

Acceptability of Covid-19 Vaccine among Frontline Health Care Workers in North Central and South Western, Nigeria

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ABSTRACT

OBJECTIVE: To explore the acceptability of COVID-19 vaccines among frontline health workers in Nigeria.

METHODOLOGY: A descriptive cross-sectional multi-centre survey was conducted among 115 randomly selected frontline health workers in two tertiary health facilities; Federal Medical Centre Abeokuta (South-Western, Nigeria) and University of Ilorin Teaching Hospital (North Central, Nigeria). The inclusion criteria were Frontline Healthcare Workers over the age of 18 years who gave consent for the study, while other hospital workers were absent from work and those unwilling to participate in the study. Data analysis was done using SPSS version 23.

RESULTS: Accordingly, 59.1% of respondents accepted to be vaccinated with the COVID-19 vaccine when it becomes available. The level of acceptance increased with the effectiveness and safety of the vaccine. More respondents were also willing to wait 6 months to receive the vaccine than those willing to accept the vaccine at the moment. The age of respondents was statistically significant in the willingness to accept the vaccine.

CONCLUSION: The acceptability of the COVID-19 vaccine among health workers increased with the effectiveness of the potential vaccines as well as the duration of vaccine usage. Trusted policymakers can be used for advocacy in combatting the misinformation on COVID-19 vaccines.

KEYWORDS: COVID-19, Vaccine-acceptability, Frontline-Health-workers, vaccine-efficacy, Vaccine-misinformation, pandemic

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INTRODUCTION

The coronavirus disease 2019 (COVID-19) was first identified in the Wuhan region of China and has since been reported in almost all countries in the world. It has become a major public health emergency. This pandemic disease has affected 114,823,613 (over one hundred and fourteen million) individuals and caused 2,545,439 (over two million, five hundred thousand) deaths globally by end of February 2021^{1,2}. Nigeria has recorded 155,657 cases and 1,907 deaths as of the end of February, 2021³. To effectively control the coronavirus pandemic, several public health measures such as social distancing, wearing of face coverings, hand washing with soap and water or alcohol-based gel, limiting the number of individuals at public events and educating the members of the public have been instituted. The administration of efficacious vaccines is also emerging as an essential component in extenuating morbidity and mortality from the disease¹.

The genetic sequence of SARS-CoV-2, the coronavirus that causes COVID-19, was published on 11 January 2020. The huge negative impact of the pandemic is currently leading to the evaluation of new

vaccine technology platforms to fast-track the production of an effective vaccine. The first COVID-19 vaccine candidate entered human clinical testing with unprecedented rapidity on 16th March 2020. A remarkable facet of the development of the COVID-19 vaccine is the range of technology platforms that are being considered. These include nucleic acid (DNA and RNA), virus-like particles, peptide, viral vector (replicating and non-replicating), recombinant protein, live attenuated virus and inactivated virus approaches⁴. The vaccines already approved for administration and rolled out in various countries in December 2020 are based on two different technologies. Some of which, such as the AstraZeneca vaccine is based on viral vector technology and has a minimum of two doses 4 weeks apart to achieve its 62% efficacy in preventing symptomatic infection and 100% efficacy in preventing severe forms of COVID-19⁵. The Johnson & Johnson vaccine is also based on viral vector technology with a single dose to achieve the reported 66% efficacy in preventing symptomatic infection and 85-100% efficacy in preventing severe disease⁵. The Pfizer/BioNTech vaccine is based on mRNA technology with a 2 dose regimen, 3 weeks apart to achieve its

reported 95% efficacy in symptomatic infection and 89% efficacy in preventing severe disease. The Moderna vaccine is also based on mRNA technology and has 2 doses which are administered at a 4-week interval to achieve its 94% efficacy in preventing symptomatic infection and 100% efficacy for prevention of severe disease⁵.

Acceptance of any COVID-19 vaccine is imperative in the control of the disease. A recent survey reported that more than one-third of respondents from the general public were either uncertain or had no intention of receiving the vaccine. Acceptance and willingness to pay for the COVID-19 vaccine will show a significant effort in combating the pandemic. Healthcare workers (HCWs) will be among the pioneer to receive COVID-19 in Nigeria. Frontline healthcare workers' uptake of the COVID-19 vaccine is an integral determinant in improving the prospect of acclaiming the vaccine to their patients.

Health workers are a significant resource in the provision of information about vaccines. The endorsement they provide can greatly enhance the confidence the members of the public have in receiving the COVID-19 vaccine^{6,7}. Thus, the role of healthcare workers (HCWs) becomes particularly central in the health education of clients and communities, and as well as through role modelling behaviour. As such, it is essential to take into account the HCWs favourable reception of the COVID-19 vaccination to avoid rejection based on myths and conspiracy theories.

The mass vaccination of individuals in the communities is aimed at ensuring the establishment of herd immunity among the population. The development of herd immunity to COVID 19 is hindered by vaccine hesitancy with no assurance on the full acceptability of the vaccine even though it is free. This study was conducted to assess the acceptability of the COVID 19 vaccine among frontline health workers, to assess the factors responsible for vaccine hesitancy and the effects of its efficacy on the degree of acceptance of the vaccine.

METHODOLOGY

A descriptive cross-sectional study was carried among 115 respondents in 2 Federal Tertiary hospitals. FMC Abeokuta 45 respondents and 70 respondents at UITH Ilorin. HCWs (doctors, nurses, pharmacists and administrators) aged 18 years or older who are currently employed in the two hospitals were accepted as respondents for the study. HCWs who were absent during the survey and those who were unwilling to participate in the study were excluded. The sample size was determined using the formula for a small population with the proportion obtained from a previous similar study. The study participants were selected using a convenient sampling technique. All participants, after the provision of adequate

information about the study, agreed to and signed a consent form. The study was approved by the ethics committee of UITH. The study was conducted using a three-part questionnaire. The first part was the socio-demographic characteristics of respondents. The second section explored the acceptability of vaccines while the third explored the level of trust of respondents in the sources of vaccine information. The sample size was determined using the Cochran formula and adjusted for a small population with a 10% non-response rate. The data were analysed using SPSS 23.0 software. Categorical data related to demographic variables are presented as frequencies and proportions. The associations between independent variables and the primary outcomes (acceptance of COVID-19 vaccine) were tested using *t*-test or Chi-square test as appropriate. Variables that are associated ($p < 0.05$) in the unadjusted analyses were further adjusted for demographic factors (ie, age) using stepwise logistic regressions. The level of significance was set to 0.05 (two-tailed).

RESULTS

As seen in **Table I**, the respondents was predominantly female with a modal age group of 31-40 years. Doctors accounted for the largest proportion of respondents with 27.8%. A large proportion of the respondents (92.2%) do not have a history of chronic illnesses. The rate of testing for COVID-19 was low among respondents with only 24 (20.9%) being tested and 4 (3.5%) reporting positive results. In contrast, a higher percentage (53%) of the health workers knew others who had been tested for COVID-19, out of whom 41 (67.2%) were positive. Most of the positive cases received treatment in the isolation centre (65.9%).

As depicted in **Table II**, over half (59.1%) of the respondents are willing to receive the COVID-19 vaccine when it becomes available while 20.9% of them would not receive the vaccine and the remaining were undecided. The figures for those willing to accept improved marginally to 62.2% when given the option to receive the vaccine in 6 months. As regards the efficacy of the vaccine, 59.1% of the health workers were willing to take it at 50% efficacy. The number of people willing to receive it increased markedly to 87.8% when the efficacy of the vaccine was 90% although the figures dropped (62.6%) when mild side effects of the vaccine were taken into account.

As shown in **Table III**, with regards to the factors related to the willingness to accept the vaccine, the age of respondents was found to be statistically significant ($p = 0.003$). There was also a significant difference in the willingness to accept the vaccine among the different cadres of health workers ($p = 0.005$). The gender, marital status and history of chronic illnesses were not statistically significant factors associated with the respondents' willingness to accept the COVID-19 vaccine.

Table IV depicts the level of confidence among respondents in sources of information about vaccines on COVID-19 was found to be highest in their doctors (mean rank =2.00) with varying degrees of confidence and trust in other organisations such as the Nigerian Centre for Disease Control (NCDC) with a mean rank of 4.16 and religious leaders (4.77). The level of trust was however lowest in patent drug store owners (mean=72.1). In determining the strength of the association between the age of respondents and their willingness to accept the covid-19 vaccine, a lower age range had the highest association with ≤ 30 age group having OR (95%CI) 7.132 (1.242-10.955) as shown in **Table V**.

TABLE I: SOCIO-DEMOGRAPHIC VARIABLES OF RESPONDENTS

Socio-demographic Characteristics	Frequency	Percentage
Age (years)		
≤ 30	14	12.2
31 – 40	39	33.9
41 – 50	32	27.8
51 – 60	30	26.1
Mean±SD	42.95 ± 10.71	
Range	20 – 66	
Gender		
Male	39	33.9
Female	76	66.1
Marital status		
Single	12	10.4
Married	99	86.1
Widowed	4	3.5
Number of children		
None	10	8.7
1 – 3	73	63.5
> 3	32	27.8
Cadre		
Doctor	32	27.8
Nurse	30	26.1
Pharmacist	19	16.5
Lab scientist	8	7.0
Hospital Administrators	26	22.6
Respondents' History of chronic disease		
Yes	9	7.8
No	106	92.2
Respondents' tested for COVID-19		
Yes positive	4	3.5
Yes negative	20	17.4

No	91	79.1
The intervention utilised for a positive result		
Self-isolation	3	75.0
Isolation with treatment	1	25.0
Respondents' Acquaintances tested for COVID-19		
Yes	61	53.0
No	54	47.0
Result of test (n = 61)		
Positive	41	67.2
Negative	18	29.5
I don't know	2	3.3
Treatment the person was offered (n=41)		
Self-isolation	13	31.7
Isolation without treatment	1	2.4
Isolation with treatment	27	65.9

TABLE II: WILLINGNESS TO ACCEPT COVID-19 VACCINE

Acceptance of vaccine	Yes n(%)	No n(%)	I don't know n(%)
Acceptance of the vaccine now	68(59.1)	24(20.9)	23(20.0)
Acceptance in 6 months	72(62.6)	24(20.9)	19(16.5)
Acceptance at 50% effectiveness			
Acceptance if available now	68(59.1)	37(32.2)	10(8.7)
Acceptance in 6 months	75(65.2)	30(26.1)	10(8.7)
Acceptance for children/ family	83(72.2)	25(21.7)	7(6.1)
recommend vaccine to colleagues	84(73.0)	19(16.5)	12(10.4)
Acceptance at 90% effectiveness			
Acceptance if available now	101(87.8)	10(8.7)	4(3.5)
Acceptance in 6 months	99(86.1)	14(12.2)	2(1.7)
Acceptance for children/ family	100(87.0)	10(8.7)	5(4.3)
Recommendation of vaccine to colleagues	98(85.2)	8(7.0)	9(7.8)
Acceptance at 90% effectiveness with mild adverse events			
Acceptance if available now	72(62.6)	36(31.3)	7(6.1)
Acceptance for children/ family	72(62.6)	37(32.2)	6(5.2)
recommend vaccine to colleagues	77(67.0)	27(23.5)	11(9.6)
Ever vaccinated in adult life	98(85.2)	15(13.0)	2(1.7)
Plan to get any vaccination in the next 4 months	27(23.5)	50(43.5)	38(33.0)

TABLE III: RESPONDENTS' FACTORS ASSOCIATED WITH WILLINGNESS TO RECEIVE THE VACCINE

Factors	Willingness to accept			X ²	p-value	History of chronic disease			0.871 ^F	0.483	
	Yes n(%)	No n(%)	Total N			Yes					
Age (years)											
≤ 30	12(85.7)	2(14.3)	14	14.067	0.003*	Ever been tested for COVID-19					
31 – 40	29(74.4)	10(25.6)	39			Yes positive	2(50.0)	2(50.0)	4		
41 – 50	14(43.8)	18(56.2)	32			Yes negative	12(60.0)	8(40.0)	20	0.320 ^F	1.000
51 – 60	13(43.3)	17(56.7)	30			No	54(59.3)	37(40.7)	91		
Gender						Intervention for a positive result					
Male	24(61.5)	15(38.5)	76	0.142	0.707	Self-isolation	1(33.3)	2(66.7)	3		
Female	44(57.9)	32(42.1)	76			Isolation with treatment	1(100.0)	0(0.0)	1	1.333 ^F	1.000
Marital status						Knows someone tested for COVID-19 in immediate social network					
Single	7(58.3)	5(41.7)	12	2.562 ^F	0.283	Yes	28(45.9)	33(54.1)	61		
Married	57(57.6)	42(42.4)	99			No	40(74.1)	14(25.9)	54	9.407	0.002*
Widowed	4(100.0)	0(0.0)	4			Result of test (n = 61)					
Number of children						Positive	20(48.8)	21(51.2)	41		
None	7(70.0)	3(30.0)	10	0.567	0.753	Negative	6(33.3)	12(66.7)	18	3.219 ^F	0.201
1 – 3	42(57.5)	31(42.5)	73			I don't know	2(100.0)	0(0.0)	2		
> 3	19(59.4)	13(40.6)	32			Treatment the person was offered					
Cadre						Self-isolation	8(61.5)	5(38.5)	13		
Doctor	20(62.5)	12(37.5)	32	14.905	0.005*	Isolation without treatment	0(0.0)	1(100.0)	1	1.925 ^F	0.410
Nurse	16(53.3)	14(46.7)	30			Isolation with treatment	12(44.4)	15(55.6)	27		
Pharmacist	5(26.3)	14(73.7)	19			<i>χ²: Chi square test; F: Fisher's exact test; *: p value <0.05</i>					
Lab scientist	6(75.0)	2(25.0)	8								
Admin	21(80.8)	5(19.2)	26								

TABLE IV: LEVEL OF TRUST AND CONFIDENCE OF PERSONS/ORGANISATIONS INVOLVED IN THE MANAGEMENT OF COVID19 IN NIGERIA

Variable	Very Little n(%)	Little n(%)	Some n(%)	Much n(%)	Very Much n(%)	Don't know n(%)	Level of confidence Mean rank
Your own doctor	2(1.7)	2(1.7)	15(13.0)	47(40.9)	47(40.9)	2(1.7)	2.00
Patent Drug Seller	57(49.6)	33(28.7)	8(7.0)	9(7.8)	6(5.2)	2(1.7)	7.21
Primary Health Centre	7(6.1)	25(21.7)	33(28.7)	26(22.6)	22(19.1)	2(1.7)	4.90
State Health Department	6(5.2)	14(12.2)	38(33.0)	40(34.8)	15(13.0)	2(1.7)	4.72
Nigerian Centre for Disease Control (NCDC)	3(2.6)	14(12.2)	30(26.1)	40(34.8)	26(22.6)	2(1.7)	4.16
Presidential Taskforce on COVID-19 (PTF)	5(4.3)	32(27.8)	34(29.6)	28(24.3)	14(12.2)	2(1.7)	4.66
Professional Organizations (e.g : NMA)	5(4.3)	7(6.1)	32(27.8)	39(33.9)	31(27.0)	1(0.9)	4.00
Religious Leaders	3(2.6)	24(20.9)	27(23.5)	35(30.4)	25(21.7)	1(0.9)	4.77
Traditional Leaders	34(29.6)	28(24.3)	34(29.6)	11(9.6)	4(3.5)	4(3.5)	6.80

NB: Ranking of persons/organization ranges between 1-9 with 1 being the highest level of confidence and 9 being the lowest

TABLE V: DETERMINANTS OF WILLINGNESS TO ACCEPT COVID-19 VACCINE

	B	OR (95% CI)	p value
Age (years)			
≤ 30	1.965	7.132 (1.242 – 10.955)	0.028*
31 – 40	1.690	5.417 (1.606 – 8.268)	0.006*
41 – 50	0.062	1.064 (0.336 – 3.369)	0.916
51 – 60 ^{REF}			1
Cadre			
Doctor	-0.704	0.495 (0.118 – 2.076)	0.336
Nurse	-1.338	0.262 (0.066 – 1.036)	0.056
Pharmacist	-1.970	0.139 (0.027 – 0.726)	0.019*
Lab scientist	-0.500	0.606 (0.074 – 4.986)	0.642
Admin ^{REF}			1
Knows someone tested for COVID-19 in immediate social network			
Yes	-1.358	0.257 (0.088 – 0.748)	0.013*
No ^{REF}			1

*B: Coefficient of Binary logistic regression; OR: Odds ratio; 95% CI: 95% Confidence Interval; *: p value <0.05*

DISCUSSION

Healthcare worker endorsements will show a persuasive role in the patients' attitude towards vaccination. They are also vital in the provision of health education to other individuals and their communities. The production of an effective COVID-19 vaccine plays an integral role in the control of the pandemic and the return to less restriction on daily activities. The acceptance of this vaccine among frontline HCW in Nigeria is emphasised in the study.

The study respondents were predominantly female 76 (66.1%). The mean age of respondents was 42.95±10.71. This finding was in agreement with the mean age of Nigeria Federal workers⁸. More than three-quarters of respondents are married with a median family size of four. This aligns with the national average of 4.14±2.67⁸. The respondents in this study overwhelmingly had no history of chronic illnesses (92.2%) which could influence their level of the perceived risk of severe COVID 19 illness as a result of the link between cases of severe illnesses occurring in individuals with pre-existing diseases. The rate of conducting COVID 19 tests among the respondents was found to be poor with only less than one-fifth of HCW having been tested for the disease and less than a tenth being positive. The predominant course of action among those who tested positive was that they proceeded on self-isolation. The self-isolation of the positive respondents reflects the

relative mildness of the symptoms experienced as they do not require hospitalisation which would have occurred in more severe manifestations of the disease. The respondents, however, reported a higher positivity rate among their acquaintances with about two thirds (67.2%) reporting knowledge of individuals who had tested positive. Among those with positive results, 65.7% were treated in the isolation centres which may also reflect the severity of the symptoms and signs of the disease.

The acceptability of the COVID 19 vaccine was found to be a little above half in this survey, with only 59.1% of the respondents willing to accept the vaccine against COVID-19 when it becomes available. This finding is relatively low when compared with a similar study conducted in France that reported 77.6% (95% CI 76.2–79%) of respondents were willing to accept the vaccine to combat the spread of COVID-19⁹. This low acceptance in this study may stem from misinformation on social networks as well as the risk of adverse events following vaccination. However, the finding was higher than those reported in Congo. Only 28% of Congolese healthcare workers were willing to receive the COVID-19 vaccine¹⁰. This was attributed to the misinformation being spread across traditional and social media and termed by WHO as an infodemic (ie, excessive amounts of misinformation and rumours that make it difficult to identify reliable sources of information)^{5,6}.

In addition, the acceptability of the COVID-19 vaccine in Australia (85.8%)¹¹ and Europe (73.9%)⁹ are much higher than the results from the study in Nigeria. Among the respondents, a higher proportion (62.6%) reported a willingness to receive the vaccine after 6 months. These findings would buttress the view that vaccine hesitancy among health workers is being driven by the perceived risk from adverse events that could occur with vaccination. The time interval would allow for more analysis of reported adverse events reported with the various vaccines. The exploration of the relationship between the effectiveness of the vaccine and vaccine hesitancy also revealed that while the acceptance level for any potential vaccine with a 50% level of effectiveness in preventing COVID 19 was 59.1 %, the level of acceptance improved dramatically amongst respondents to 78% with a potential vaccine having 90% effectiveness against the disease. These findings are similar to the Australian study as well as in Canada where a safe and efficacious vaccine will be taken by more than two-thirds of respondents. Similar results were also reported in Europe with 73.9% of the participants in agreement on receiving the COVID-19 vaccine^{4,9}. The findings are also corroborated by confidence in the effectiveness of a vaccine being a strong predictor of people's acceptance of vaccination¹⁴. The cadre of healthcare workers was also found to affect the willingness to accept the vaccine, with more than half

of the doctors among another cadre of health workers having a favourable predisposition to vaccine uptake. Furthermore, to combat the disinformation regarding vaccination and vaccine hesitancy, attitudinal change must be preceded by vital information and health education on the importance of vaccination and the high benefit-risk ratio associated with vaccines and the COVID-19 vaccines in this instance. Therefore, the confidence and trust in vaccines must be advocated for by individuals and organizations that are trusted to provide adequate and correct information to the people. The information on the vaccine, the vaccine benefits, and the safety of vaccines could be provided by vaccine providers, such as healthcare workers, health authorities, and policymakers¹³. Level of trust and confidence of persons/organizations involved in the management of Covid19 in Nigeria in the study indicated that medical doctors (mean rank=2.00), professional bodies NMA (mean rank =4.00) and the Nigerian Centre for Disease Control (NCDC) with a mean rank of 4.16 were trusted to provide genuine information on vaccination. This finding may serve as an invaluable tool for advocacy to discourage vaccine hesitancy. The misinformation on poor vaccine quality being conveyed by mass and social media which includes rumours as outrageous as the reduction in the population of Africans through vaccination could influence healthcare workers on vaccine hesitancy, which could have a snowball effect on the decisions of their patients¹⁴⁻¹⁶. The need for advocacy campaigns by these trusted individuals and groups to combat this rising “endodermic” cannot be overemphasised to ensure herd immunity against the pandemic witnessed in the last century.

CONCLUSION

In conclusion in the course of this research only approximately 59.1% of the respondents agreed to a COVID-19 vaccine and 35.7% were willing to pay when the needs arise and increase with efficacy and safety of the vaccine with 78% at 90% efficacy. In the background of a pandemic, vaccine hesitancy impedes executing vaccination programmes. The acceptance of a COVID-19 vaccine among HCWs play a decisive role since health professionals’ opinion about vaccine uptake is a critical predictor for societal acceptability through their patients thus representing an advocator sector of the larger communities.

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AUTHOR CONTRIBUTIONS

Jimoh SM: Conceptualization
Kehinde OH: Data collection
EMMANUEL OS: Data Analysis, Write-up
AHMED A: Data collection, Write-up

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