the association between educational status and receiving vaccination varied from one country to another[27]. In Poland and Australia, those with higher educational background had higher vaccination uptake whereas in counties like Germany and Finland, the reverse was the case[27]. This validates the earlier suggestion that the influence of education on vaccine uptake could be affected negatively by other factors.

Other notable factors that affected the rate of vaccination significantly were male gender, religion, place of residence and also tribe/ethnicity. Olumofe et al. gave similar data on the significant male influence of potential COVID-19 vaccination[17]. This study reports the ways which different levels of socio-economic statuses can influence the acceptance of COVID-19 vaccines and it mirrors what other studies have reported both within and outside Nigeria[9,16,19,21]. Similarly to this study, Malik et al. reported a significant association between ethnicity/race and receiving vaccination, the independent variables being American Indian and Black/African American[10]. This discourages a uniform message for different races/ethnicity on COVID-19 and vaccines by health policymakers instead, more targeted messaging should be encouraged.

One important improvement that was employed for this study from the study by Malik et al. was the approach used in collection of data. The estimated percentage of Nigerian internet population is 46.6% showing that majority of the Nigerian population lack access to the internet therefore online survey will create a sample collection bias by default[28], thereby making this source of sample collection bias to be eliminated in this study. For this study, a multistage stratified sampling technique was used for this population as described in the methodology. However, the stratification to an extent led to limitations in the inclusion of some formal groups of the general population. Additionally, due to funding restraints, the lack of stratification to the recognized geopolitical zones in Nigeria likely introduced some bias. For example, about 91% of our participants had at least a secondary school education, which is not in keeping with a lower adult literacy level in Nigeria. While we made efforts to avoid bias, as outlined in our sampling methodology, given our limited resources, there was still some degree of bias in the results obtained, thus affecting its representativeness of the general population.

Conclusion

Over 60% of Nigerians are willing to take the COVID-19 vaccines if recommended by health workers. We found male gender, religion and ethnicity to positively influence the willingness of Nigerians to get vaccinated against COVID-19. It is recommended that there should be support for the health practitioners to enable sensitization beyond the confines of the hospital to create awareness to the general public in corporate organizations, education centers, marketplaces and religious houses on the safety and efficacy of vaccinations.

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