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ORIGINAL ARTICLE

Determinants of Willingness to Pay for COVID-19 Vaccines among Residents of Osun State, South-West Nigeria

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Keywords

COVID-19;

Vaccine;

Willingness to pay;

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ABSTRACT

Background: COVID-19 pandemic has affected virtually all spheres of society. As countries await the COVID-19 vaccine, it is imperative to plan for its financing to ensure high vaccine coverage. This study aimed to determine the willingness to pay for COVID-19 vaccine among adult residents of Osun State.

Methods: A cross-sectional analytical study design was employed. Seven hundred and forty-four respondents were enrolled from three selected Local Government Areas using multistage sampling method. An interviewer-administered questionnaire in electronic format (Kobo Collect) was used for data collection while the data was analysed using SPSS version 25. Determinants of willingness to pay for COVID-19 vaccine were assessed using binary logistic regression. A p-value of < 0.05 was considered statistically significant.

Results: About one-quarter, 181 (24.3%) were willing to pay for COVID-19 vaccine. The median amount respondents were willing to pay was ₦650 (IQR= ₦1563) [$1.71 (IQR = $3.96)]. Being a healthcare worker (Odds ratio = 2.0, 95% CI =1.085–3.712, p=0.026), perception of susceptibility (Odds ratio = 1.9, 95%CI = 1.232-2.973, p=0.029) and self-efficacy (Odds ratio = 2.5, 95% CI = 1.571 – 4.071, p<0.001) were significant positive determinants of willingness to pay for COVID-19 vaccine. Misconceptions or perceived barriers were not significant determinants of willingness to pay for the vaccine.

Conclusion: These findings indicate that there is a need for health promotion interventions to correct misconceptions about COVID-19. Government and private donor interventions may be required to subsidize the vaccine to ensure high vaccine coverage.

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INTRODUCTION

COVID-19 has become a public health emergency of international concern.[1] The pandemic of this highly virulent viral infection has impacted various aspects of human life in terms of its high mortality and morbidity rates, disruption of the health system, and the economy of individuals, nations, and the world at large.[2-6] The mode of transmission is

mainly via respiratory droplets which put virtually all at risk of contracting the disease.[7,8] Health care workers are more at risk of contracting the disease relative to most other professions.[9] The increased susceptibility, morbidity, and mortality among the healthcare workers have further worsened the already strained health system, and consequently, worsen the fight against the pandemic.[10-13] Several public health measures have been tried in the fight against the disease, including the promotion of universal precaution, drug and vaccine development, and trials.[14-17] Several drugs and vaccines are at various stages of clinical trials, with some on the verge of mass administration.

Vaccine hesitancy, a situation where individuals, groups, or populations delay the acceptance of vaccines or reject it outrightly, may play a role in COVID-19 vaccine acceptance by the people.[18] The World Health Organization (WHO) had proposed the 3Cs model for vaccine hesitancy and opined that factors such as confidence, complacency, and convenience may influence vaccine hesitancy.[19] Various misconceptions concerning COVID-19 disease and its vaccines may reduce confidence in the vaccine and facilitate hesitancy.[20,21] The common misconceptions that have been identified include the political undertone behind the disease and relationship of the disease with 5G network.[22,23] The infodemic that characterized COVID-19 has also been linked with reduced risk perception of COVID-19 infection leading to emotional fatigue towards compliance with non-pharmacologic public health measures put in place to combat the disease.[24] The reduced risk perception breeds complacency and may have implications on the willingness of people to pay for vaccinations in the fight against the dis ease.

There have been no known previous studies that assessed willingness to pay for COVID-19 vaccine in this study area. However, a previous study on willingness to pay for COVID-19 vaccine among Indonesians showed that majority (78.5%) of the respondents were willing to pay for the vaccine.[25] Previous studies on willingness to pay for other vaccines showed varying outcomes.[26-28] While majority of the respondents were willing to pay for Ebola vaccine (87.5%) and Monkey Pox vaccine (87.4%)[26,28], very few households (37.5%) were willing to pay for Hepatitis B vaccines in a similar study conducted among Malaysians.[27] Similar

studies conducted on willingness to pay for Human Papilloma Virus (HPV) vaccine in Nigeria revealed that majority of the participants were willing to pay for HPV vaccine.[29,30]

As most countries strive to procure COVID-19 vaccines for their citizens, it is imperative to assess the willingness of people to pay for the vaccine and factors influencing their willingness to pay, particularly in developing countries where there is heavy reliance on out-of-pocket payment. The study also assessed the average amount of money an individual will be willing to pay for the vaccine. This may form the basis for projecting subsidization of the vaccine to ensure universal access.

METHODOLOGY

Study area: The study was conducted in Osun State, a land-locked state in the southwest of Nigeria. It covers an area of approximately 14,875 square kilometres, 7°30′N 4°30′E. According to the national population census, it has a total population of 3,423,535 as of 2006, with a 2020 population projection figure of 5,320,967 based on an annual growth rate of 3.2%. Up to 96% of the population are Yoruba while the other major Nigerian tribes, Hausa and Igbo, are also fairly represented. The state has thirty Local Government Areas (LGAs) with an equal proportion of rural and urban LGAs. Majority of the people speak Yoruba language while English is the official language. Majority of the inhabitants of the state are either Christian or Muslim; there are also few traditional religious worshipers. About 1 out of 5 adults (20.1%) were illiterate.[31] Both the rural and urban local communities in Osun State have good access to communication infrastructures that are being used for the dissemination of health information. The common means of communication include radio, television, posters, and health education or sensitization conducted by healthcare workers in the communities.

Each LGA has between 10 and 11 wards with at least a Primary Health Care (PHC) centre per ward to ensure access to healthcare. All the PHC centres have facilities for vaccination thus reducing the barrier of physical access to facilities that offer routine immunization. This can be leveraged upon to ensure adequate COVID-19 vaccine coverage. The state has three major centres for the testing and treatment of COVID-19, located at Osogbo, Ile-Ife, and Ejigbo. These centres served as the referral centres for other adequately

sensitised healthcare facilities within their catchment area. The screening and treatment at these centres are free while the option of screening for a fee is also available.

Study design and population: This study was conducted using a cross-sectional, analytic study. Participants in the study comprised both males and females who were 18 years old and above. Younger age groups were excluded because their willingness to uptake or pay for COVID-19 may be subject to the decision of their parents or their guardian. Data were collected over three weeks between August and September 2020. The minimum sample size (N) was calculated to get an absolute precision of ± 5% using the sample size formula for a single proportion; $N = Z^2P(1-P)/d^2$, where Z is the standard normal deviation of at 95% confidence level (1.96).[32] The sample size was calculated based on the proportion (P) of the study population that was willing to uptake COVID-19 (78.3%) in a similar study conducted in Indonesia.[25] After correcting for anticipated non-response rate of 10%, the sample size was 290.

A total of 744 respondents, however, participated in the study across the three selected LGAs to ensure the robustness of the study.

Sampling technique: The participants were selected via a multistage sampling method. Three out of thirty local government areas in Osun State were selected via simple random sampling technique, balloting method. The three LGAs were from two out of the three senatorial districts in the state. Osun State is a homogenous state in terms of socio-cultural environment and practices; hence, the selection of three local government areas which comprise both the rural and urban adequately represent the study area Each selected LGA has eleven wards, out of which three wards were selected per LGA, by simple random sampling method. Alternate households were selected and a willing eligible adult per household was enrolled in the study. The sample size was proportionally allocated to the LGAs based on the projected population of the selected local government areas. A total of 370 respondents was recruited from Osogbo LGA, while 252 and 122 respondents were recruited from Ife Central and Atakumosa West LGAs, respectively.

Data collection: Data were collected using an electronic interviewer-administered

questionnaire, Kobo Collect. The questionnaire was structured mainly as close-ended while room was given for other responses not captured in the close-ended response to each question in form of an open-ended response. The questionnaire consisted of five sections: Section A contained questions on the socio-demographic data while section B assessed the awareness and knowledge of COVID-19. Section C contained myths and misconceptions about COVID-19 while section D contained questions on perception of COVID-19. The questions on perception of COVID-19 were structured based on the construct of the Health Belief Model.[33] This included assessment of perception of respondents being susceptible to contracting COVID-19 based on response to four questions bothering on the felt risk of contracting the disease. The perception of severity of the disease was assessed based on response to five questions related to the constructs while their perception of benefits of adopting measures to prevent the disease, including uptake of COVID-19 vaccine, was assessed based on the response to four questions that addressed the construct. Perceived barriers to taking COVID-19 vaccine and cue to action were accessed based on response to five and six sets of questions tailored to address these constructs, respectively. Response to questions under each construct was rated on a 4-point Likert scale where 1 represented "strongly disagree" and 4 represented "strongly agree". Section E assessed the willingness to pay for COVID-19 vaccine by the respondents. The questionnaire was pretested at Ife-East Local Government Area, an area not involved in the main study.

Data analysis: Data were analysed using IBM SPSS version 25 for Windows.[34] Categorical variables like sociodemographic variables and willingness to pay for COVID-19 vaccines were summarised using frequencies and proportions. Association between sociodemographic variables and willingness to pay for the vaccine was assessed using Chi-Square test. The perception of COVID-19 was scored based on response to 4-point Likert scaled structured questions. Maximum attainable score was 32. Those that scored half 16 and above were regarded as having good perceptions while those that score below 16 were regarded as poor perception. Each construct of the Health Belief Model, susceptibility, severity, benefits, barriers, and self-efficacy was determined separately through summa-

tion of the values attached to the Likert scale response attached to each question. Overall perception of COVID-19 disease and its vaccines, was scored via a summation of scores from all the constructs of the model.

The level of knowledge of COVID-19 was assessed through the summation of scores derived from responses to seven questions under section B of the questionnaire. The level of knowledge about COVID-19 was assessed based on the responses to seven sets of questions bordering on aetiology, mode of transmission, and prevention of the disease. Appropriate response attracted one mark while inappropriate response attracted zero mark. Respondents that scored 4 and above out of the maximum attainable score of 7 were classified as having good knowledge of COVID-19 while those that score below 4 were classified as having poor level of knowledge. The determinants of willingness to pay for COVID-19 vaccine were further assessed using binary logistic regression. A p-value of less than 0.05 was considered to be statistically significant.

Ethical considerations: Ethical approval was obtained from the Research and Ethics Committee of the Institute of Public Health (IPH), Obafemi Awolowo University, Ile-Ife, Nigeria (IPH/OAU/12/1590). Verbal informed consent was sought from each respondent after an adequate explanation of the objectives of the study. Confidentiality and data security were assured. Participation was made voluntary as each participant was at liberty to opt out at any point in the study.

RESULTS

Out of 750 respondents enrolled in the study, 744 completed the questionnaire; hence, a response rate of 99.2%. The median age of respondents was 35.0 (17.0) years and there was almost equal representation of both male and female respondents, 367 (49.3%) and 377 (50.7%) respectively. Most of the respondents, 514 (69.1%) were married followed by the proportion of respondents that were single, 196 (26.3%). More than one-third, 281 (37.8%) of the respondents had secondary level of education while 335 (45.0%) had completed tertiary level of education. Artisanate job was the most common occupation among the respondents, 230 (30.9%). This was followed by the proportion of respondents that were civil servants, 157 (21.1%), and unemployed, 155 (20.8%). Most of the respondents were Christian, 488 (65.6%) followed by Islam, 240 (32.3%). (Table 1).

A multiple response analysis on common misconceptions about COVID-19, based on the 655 respondents with at least a misconception as the denominator, showed that the most common misconception about COVID-19 was that the disease was politically motivated, 431 (65.8%) of the responses. This was followed by the proportion of responses that associated the COVID-19 outbreak to religious beliefs, 418 (63.8%). Other common misconceptions observed were as follows: COVID-19 was created to develop vaccine markets for the influential people, 176 (26.9%), the disease was created to reduce the population of the world, 136 (20.6%). The least mentioned misconceptions were links of the disease with 5G network 108 (16.5%) and intention of network service providers to use the vaccine to control people like robots, 84 (12.8%). `

Majority of the respondents, 563 (75.7%) were not willing to pay for COVID-19 vaccines. (Figure 1) The median amount respondents were willing to pay was ₦650 (IQR=₦1563) [$1.71 (IQR=$3.96)]. There was a significant association between level of education and willingness to pay for the vaccine (p = 0.006). The proportions of people willing to pay for COVID-19 vaccine were observed to decline with the decreasing level of education of respondents. Majority of those that were willing to pay for the vaccine were those with tertiary level of education 102 (30.4%). Participants with no formal education had the least proportion of people willing to pay for COVID-19 vaccine, 2 (15.4%). The nature of occupation of the respondents had a significant association with willingness to pay for COVID-19 vaccine, p <0.001. The proportion of healthcare workers willing to pay for the vaccine was 36 (40.9%) while the proportion of respondents in non-health-related professions willing to pay for the vaccine was 145 (22.1%). The proportion of respondents with good knowledge of COVID-19 that were willing to pay for its vaccine was 174 (25.5%) while the proportion of respondents with poor knowledge of COVID-19 that were willing to pay for the vaccine was 7 (11.3%); and this was statistically significant, p = 0.012. There was a significant association between having at least one misconception about COVID-19 and willingness to pay for the COVID-19 vaccine, p = 0.005. (Table 2).

The proportion of respondents who perceived themselves to be susceptible to

contracting COVID-19 that were willing to pay for the vaccine, 144 (27.5%), was significantly higher than the proportion of respondents with poor perception of their susceptibility to contracting COVID-19 disease, 37 (16.8%), p = 0.002.

Table 1: Sociodemographic characteristics of the respondents

Variables	Frequency (n=744) n (%)
Age group (years)	
18- 20	75 (10.1)
21- 40	433 (58.2)
41 – 60	212 (28.5)
61 and above	24 (3.2)
Sex	
Male	367 (49.3)
Female	377 (50.7)
Marital status	
Single	196 (26.3)
Married	514 (69.1)
Divorced	6 (0.8)
Widowed/widower	28 (3.8)
Tribe	
Yoruba	648 (87.1)
Hausa	14 (1.9)
Igbo	76 (10.2)
Others	6 (0.8)
Religion	
Christianity	488 (65.6)
Islam	240 (32.3)
Traditional	15 (2.0)
Atheist	1 (0.1)
Level of education	
None	13 (1.7)
Primary	115 (15.5)
Secondary	281 (37.8)
Tertiary	335 (45.0)
Occupation	
Artisan	230 (30.9)
Civil Servant	157 (21.1)
Trading	151 (20.3)
Farming	45 (6.1)
Others	6 (0.8)
Unemployed	155 (20.8)

Median age (IQR) = 35 (17.0) years

Also, the proportion of respondents willing to pay for COVID-19 vaccine among those with high perceived barriers, 167 (23.4%) was significantly lower than the proportion willing to pay among respondents with low perceived barriers, 14 (48.3%), p = 0.002. The proportion of respondents willing to pay for the vaccine among those with good self-efficacy, 165 (27.6%), was significantly higher than the proportion willing to pay among respondents with poor self-efficacy, 16 (11.0%), p < 0.001. Though higher proportions of respondents with good perceptions of severity of the disease and good perception of the benefit of the vaccine were willing to pay for the vaccine compared with respondents with poor perceptions of the constructs, the differences in the proportion were not statistically significant. (Table 3).

The respondents' occupation was a significant determinant of willingness to pay for COVID-19 vaccine. Health workers were 2.0 times more likely to pay for the vaccine than respondents from other non-health-related fields [Odds ratio = 2.0, (95%CI = 1.085 – 3.712), p = 0.026]. The respondents with at least one misconception were less likely to be willing to pay for COVID-19 vaccine; this

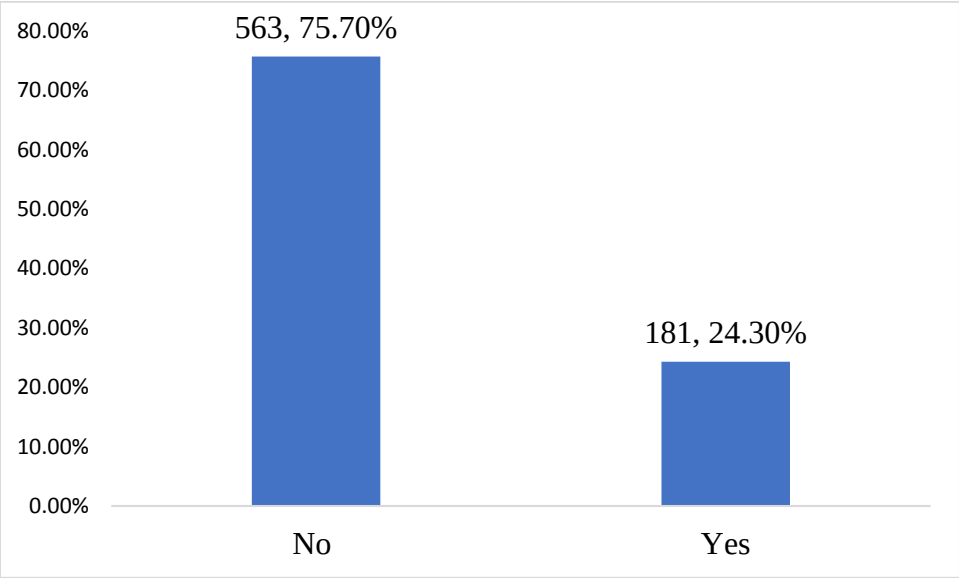

Figure 1: Willingness to pay for COVID-19 vaccine among respondents

Table 2: Association between respondents' characteristics and willingness to pay for COVID-19 Vaccine

Variables	Willingness to pay for COVID-19 Vaccine		Test statistics
	No (n=563) n (%)	Yes (n=181) n (%)	
Sex			$X^2 = 0.048$
Male	279 (76.0)	88 (24.0)	$p = 0.826$
Female	284 (75.3)	93 (24.7)	
Religion			
Christianity	368 (75.4)	120 (24.6)	$X^2 = 2.917$
Islam	180 (75.0)	60 (25.0)	$p = 0.233$
Traditional	15 (93.8)	1 (6.3)	
Level of education			
None	11 (84.6)	2 (15.4)	$X^2 = 12.5372$
Primary	92 (80.0)	23 (20.0)	$p = 0.0057$
Secondary	227 (80.8)	54 (19.2)	
Tertiary	233 (69.6)	102 (30.4)	
Occupation			
Health Workers	52 (59.1)	36 (40.9)	$X^2 = 14.905$
Non-health Related Workers	511 (77.9)	145 (22.1)	$p < 0.001$
Knowledge of COVID-19			
Poor	55 (88.7)	7 (11.3)	$X^2 = 6.245$
Good	508 (74.5)	174 (25.5)	$p = 0.012$
Presence of misconception			
Yes	506 (77.3)	149 (22.7)	$X^2 = 7.424$
No	57 (64.0)	32 (36.0)	$p = 0.006$

Table 3: Association between respondents' perceptions of COVID-19 disease and willingness to pay for COVID-19 vaccine

Variables	Willingness to pay for COVID-19 vaccine		Statistics
	No n (%)	Yes n (%)	
Perceived Susceptibility			
Poor	183 (83.2)	37 (16.8)	$X^2 = 9.569$
Good	380 (72.5)	144 (27.5)	p = 0.002
Perceived Severity			
Poor	8 (88.9)	1 (11.1)	$X^2 = 0.864$
Good	555 (75.5)	180(24.5)	p = 0.864
Perceived Benefit			
Poor	57 (82.6)	12 (17.40	$X^2 = 1.988$
Good	506 (75.0)	169 (25.0)	p = 0.159
Perceived Barriers			
Low	15 (51.7)	14 (48.3)	$X^2 = 9.401$
High	548 (76.6)	167 (23.4)	p = 0.002
Self-Efficacy			
Poor	130 (89.0)	16 (11.0)	$X^2 = 17.635$
Good	433 (72.4)	165 (27.6)	p < 0.001

was however not statistically significant [odds ratio = 1.2, (95% CI = 0.643 – 2.246), p = 0.564]. Though people with good knowledge of COVID-19 were 2.0 times more willing to pay for vaccines, the odds ratio was not statistically significant [odds ratio = 2.0 (95%CI = 0.454 – 8.596), p = 0.365]. The respondents that perceived themselves to be susceptible to having COVID-19 were 1.9 times more willing to pay for the COVID-19 vaccine [odds ratio = 1.9, (95% CI = 1.232 – 2.973), p = 0.004]. The respondents with good self-efficacy were about 2.5 times [odds ratio = 2.5, (95% CI = 1.571 – 4.071) p < 0.001] more likely to be willing to pay for the vaccine.

Those who had a high perceived barrier to obtaining COVID-19 vaccine were less likely to be willing to pay for COVID-19 vaccine. This was however, not statistically significant [odds ratio = 0.9, (95%CI = 0.716 – 1.654), p = 0.693] (Table 4).

DISCUSSION

Majority of the respondents in the study were not willing to pay for COVID-19 vaccine. This might be due to the misconceptions about the disease because about one-quarter of the respondents believed that the disease was politically motivated. This, in addition, to the belief by about one-tenth of the respondents that COVID-19 was invented to create a vaccine market may have been responsible

Table 4: Binary logistic regression showing determinants of willingness to pay for COVID-19 vaccine

Variables	Odds Ratio	95% CI	p-value
Level of Education			
No formal education	Ref		
Primary	1.2	0.130 – 10.564	0.889
Secondary	2.1	0.254 – 17.086	0.494
Tertiary	1.9	0.227 – 15.277	0.562
Occupation			
Non-Health Workers	Ref		
Health Workers	2.0	1.085 – 3.712	0.026
Knowledge of COVID-19			
Poor	Ref		
Good	2.0	0.454 – 8.596	0.365
Having at least a myth/misconception	Ref		
No	1.2	0.643 – 2.246	0.564
Yes			
Perception of Susceptibility to COVID-19	Ref		
Poor	1.9	1.232 – 2.973	0.004
Good			
Perceived Barriers			
Low	Ref		
High	0.9	0.716 – 1.654	0.693
Self-Efficacy/Cue to Action			
Poor	Ref		
Good	2.5	1.571 – 4.071	<0.001

for the high rate of anticipated COVID-19 vaccine hesitancy. The common vaccines in the study area are those under the Nigerian National Programme for Immunization. These vaccines are donor-funded, hence, free for all, especially for under 5 children. The long-term existence of free immunization programme could have contributed to the perception that COVID-19 vaccine should be free. This shows that the vaccine coverage will be poor without government and non-governmental support to offset the cost of vaccination. However, offsetting the cost of vaccination to make it affordable for citizens of low-resource countries like Nigeria may not be economically sustainable. The poor willingness to pay for COVID-19 vaccine may be a drawback in the fight against the pandemic as majority of the population will be left unprotected without alternative sources of funding for the vaccination programme.

The finding from this study is contrary to the observation of most studies where it was observed that majority of respondents

were willing to pay for vaccines.[26,28-30] The studies were however conducted on diseases with fewer misconceptions and infodemics like human papilloma virus, monkeypox, and Ebola.[26,28-30] The finding from this study was however similar to the result from a study conducted on willingness to pay for hepatitis B vaccine among Malaysians.[27] The poor willingness to pay for Hepatitis B vaccine could also be due to its availability free of charge under the Malaysian Immunisation Programme.[35]

The average amount the respondents were willing to pay was low, $1.71 (₦650). This could be due to the socio-economic status of majority of the citizens in the study area because a significant proportion of the citizens live on less than 1.9 dollars per day [36], coupled with the poverty induced by COVID-19 lockdown in low-income countries like Nigeria. The low amount respondents were willing to pay could also be due to misconceptions that the disease was politically motivated and to create markets for the elites. The amount respondents were willing to pay was much lower than findings from a similar study conducted in Indonesia where the median amount respondents were willing to pay was $30 (₦11,403).[25] The difference in the value placed on COVID-19 vaccine in the two study areas could be due to differences in the socio-economic status of the countries.[25] The amount respondents were willing to pay for Human Papilloma Virus (HPV) vaccine in similar study areas in Nigeria was higher than the amount respondents were willing to pay for COVID-19 vaccine.[29,30] The studies on HPV were however conducted among females only and may be a reflection of the difference in health care demand across genders. This higher value place on the HPV vaccine could also be due to little or no misconception about the virus and its long-term effect, relative to COVID-19.

Based on the constructs of the health belief model, by which respondents' perception was assessed, perception of COVID-19 was a strong determinant of willingness to pay for the vaccine. Those that perceived themselves to be susceptible were twice more likely to be willing to pay for the vaccine. This could explain the reason for a higher proportion of health care workers that were willing to pay for the vaccine because healthcare workers are more at risk of contracting the disease. Hence, the willingness to protect themselves and the expected higher level of knowledge about the disease from this group may be

responsible for the high willingness to pay for the vaccine. The observation of higher willingness to pay for COVID-19 vaccine was in agreement with that of a similar study conducted in Indonesia where being a healthcare worker and having high perceived susceptibility had significant associations with the willingness to pay for the vaccine.[25]

This study observed that those with at least one perceived barrier were less likely to be willing to pay for the vaccine. The perceived barriers that were assessed include availability in the locality, the cost implication, belief about the disease and its vaccine, and stigmatization associated with having COVID-19. These barriers may have a significant effect on the uptake of COVID-19 vaccine, even if vaccines are offered free. This is similar to findings from a study that assessed barriers to COVID-19 vaccination in the USA where both structural and attitudinal factors constituted barriers against COVID-19 vaccination.[37] Self-efficacy was also observed to have a positive association with willingness to take COVID-19 vaccine. Most of the respondents with high self-efficacy were willing to take the vaccine compared to the proportion of respondents with low self-efficacy. This is similar to findings from a study conducted among US adults where a significant association was observed between self-efficacy and intention to take the COVID-19 vaccine.[38] There was no significant association between perceived severity of the disease, perceived benefit of the vaccine, and willingness to take the COVID-19 vaccine. This could be due to an array of misconceptions surrounding the disease and its vaccines, thereby, casting doubt on the existence of the disease and the need for uptake of preventive measures like taking its vaccine.

As the government makes a frantic effort to procure the COVID-19 vaccine, there is a need to strategize to address the impending COVID-19 vaccine hesitancy. The Nigerian health system, like many other developing countries, relies more on the out-of-pocket system of financing and donor funds. Therefore, with less than one-quarter of respondents willing to pay for the vaccine, the fight against COVID-19 may linger for long without intervention. The average amount ₦650 ($1.71), respondents were willing to pay for the vaccine is below the cost of production of most vaccines, and the logistics required to get it to end-users. A multidisciplinary approach is required to ensure COVID-19

vaccine coverage with a major focus on community engagement and participation. There is also a need for the government and other concerned donor agencies to subsidize the vaccine while being made free for the poor in the community to ensure high COVID-19 vaccine coverage when it is eventually introduced. This will include health promotion to address all the constructs of health belief model. This should include health education intervention to increase perception of susceptibility to the disease and improve self-efficacy of the populace. Other health promotion measures should be put in place to address the perceived barriers against uptake of the vaccine. The misconceptions about the pandemic and its vaccine will also require intense health education. The reduction in misconceptions about the disease will improve perceived benefit of taking COVID-19, therefore, improve the willingness of people to pay for the vaccine.

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Authors' contributions: The research was led by the principal investigator, PAA. All authors (PAA, OF, IAO, FOW, OTE) participated in the development of questionnaire used for the study and coordination of data collection. Data analysis was done by PAA, while PAA, OF, and IAO were involved in manuscript writing. All authors were involved in the review of manuscript and effecting corrections suggested by the reviewers.

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