

Factors Affecting COVID-19 Vaccine Hesitancy in Kakau ward of Chikun LGA, Kaduna State

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ABSTRACT

Despite global efforts to end the covid-19 pandemic, vaccine hesitancy remains a public health issue. Only 9.1% of Nigerians have received at least one dose of the vaccine. This study was carried out to determine the prevalence of vaccine hesitancy and the factors which affect it. This was a cross-sectional study carried out among 348 residents of a community in Kakau ward in Kaduna state. Respondents were selected via a multi-stage sampling technique. Data was collected with an interviewer-administered questionnaire. Analysis was done with IBM SPSS Statistics version 23 and results were presented in frequency tables. Appropriate tests of association were done, and the level of statistical significance was set at 0.05. Only 96(27.6%) of the respondents know that the COVID-19 vaccine is not used to treat the infection. Majority 239(68.7%) do not trust the pharmaceutical companies while only 128(36.7%) of the respondents perceive themselves as being at risk for the disease. Sixty-five of the respondents (18.7%) have taken the vaccine. The prevalence of vaccine hesitancy was 273(78.5%). There is a statistically significant relationship between age and knowledge of Covid-19 infection and the of vaccine with vaccine hesitancy $p < 0.0001$. The prevalence of COVID-19 vaccine hesitancy was high among these respondents, and factors associated with it were age, sex, educational level, knowledge, and perception. To address this issue, public health authorities need to target social drivers and improve trust for the vaccine among the populace.

Keywords: COVID-19, vaccine, hesitancy, pandemic, Kaduna State

INTRODUCTION

The COVID-19 pandemic remain a serious public health challenge in spite of the comprehensive response by public health authorities at various levels.¹ The far-reaching effects of this disease range from acute and chronic health outcomes to poor socio-economic indices.² COVID-19 is responsible for over six million deaths globally.³ Initial preventive measures consisted of physical and social distancing; good hand hygiene, proper use of face masks, good cough etiquette, travel bans/restrictions as well as surveillance, risk communication, early diagnosis and supportive management.⁴ However, a complex interrelationship of

individual, environmental, poorly coordinated outbreak control efforts and socio-economic factors resulted in underserved communities not being adequately protected. While the aforementioned preventive measures were being promoted, vanguards in biotechnology were simultaneously working on vaccines and drug treatments. The vaccines became available for use in 2020; but due to the limited supply, they were for elderly people, those at increased risk for severe outcomes and frontline workers. Recipients of the vaccine are expected to receive one to two doses and a booster dose at least five months after depending on the vaccine type.⁵

Equitable access to safe and effective vaccines is integral to control strategies aimed at ending this global pandemic. The dire need for a more decisive solution to control the pandemic has only been emphasised with the emergence of the new variant, omicron. As a corollary, there is a global imperative to achieve 70% vaccine coverage in all countries.⁵ Globally, over 60% of the population has been administered at least one dose of the vaccine; this is a far-cry from what

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Date manuscript was received: 25/3/2022

Date manuscript was accepted: 6/6/2022

is obtainable in low and middle income countries where only 13% of the population have received at least one dose.⁶ In Nigeria, the situation is quite disconcerting with extremely low vaccine coverage; only about 4% of the population are fully vaccinated.⁷ The economic impact of this condition in sub-Saharan African countries like Nigeria where 4 out of 10 people live below is catastrophic. This is due to the lack of social protection which leads to significant loss of welfare.⁸

Northern Nigeria is already beleaguered with poor vaccine coverage for routine immunisation against childhood killer diseases due to social drivers such as cultural, religious, educational and economic factors; as well as health system factors.⁹ Vaccination in this region is far below the national target of 80% coverage; with less than a third of children aged between 12 months and 23 months having received all the required vaccines.^{9,10,11} Research shows that poor knowledge, negative attitude and distrust of vaccine by community stakeholders, parents and caregivers are major barriers to achieving good immunisation coverage in the area.^{12,13} It is therefore unsurprising that vaccine coverage in this zone among the lowest in the country. There is an overwhelming distrust of COVID-19 vaccines which are perceived to be part of an ulterior agenda; in part due to the unparalleled speed at which they were developed.¹⁴ The delay or refusal to take vaccines in spite of their availability is referred to as vaccine hesitancy. It occurs as a result of a complicated nexus of factors.¹⁵ In addition to the previously noted factors, there is the challenge with the perception of the populace about the disease. There is widespread scepticism about the existence and severity of the disease; there is also a pronounced lack of belief in the efficacy of the vaccine. The prevailing misconception is that the vaccine does more harm than good.¹⁶

There is dearth of information concerning this issue especially in Northern Nigeria where health outcomes are notoriously poor. This study was carried out to determine the prevalence of and factors affecting COVID-19 vaccine hesitancy in a

peri-urban community in Kaduna State, Nigeria.

MATERIALS AND METHODS

Study Area

Kakau is one of twelve wards in Chikun local government area in Kaduna State. Chikun local government area (LGA) is one of twenty-three LGAs in Kaduna State, north-west Nigeria. The projected population of Chikun LGA for 2016 is about 502,500. The population density is 112.5/km² and male to female ratio of about 1:1. The area is inhabited by people of multiple ethnicities; the predominant religions are Islam and Christianity.¹⁷ There are good road networks which facilitates access within the LGA and to surrounding environs. There are eleven health facilities in Kakau ward seven are publicly owned while 4 are privately owned. Of the eleven health facilities, 10 are primary healthcare centres (PHC), one is a secondary facility. The nearest tertiary health facility is located about 30 minutes away. Only one of the PHCs offers Covid-19 testing and vaccination services.

Study Design

This was a cross-sectional study among adults in Kakau ward.

Exclusion Criteria

Adult residents of Kakau who are not available during the data collection period.

Sample Size Determination

The required sample size (n) is calculated using the formula.¹⁸

$$n = \frac{Z^2 pq}{D^2}$$

Where n = the minimum sample size,
z = the percentage point of the standard normal distribution curve, which the curve defines 95% confidence interval as 1.96.

p = the prevalence of vaccine hesitancy from previous study

q = complimentary probability i.e., 1-p

d = maximum sampling error allowed (precision) at 95% confidence limit i.e., 0.05

Prevalence rate (p) of vaccine hesitancy (71%) was obtained from a previous study.¹⁹

$$n = \frac{(1.96)^2 \times 0.71 \times 0.29}{0.05^2}$$

$$= 316$$

To correct for non-response, 10% added as non-response rate

$$N = n + 10\% \text{ of } n$$

$$= 316 + 10/100 \times 316$$

$$= 316 + 32$$

$$= 348$$

Sampling Technique

Multi-stage sampling technique was used in this study.

Stage 1: Selection of Community

There were 3 communities (each a defined cluster) in Kakau ward. One ward was selected using simple random sampling by balloting.

Stage 2: Selection of Households

After a household listing was done by the researcher and research assistants, households were selected by systematic sampling. There are 3,113 households in the selected community; a sampling interval of about 10 was calculated. The first household to be included in the study was determined by balloting and found to be household number seven. Following that, every 10th household was selected.

$$N/x = 348/3113 = 0.10$$

$$0.10 = 10/100 = 1/10$$

Stage 3: Selection of Respondents

One eligible respondent was selected from the household by simple random sampling by balloting.

Data Collection Instrument

The data was collected using a semi-structured interviewer-administered questionnaire. The questionnaire is made up of four (4) sections:

Section A: Socio-demographic characteristics of the respondents. Section B: Knowledge on Covid-19 vaccines. Section C:

Perception towards Covid-19 vaccines. Section D: Uptake of Covid-19 vaccine hesitancy.

Data Analysis

All completed questionnaires were clearly numbered manually by the researcher for completeness. Data was analysed using IBM SPSS Statistics version 23 software package. For the descriptive aspect of the analysis, frequency distributions were generated for all categorical variables. Median and interquartile range were determined for the quantitative variables. Chi-square test, Fisher's Exact test were used as applicable tests for associations. The level of statistical significance was set at 0.05.

The knowledge section comprised 14-items with three possible responses (i.e., "Yes", "No" and "Don't know"). The correct responses were coded as 1, while the 'Don't know' and incorrect responses were coded as 0. The total score was obtained by summing up the scores of four questions and ranged from 0 to 4. The scoring system was graded as follows:

- Good knowledge a score of ≥ 7
- Poor knowledge a score of < 7

A respondent was termed **hesitant** if he/she had not taken any dose of the COVID-19 vaccine and had no intention of taking the vaccine in the future.

Ethical Consideration

Ethical approval was obtained from the Ethics and Scientific Committee of Barau Dikko Teaching Hospital. Verbal consent was obtained from the respondents after the nature of research was duly explained to them. Respondents were assured of strict confidentiality of the responses provided. They were also told that they could withdraw from participating in the study at any point during the research.

RESULTS

Table 11 shows that the highest proportion (66 (89.9%)) of respondents were aged between 30 to 34 years; the median age of the respondents was Median (IQR 1-IQR 3)

i.e., 33.00(26.75-42.00) years. Males were in the majority with 213(61.2%). Majority of the respondents were married 195(56%), Christian 332(95.4%) and had tertiary level of education 223(64.1%). The greatest proportion of respondents earned less than ₦50,000. Table 2 shows that majority 328 (94.3%) of the respondents know that covid-19 infection; but only 96(27.6%) know that the vaccine is not used to treat the infection. Findings in Table 3 show that only 128(36.7%) of the respondents perceive themselves as being at risk for the disease.

Majority 239(68.7%) do not trust the pharmaceutical companies that make the vaccine. Table 4 shows that only 65(18.7%) have taken the vaccine; while the prevalence of vaccine hesitancy was 273(78.5%). Majority 248(90.8%) of the respondents gave lack of trust (fear of side effects) as their reason for not wanting the vaccine Table 5. There is statistically significant relationship between age, knowledge of Covid-19 vaccine and perception of the vaccine with vaccine hesitancy; $p < 0.0001$ Table 6.

Table 1: Sociodemographic profile of the respondents (n=348)

Variable	Frequency	Percentage
Age (in years)		
18-20	7	2.0
20-24	56	16.1
25-29	56	16.1
30-34	66	18.9
35-39	51	14.7
40-44	35	10.1
45-49	35	10.1
50-54	21	6.0
55-59	7	2.0
≥60	14	4.0
Sex		
Male	213	61.2
Female	135	38.8
Marital Status		
Single	147	42.2
Married	195	56.0
Separated	2	0.6
Widowed	4	1.2
Religion		
Christianity	332	95.4
Islam	16	4.6
Level of education		
Primary	7	2.0
Secondary	223	64.1
Tertiary	118	33.9
Monthly Income		
<50,000	134	38.5
50,000-100,000	115	33.1
≥100,000	99	28.4

Table 2: Distribution of respondents' knowledge of covid-19 (n=348)

Variables	Frequency (%)
Covid-19 is transmitted by close contact with infected person	328(94.3)
Covid-19 disease can be fatal	285(81.9)
Covid-19 infection is worse for older people (aged 60 and above)	201(57.8)
Is there a Covid-19 vaccine?	285(81.9)
Vaccination can prevent Covid-19 infection	111(31.9)
Vaccination is not used to treat Covid-19 infection	96(27.6)
Even a healthy person needs vaccination for Covid-19	129(37.1)
Covid-19 vaccines do not contain harmful substances	95(27.3)
People who recovered from Covid-19 are still at risk of re-infection	81(23.3)

Table 3: Distribution of respondents' perception of the Covid-19 vaccine

Variables	Agree (%)	Neutral (%)	Disagree (%)
You are susceptible to Covid-19 infection	128(36.7)	74(21.3)	146(42.0)
The Covid-19 vaccine is very safe	75(21.6)	62(17.8)	211(60.6)
The Covid-19 vaccine is very effective	75(21.6)	60(17.2)	213(61.2)
Covid-19 vaccine can cause health problems in individuals	216(62.1)	60(17.2)	72(20.7)
The pharmaceutical companies that produced the Covid-19 vaccines cannot be trusted	239(68.7)	42(12.1)	67(19.3)
The government cannot be trusted in regards to Covid-19 vaccination	239(68.7)	39(11.2)	70(20.1)
Being exposed to Covid-19 naturally is safer for the immune system than being exposed through vaccination	234(67.2)	42(12.1)	72(20.7)

Table 4: Respondents acceptance of COVID-19 vaccine

Variables	Frequency	Percentage (%)
Have you taken at least one dose of the Covid-19 vaccine?* (n=348)	65	18.7
Are you willing to be vaccinated against the Covid-19 disease?* (n=283)	10	3.5
Prevalence of vaccine hesitancy	273	78.5

*Only the yes responses have been included in this table

Table 5: Reasons for vaccine hesitancy (n=273)

Variable	Frequency	Percentage (%)
It has to be proven safe	245	89.7
I am not sure the vaccine is effective	192	70.3
I'm scared about the side-effects	248	90.8
I'm afraid of needles	10	3.7
I don't need it	167	61.2
Too busy	43	15.8
Lack of availability of vaccination centres	18	6.6
Currently breastfeeding baby	22	8.1

Table 6: Factors affecting Vaccine Hesitancy

Variable	Hesitance (%)	Acceptance (%)	Test statistic and p-value
Age			
<20	2(28.6)	5(71.4)	Fisher's Exact=25.792; p=0.001
20-24	24(72.7)	9(27.3)	
25-29	27(87.1)	4(12.9)	
30-34	35(56.5)	27(43.5)	
35-39	31(60.8)	20(39.2)	
40-44	32(91.4)	3(8.6)	
45-49	32(91.4)	3(8.6)	
50-54	20(95.2)	1(4.8)	
55-59	5(71.4)	2(28.6)	
≥60	13(92.9)	1(7.1)	
Sex			
Male	186(87.3)	27(12.7)	$\chi^2 = 25.58$; p<0.0001
Female	87(64.4)	48(35.6)	
Marital Status			
Single	116(78.9)	31(21.1)	Fisher's exact = 0.975; p=0.324
Married	152(77.9)	43(22.1)	
Separated/Widowed	6(85.7)	1(14.3)	
Level of education			
Primary	6(85.7)	1(14.3)	Fisher's Exact =12.438; p=0.002
Secondary	211(94.6)	12(95.4)	
Tertiary	56(47.5)	62(52.5)	
Monthly Income			
<50,000	130(97.0)	4(3.0)	$\chi^2 = 7.534$; p=0.017
50,000-100,000	103(89.6)	12(10.4)	
≥100,000	40(40.4)	59(59.6)	
Graded Knowledge			
Good knowledge	61(46.2)	71(53.8)	Fisher's exact =10.237; p=0.006
Poor knowledge	212(98.1)	4(1.9)	
Graded Perception			
Positive perception	11(13.1)	73(86.9)	Fisher's exact=7.631; p<0.0001
Negative perception	262(99.2)	2(0.8)	

DISCUSSION

Vaccine hesitancy remains a major issue in low and middle income countries; due to socio-cultural biases and a plethora of false and inaccurate information which has spread quickly via social networking sites.²⁰ This study showed that majority of the respondents had poor knowledge; less than a third of the respondents knew that the vaccine not used as a treatment modality and that the covid-19 vaccines do not contain harmful substances. Previous research carried out in low and middle income countries with similar socio-demographic profiles to the respondents from this study corroborate these findings.²¹ This

lack of knowledge of the COVID-19 vaccine extends to routine childhood immunization; with caregivers in northern Nigeria having suboptimal knowledge.^{22,23} Poor knowledge has been found to be a correlate of fear and mistrust of the vaccines.²² Research shows that adequate information is a key predictor of uptake of health behaviour.²⁴ The poor knowledge among the respondents in this study points to the fact that there has been a lot misinformation circulating as well as the fact that risk communication component of the comprehensive covid-19 control strategy in Kaduna state is not achieving the desired outcome. Adequate knowledge of covid-19

and the vaccine will play an integral role in successfully controlling this pandemic.

An underwhelming proportion of the respondents in this study had an overall good perception of the vaccine. These findings mirror those concerning routine immunization in the region.^{23,25} Majority of the respondents do not trust the government regarding the covid-19 vaccine. Research shows that trust in government is associated with increased acceptance of the covid-19 vaccine.²⁶ Less than a quarter of the respondents believed the vaccine was safe or effective; additionally, only about a third of them believed they were susceptible to covid-19 infection. This is similar to findings in a study carried out in Kano state, Ghana and a study carried out among healthcare workers in Nigeria where respondents did not perceive the vaccines as being safe.^{27,28,29} The studies in Kano and Ghana also reported a low risk perception among the respondents.^{27,28} The findings however, differ from those in studies carried out in China and Malaysia.^{30,31} Respondents from this study are likely to have underestimated the severity of the pandemic due to the relatively low number of reported cases. Many countries in Asia experienced high prevalence of severe cases and case fatality leading them to be more favourably disposed towards the vaccine. Thereby giving people a false sense of security; making them believe that the pandemic is over and their risk of infection low. As a corollary, uptake of precautionary measure has been low with poor and/or improper use of face masks and inadequate hand hygiene.³² This causes a hindrance to the strides made by concerted efforts of public health authorities globally.

Acceptance of the vaccine was quite poor with less than a quarter of the residents currently vaccinated and less than a tenth of them willing to take the vaccine in the future. These findings are higher than the current prevalence for uptake in Nigeria which shows that only 9.1% of eligible people have been vaccinated thus far.³³ This contrast is due to the fact that this is a national proportion taking into account a diverse socio-demographic characteristics, study areas (rural, peri-urban

and urban) and access to vaccination sites. The findings from this study also differs from a study in Palestine where 37.8% of the respondents were willing to take the vaccine. The reason for this contrast is that the Palestinian study was carried out among health care workers as such acceptance would understandable be higher.³⁴ Research shows that uptake could be improved with the utilisation of locally produced vaccines.^{35,36} This would aid in increasing trust and confidence in the vaccine's safety and effectiveness. Improving vaccine uptake is founded upon trust of the vaccine, health systems, and larger political climate which makes decision concerning development and deployment of vaccines.³⁶ However, it should be noted that the relationship between the population in this region and the health system is complex and nuanced as evidenced by the consistently poor health outcomes. Therefore, further studies would have to be conducted to determine if this solution would be the best approach. The poor uptake of vaccines found in this study means that achieving herd immunity is still an improbable outcome. The global target uptake for covid-19 vaccine for 2022 is at least 70% of the population; so far, no country has achieved this.³⁷

There was a statistically significant relationship between hesitancy and age of respondents, sex; the level of education; monthly income; graded knowledge and perception. Findings from previous studies corroborate these findings. Age has been shown to be a predictor of vaccine acceptance with younger age groups believing they are at lower risk for the disease and as such less likely to be vaccinated. Evidence from a global systematic review has found gender to be a predictor of vaccination intention with women having lower intentions to be vaccinated and consequently lower vaccine uptake.³⁸ Additionally, level of education and monthly income have been shown to be predictors of vaccine hesitancy; those with low level of education and monthly income are more likely to be hesitant to take the vaccine. Poor knowledge and perception of

the vaccine have also been found to be predictors of vaccine hesitancy.³⁹ In low and middle income countries such as Nigeria where a large proportion of the population live below the poverty line, uptake is low because of the relationship between poverty and social conditions like educational status.²⁹ Low educational level is associated with poor understanding of health knowledge with the offshoot of low uptake of desired health behaviour leading to poor health outcomes; such as high prevalence of morbidity and mortality.

CONCLUSION

Vaccine hesitancy remains a global health issue. The findings from this study show that majority of the respondents had poor knowledge and perception of the covid-19 vaccine; majority of them had no intention of utilizing the vaccine. Social drivers were found to play a key role in the acceptance and uptake of the vaccine. Awareness campaigns and programmes designed to increase societal trust in the vaccine should be employed on a large scale to improve vaccine uptake.

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