COVID-19 VACCINE ACCEPTANCE AND HESITANCE AMONG PREGNANT WOMEN AND NURSING MOTHERS IN NIGERIA

ABSTRACT

Background: As evidence emerges about its safety and effectiveness, COVID-19 vaccine uptake among pregnant women and nursing mothers is of interest. This study assessed the level of acceptance of COVID-19 vaccination among these cohorts in Nigeria.

Method: A multicentre, descriptive cross-sectional study was conducted among attendees of antenatal and postnatal clinics. Pretested self-administered questionnaire which consists of 29 items that assessed perception and acceptance of vaccine was used to generate data following informed written consent.

Data analysis: Data was analysed using the IBM Statistics version 26. Descriptive and inferential statistics was used to assess for factors that influence their choices. Statistical significance was set at P value ≤ 0.05.

Result: Six hundred and forty women participated, 336 (52.5%) were pregnant and 304 (47.5%) nursing mothers. Only 54 (8.4%) of the women were willing to be vaccinated. Acceptance was driven by the desire to prevent severe disease or infecting others. The death of a family member from the virus (AOR 5.322; 95% CI 2.641-10.749; p<0.001) and age <30 years (AOR 1.862 95% CI 1.043-3.322; p=0.035) had significant influence on acceptance. Lack of trust in the government (53%), cost (48.2%) and safety issues (44.1%) were main reasons for hesitance.

CONCLUSION: Hesitance to COVID-19 vaccination among pregnant and nursing mothers is high. This may be improved with concerted efforts in the dissemination of accurate evidence on vaccine safety in these women in various communities.

KEYWORDS: COVID-19 infection, vaccines, pregnancy, breastfeeding, acceptance, hesitance

INTRODUCTION

The COVID-19 pandemic has been associated with not only loss of lives but with an unimaginable public and health care system strain and challenges, disruption of economies and families, change in lifestyles with great impact on mental health.[1, 2]

Recent systematic review reports suggest that the rate of COVID-19 infection in pregnancy is about 10%.[3] Most affected pregnant women tend to be largely asymptomatic but those with the symptomatic disease tend to follow a more severe course of the disease compared to non-pregnant women.[4] Pregnant women are a vulnerable group of the population with a higher risk of contracting COVID-19 infection due to the changes in their physiological and hormonal status and associated immunity.[4,5] Initial clinical trials on the available COVID-19 vaccines had excluded pregnant women and breastfeeding mothers. As a result, only limited data was available on vaccines efficacy and safety in these population. Recent data however, suggest no concerning effects directly or indirectly on pregnancy.[6] COVID-19 vaccines are believed to pose minimal to no potential risk to the newborn through breast milk.[7] A study of 84 pregnant and 31 lactating women who received either the Pfizer/BioNTech or Moderna vaccine showed no major adverse events and similar reactogenicity profiles with non-pregnant women.[6] In Israel, none of the 84 breastfeeding women who were vaccinated with the Pfizer/BioNTech vaccine in a study, had any serious adverse event in the mother or breast-fed infant during the study period.[7] Similarly, no data from safety monitoring systems have since shown the increased risk of miscarriages or fetal or neonatal death. Despite the available information, there has been low incidence of vaccine uptake by pregnant and breastfeeding mothers worldwide

Vaccination hesitancy is increasingly recognized as a challenge to the success of vaccination programs worldwide especially for newly discovered pathogens like the SAR-CoV-2 virus. The World Health Organization (WHO) in 2019 listed vaccine hesitancy, a reluctance or refusal to be vaccinated despite availability of vaccines as one of the ten (10) top threats to global health.[8] This declaration was made before the onset of the COVID-19 pandemic. Vaccine hesitancy was believed to threaten to reverse the progress made in the fight against vaccine-preventable diseases. The acceptance and uptake of new vaccines can be influenced by several factors such as personal risk perception, safety concerns, access to accurate information including the influence of the social media, religious/cultural beliefs, ease of access to a health facility and its affordability.[9]

Studies on COVID-19 vaccines acceptance and hesitance have been documented in some countries.[10, 11] In the United States of America and United Kingdom, the rates of vaccination uptake during pregnancy was dependent on ethnicity, age and deprived (social or economic) populations.[9,10] Nigeria like many other countries is experiencing increasing COVID-19 vaccine reluctance with resultant low uptake. Despite the proven benefits of immunization, Nigeria still struggles with vaccine-preventable diseases with low immunization coverage. Inadequate funding of health services, religious beliefs, misconception about vaccines and vaccine safety and poor access to health services have been cited as reasons for this poor coverage. Lagos is the epicenter of the COVID-19 infection in Nigeria with a population of about 21 million. A port city, it is the most populous city in Nigeria and in Africa and is made up of divers' population. Women of reproductive age are said to constitute 28% of its population.[12] It is imperative to identify factors that influence acceptance or hesitance to the COVID-19 vaccine especially among high-risk cohort like pregnant women and nursing mothers. The findings from this study will provide information on the knowledge and perception of pregnant women and breastfeeding mothers in Lagos about COVID-19 infection and the role of available vaccines in preventing severe disease and its complication in them and their babies. It will also help to determine the factors that will influence their choices towards vaccination against the virus. The information generated will help plan and improve uptake through improved knowledge and perception in this high-risk cohort. Findings may also provide guidance to government, policy makers and health care workers to enhance education of the population, and deployment of resources and services to improve uptake of the vaccine.

Research Objectives

To assess the knowledge and perception of COVID-19 infection among pregnant women and breastfeeding mothers, to determine their knowledge and attitude to COVID-19 vaccines and to examine their level of acceptance or hesitance to the uptake of the COVID-19 vaccines and the factors or circumstances that influenced it.

METHODOLOGY

This was a multi-centre, descriptive cross-sectional study conducted among pregnant women of all gestational ages and nursing mothers, resident in Lagos and seeking antenatal or postnatal (including family planning) services respectively. Sick pregnant or nursing mothers, those with history of mental illness or who are unable to provide the information were excluded. The study was conducted in the antenatal and postnatal clinics of the Lagos State University Teaching Hospital Ikeja, General Hospital Ifako Ijaiye and Island Maternity Lagos. These are public tertiary and secondary hospitals with large patronage and serve as referral centres for other health facilities in the state.

The participants were consecutively enlisted until the sample size calculated was achieved. The sample size was estimated using the Leslie and Kish sample size formula for single proportions: $n = Z\alpha^2pq/d^2$; Where: n= minimum sample size; $Z\alpha^2$= confidence level of 95% [1.96]; p = proportion of pregnant women and breastfeeding mothers who are willing to receive the COVID-19 vaccine; p = 0.50 (no previous related study in Nigeria on COVID-19 vaccine acceptability or hesitancy in pregnancy or nursing mothers); q =1- p; q=1 - 0.50; d = 0.05 (Degree of precision); $n= ((1.96)^2 \times 0.50 \times 0.50)/((0.05)^2)$ = 384. Adjusting for non-response rate of 10%, = n/(1-nr) = 384/ (1-10%) = 427. Applying design effect of 1.5 to reduce the effect of clustering, we have 427 x 1.5 = 640

The sample size required was 640.

Data Collection

A pretested self-administered questionnaire adapted from another study[13] was used to assess the knowledge and perception about COVID-19 infection, vaccines and the level of willingness to be vaccinated. Predictors of vaccine uptake examined include knowledge, perception of risk and seriousness of the infection, vaccine confidence, public trust, demographics and general attitude to COVID-19 infection. An instruction for filling in the questionnaire was included as well. The questionnaire consisted of 29 items with sections on socio-demographic information, knowledge and perception of COVID-19 infection and vaccines, and acceptance or hesitance of vaccination. Each question was followed by a Yes, No and Not sure/Maybe response options. To measure COVID-19 vaccine acceptance or hesitance in the two groups, a general format question was asked. 'Are you willing to be vaccinated? Will the knowledge that the COVID-19 vaccine is safe and effective in pregnancy and breastfeeding make you accept to be vaccinated? Will you take

the vaccines if given for free? Will you receive the vaccine, if vaccination centre is located close to you?' Each question was followed by either Yes, No or Not sure options. Reasons for vaccine acceptance or hesitance were also assessed using multiple answer questions. Vaccine acceptance was defined as a Yes response, while hesitance was defined as No or Not sure/Maybe response.

Data Analysis

Data was entered and analysed using the IBM Statistics version 26. Continuous variables were expressed as mean and standard deviation while categorical variables were expressed as percentages. Knowledge of pregnant women and nursing mothers about COVID-19 vaccination was assessed using nine questions. A correct answer to each question was scored 1 while a wrong or no-response was scored 0. The total score was summed and the median score 3 was used as cutoff. Participants were categorized as having good knowledge when they scored ≥3 while participants who scored < 3 were categorized as having poor knowledge.[13] The Student 't' test was used to compare means of two independent groups while categorical group were compared using Chi squared test. Regression analysis was used to assess the factors associated with acceptance of COVID-19 vaccination. The confidence level was set at 95% and statistical test <0.05 was considered significant.

RESULTS

A total of 640 women of the 1050 pregnant and nursing mothers seen in the antenatal and postnatal clinics were enlisted as participants in this study. The mean age of the women was 32.5 ± 6.4 years old (range 18-49 years). The majority of the participants had at least a secondary level education (85.8%). They were mostly (83.4%) married. Three hundred and thirty-six (52.5%) were pregnant and 304 (47.5%) nursing mothers. The socio-demographic detail of participants is shown in Table 1.

Table 1: Socio-demographic and obstetric characteristics

Variable	Frequency (n = 640)	%
Age group (years)		
< 20	3	0.5
20 – 29	222	34.7
30 – 39	299	46.7
40 – 49	116	18.1
Mean (sd)	32.5 (6.4)	
Level of education		
Primary	68	10.6
Secondary	262	40.9
Tertiary	288	45.0
No response	22	3.4
Marital Status		
Single	56	8.8
Married	534	83.4
Divorced/ Separated	12	1.9
Living with Partner	38	5.9
Number of Children		
None	138	21.6
One	167	26.1
Two	215	33.6
Three	91	14.2
More than 3	27	4.2
No response	2	0.3
Status		
Pregnant	336	52.5
Nursing mother	304	47.5
Employment status		
Employed	557	87.0
Unemployed	55	8.6
No response	28	4.4
Trimester	n = 336	
First	68	20.2
Second	206	61.3
Third	62	18.5

The participants' knowledge about COVID infection and vaccination is shown in table 2. Although only about one-third of the women knew that the COVID-19 infection was transmitted by a virus, majority were aware that the disease can be spread from person to person. More than two-third of them did not know that not all infected persons were symptomatic. The women were mostly unaware that infection with COVID-19 could be severe in pregnancy (72.3% who did not know versus 19.5% who knew). Only 77 (12%) of the participants knew that the fetus of a pregnant woman with Covid-19 infection could be affected. Majority (60%) were also uncertain if the babies could get the infection through breast milk. A large proportion of the women did not know that vaccination against the COVID-19 virus with the available vaccines had commenced across the country and in Lagos especially. Expectedly, most of them did not consider the vaccine safe for pregnant women or nursing mothers (84.3%) or their babies. The overall assessment shows that 58.6% of the study participants had a poor knowledge of the COVID-19 infection.

Table 2: Knowledge of COVID-19 infection and Vaccination

Variable	frequency (n = 640)	%
COVID-19 spread by Virus		
Yes	219	34.2
No	168	26.3
No response	253	39.5
COVID-19 spread from person to person		
Yes	326	50.9
No	69	10.8
No response	245	38.3
Persons infected with COVID-19 will always show symptoms		
Yes	195	30.5
No	125	19.5
No response	320	50.0
COVID-19 can cause severe disease in affected pregnant women		
Aware	104	16.3
Not aware	463	72.3
No response	73	11.4
Fetus can be affected by COVID-19 infection during pregnancy		
Yes	77	12.0
No	219	34.2
No response	344	53.8
COVID 19 can be transferred to babies during breastfeeding by infected mothers		
Yes	215	33.6
No	40	6.3
No response	385	60.1
Aware COVID-19 vaccination has commenced		
Aware	248	38.8
Not aware	318	49.7
No response	74	11.5
Pregnant and nursing mothers can safely receive COVID-19 vaccine		
Yes	65	10.2
No	494	77.2
No response	81	12.6
COVID-19 vaccine is safe for babies during breastfeeding		
Yes	189	29.5
No	377	58.9
No response	74	11.6

NB: 41.4% had good knowledge while 58.6% had poor knowledge of COVID-19 infection and vaccination.

On assessment of factors that may influence the level of the knowledge of these women, being married (P value=0.002), pregnant (P=0.007) and having a close family or friend who had COVID-19 infection (P value<0.001) significantly influenced having a good knowledge of the disease entity. This is captured in Table 3.

Table 3: Assessment of patients' variables that influenced the knowledge of COVID-19 and vaccines

Variable	Good knowledge 265 (%)	Poor knowledge 375 (%)	p
Age group			
< 20	1 (0.4)	2 (0.5)	
20 – 29	92 (34.7)	130 (34.7)	
30 – 39	133 (50.2)	166 (44.3)	
40 – 49	39 (14.7)	77 (20.5)	
Mean (sd)	32.2 (6.0)	32.8 (6.7)	0.202
Marital status			
Married/ living with partner	249 (94.0)	323 (86.1)	0.002
Single/divorced/separated	16 (6.0)	52 (13.9)	
Status			
Pregnant	156 (58.9)	180 (48.0)	0.007
Nursing mothers	109 (41.1)	195 (52.0)	
Close family/friend had COVID-19			
Yes	42 (15.8)	11 (2.9)	<0.001
No/No response	223 (84.2)	364 (97.1)	
Family member/ Friend died from COVID			
Yes	14 (5.3)	9 (2.4)	0.1622
No/Not sure	251 (94.7)	366 (97.6)	
Employment status			
Employed	218 (90.4)	339 (90.4)	0.698
Not employed	47 (9.6)	36 (9.6)	
Willingness to be vaccinated			
Yes	38 (16.0)	16 (7.0)	0.002
No/ Not sure	200 (84.0)	213 (93.0)	

Regression analysis of these factors show that COVID-19 infection of a close family member (AOR 4.847, 95% CI 2.412 – 9.741), being married (AOR 2.185, 95% CI 1.193 – 4.001) and willingness to take the COVID-19 vaccination (AOR 2.891, 95% CI 1.539-5.429) were predictors of knowledge of COVID-19 among the participants (See Table 4).

Table 4: Regression analysis of factors associated with good knowledge of COVID-19 vaccination

Variable	AOR	95%CI	p
Good knowledge of COVID-19 vaccine			
Status			
Nursing mothers	Reference		
Pregnant	1.354	0.972 – 1.886	0.073
Friends/ relation had COVID-19			
No	Reference		
Yes	4.847	2.412 – 9.741	<0.001
Marital status			
Single/divorced	Reference		
Married/living in	2.185	1.193 – 4.001	0.011
Willingness to take vaccine			
No	Reference		
Yes	2.891	1.539 – 5.429	0.001

This study observed that only 54 (8.4%) of these women were willing to be vaccinated against the virus so that 91.6% (outright no- 27%, unsure – 37.5% and 27% who did not respond) could be said to be hesitant towards receiving the vaccine (Figure 1).

Among those who were willing to be vaccinated, the desires to prevent severe disease (75.9%) and to prevent infecting others (64.8%) were the main reasons for acceptance. The need to revert back to their normal social lives and based on recommendation by their doctors informed the choice to be vaccinated in 46.3% of the respondents respectively. 22.2% of the participants will take COVID-19 vaccines because they considered themselves to be COVID-19 high risk patients (Figure 2).

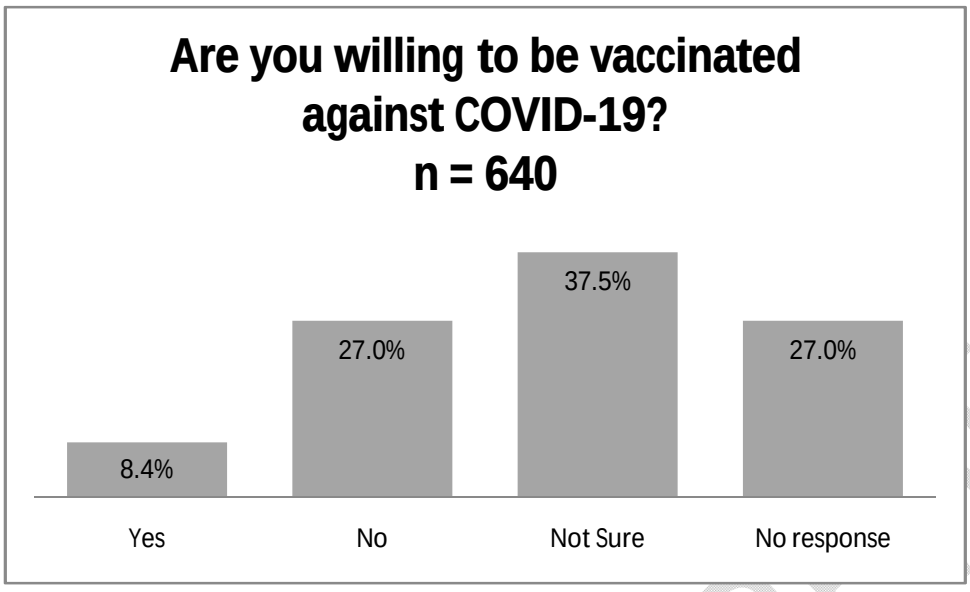

Figure 1: Willingness to be vaccinated against COVID-19

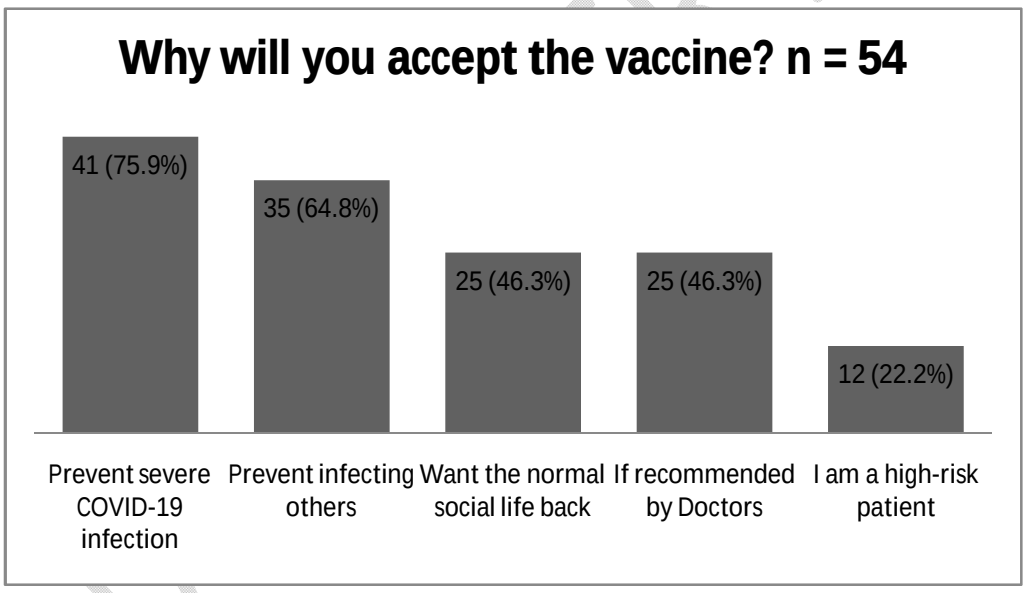

Figure 2: Reasons for vaccine acceptance

Maternal age and having a family member or relative who died following infection from the COVID-19 virus were variables that was observed to have significantly (p values <0.05) influenced their acceptance to be vaccinated. This is shown in table 5.

Table 5: Patients' variables associated with the willingness to be vaccinated

Variable	Willingness to be vaccinated		
	Yes	No	p
	n (%)	n (%)	
Age group (years)			
< 20	1 (1.9)	2 (0.3)	
20 – 29	24 (44.4)	198 (33.8)	
30 – 39	23 (42.6)	276 (47.1)	
40 – 49	6 (11.1)	110 (18.8)	
Mean (sd)	30.6 (±5.5)	32.7 (±6.5)	0.020
Marital status			
Single/Divorced	3 (5.6)	65 (11.1)	0.206
Married/ living in	51 (94.4)	521 (88.9)	
Total	54	586	
Educational level			
Primary	2 (4.3)	66 (11.6)	0.270
Secondary	23 (48.9)	239 (41.9)	
Tertiary	22 (46.8)	266 (46.5)	
Total	47	571	
Employment status			
Employed	48 (92.3)	509 (90.9)	0.733
Unemployed	4 (7.7)	51 (9.1)	
Total	52	560	
Status			
Pregnant	34 (63.0)	302 (51.5)	0.108
Nursing mothers	20 (37.0)	284 (48.5)	
Total	54	586	
Family members/relatives who died from COVID-19			
Yes	14 (25.9)	39 (6.7)	<0.001
No	40 (74.1)	547 (93.3)	
Total	54	586	
Friends with COVID-19			
Yes	4 (7.4)	19 (3.7)	0.193
No/not sure	50 (92.6)	491 (96.3)	
Total	54	510	

Regression analysis in table 6 showed that women <30 years of age had 1.9-fold more chance of accepting COVID-19 vaccination than women 30 years and older (AOR 1.862, 95%CI 1.043 – 3.322). Participants who had family members who died from COVID-19 had 5.3-fold more chance of accepting vaccination than participants whose family members did not die from COVID-19 (AOR 5.322 95%CI 2.641 – 10.749).

Table 6: Regression analysis of factors associated with the willingness to accept COVID-19 vaccination

Variable	AOR	95%CI	p
Age group			
<30	1.862	1.043- 3.322	0.035
≥ 30	Reference		
Family or relatives who died from COVID-19			
Yes	5.328	2.641- 10.749	<0.001
No	Reference		

Lack of trust in government and her policies accounted for why 53% of these women were hesitant to receive the vaccine against COVID-19 infection. Almost half (48.2%) of the women felt the vaccines will not be affordable while 44.1% were convinced that the vaccine was not safe in pregnancy and in those breastfeeding. The fear of losing the pregnancy (32.4%) and the possible side effects of the vaccine (30%) were other reasons for the unwillingness to be vaccinated as shown in Table 6. Among the participants hesitant about the COVID-19 vaccination, 50.1% will reconsider their stand if more information about safety is provided, and 13.1% if it is demonstrated to be safe in pregnant and nursing mothers. However, 4.8% stated that nothing was ever going to make them reconsider their position.

Table 7: Reasons for vaccine hesitancy and circumstances that may influence acceptance of COVID-19 vaccination

Variable	Frequency (n = 413)	%
Reason for Vaccine hesitancy		
Religious reasons	101	24.4
May lose pregnancy	134	32.4
Don't trust the government	219	53.0
May get infected after vaccination	90	21.8
Don't think the vaccine is safe	182	44.1
Don't think the vaccine is effective	119	28.8
It is not affordable	199	48.2
Baby may be infected through breastmilk	89	21.5
Worried about the possible side effect	125	30.3
Don't trust the vaccines	109	26.4
Chances of having severe infection is low	38	9.2
The impact of the virus is exaggerated	53	12.3
Don't trust vaccines	64	15.5
Circumstances that may influence reconsideration towards acceptance of COVID-19 vaccination		
Will take vaccine if it is free	69	16.7
Will take vaccine if center is close to home	65	15.7
If it is safe and effective	87	21.1
If someone I know receive the vaccine	77	18.6
If the government give incentive	131	31.7
If more people take it	76	18.4
If more information about the safety and efficacy are provided	207	50.1
If it totally prevents COVID-19 infection	37	8.9
If it is demonstrated it is safe during pregnancy And nursing mothers	54	13.1

NB: Multiple responses allowed

DISCUSSION

The accurate knowledge of COVID-19 infection among pregnant and nursing mothers was less than average in this study. In a study in Ethiopia[14] the level of overall knowledge was 60.2% which was lower than that documented in Kenya[15] (99.7.4%) and India[16] (90%). The differences observed may be due to the fact that the disease burden in these countries seemed to be much more than that recorded in Nigeria, more people or families were affected in these other countries and as such may have driven the level of information available to their population. The low level of knowledge may be partly due to the lack of clear information on the disease and vaccine safety in pregnant and lactating women as at the time of the study. It may also be due to the absence of shared information usually given to these women by their peers and healthcare workers (doctors and midwives) during antenatal and postnatal visits which was disrupted by the lock down across the globe.[16] Although information on the evolving disease was available on the internet, we did not assess how many of these women were able to easily access this especially with the economic hardship that greeted the pandemic.

In this study, the predictors of good knowledge among the participants were COVID-19 infection of a close family member (AOR 4.847, 95% CI 2.412 – 9.741), being married (AOR 2.185, 95% CI 1.193 – 4.001) and willingness to take the COVID-19 vaccination (AOR 2.891, 95% CI 1.539-5.429). These findings differed from that documented by Besho et al[18] in an Ethiopian study, where having at least a secondary education (AOR 2.99; 95% CI 1.7-5.0) and living in the urban district (AOR 1.6; 95% CI 1.2-2.7) were observed to be major predictors. Higher incidence of infection and death from the disease in a community or country with its resultant fear may have influenced the appreciation of the reality of the pandemic and the quest for more information on the disease.

Although vaccination is still on-going in Nigeria, a large number of the women in our study were not aware and did not know that they could participate. Less than 10% were willing to be vaccinated while pregnant or breastfeeding, even if recommended. This suggested that 90% had vaccination hesitancy. This rate of acceptance was lower than that documented by Iliyasu and coworkers[17] in a study in Northern Nigeria. They reported that of the 399 women studied 33.8% were willing to be vaccinated in pregnancy, 26.6% preferred to do so after delivery and another

23.3% after weaning off their babies. Riad et al[20] reported that although the level of acceptance of the COVID-19 vaccines by the pregnant and lactating mothers was 70.2%, only 3.6% were willing to do so immediately and others preferred to wait until later. The level of acceptance of the COVID-19 vaccines was much lower than reported by other researchers in USA[10] (<45%), UK[21] (62.1%), France[22] (29.5%) and South Africa[23] (63.3%). The dissimilarities in acceptance level is striking as one would expect that with a higher level of education as seen in this study and other high income countries the level of acceptance should be higher. Iliyasu et al[19] observed that women with primary education were 6 times more likely to accept vaccination than those with higher education. This may explain the low acceptance rate in our study as most of the participants had at least secondary education which may increase their bias toward the vaccines. This finding suggests that a higher level of education does not necessarily equate to acceptance. An accurate knowledge of the disease and the vaccine safety is more important. Also, because the number of COVID-19 cases and deaths have been consistently lower in most low-and-middle income countries like Nigeria compared to higher-income countries,[24] a wrong perception that the risk of disease is less, may affect the level of willingness to accept any factual or fabricated risks of vaccination. The reasons given by the women willing to be vaccinated in this study was the desire to prevent them from developing severe disease and the perception of being at high risk of infection with the virus owing to their occupation. Similar reasons were documented in other studies.[25, 26]

Age was observed to be a significant determinant of acceptance in this study. Women less than 30 years of age had a 1.9-fold increased chance of accepting COVID-19 vaccination than older women [AOR 1.862 (95% CI; 1.043 – 3.322)]. Mose et al[14] in their systematic review and meta-analysis of pregnant women's knowledge of COVID-19 infection in Ethiopia reported maternal age to be a strong predictor of acceptance too. However, the women reported in their work were older (34-41years) [AOR = 1.464 (95% CI; 1.218-5.129)]. Similar observation was reported in a French study [22] where acceptance of COVID-19 vaccination was influenced by being older in age (>30years). The difference in the age group may be due to demographic variation of the studies.

Mose et al[14] also observed that having a good knowledge about COVID-19 was also a strong predictor [AOR=5.946 (95%CI; 3.147-7.065)] of acceptance. This was seen in this study [AOR 2.891 (1.539-5,429)] too. It was observed that participants whose family members were infected

and died from COVID-19 infection had a 5.3-fold more chance of accepting vaccination. This agreed with what was documented by other researchers in literature in which a previous COVID-19 infection in either a close relative, or friend was said to be a strong determinant for willingness to be vaccinated.[26, 27] In Thailand, the willingness to be vaccinated was influenced by the increasing numbers in COVID-19 infections and deaths, especially in vulnerable populations that includes pregnant women.[26]

Lack of trust in the government, vaccine safety, the fear of miscarriage and cost were major reasons identified for vaccine hesitancy in this study. This finding was not different from what has been documented in literature. Factors identified that could reduce vaccine hesitancy were availability of confirmed data on the safety and efficacy of the vaccines in pregnancy and babies, provision of government incentives, and knowing someone who had received the vaccine without untoward side effects. Similar observations have been documented by other authors [27,28,29, 30,31]. Findings from our study highlight the need for public health action and guidance through national policy implementation to reduce misconceptions about the COVID-19 vaccine.

CONCLUSION: This study showed that COVID-19 vaccine acceptance is quite low among pregnant and nursing mothers in our environment. It also showed that the educational status of our women is not sufficient on its own to drive acceptance. Lack of trust in the government, vaccine safety, the fear of miscarriage and cost were major reasons identified for vaccine hesitancy in this study.

Ethical Approval

Ethical approval for the study was obtained from the Health and Research Ethics committee of the Lagos State University Teaching Hospital, Ikeja (REF. NO: LREC/06/10/1663).

Consent

All the participants were informed of the research objectives and written consent obtained prior to enlistment.

LIMITATION

Although this was a multicenter study, it was still institutional based. A larger community based study may thus be required for more robust and generalizable inferences.

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