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Article

Subjective Reasons for COVID-19 Vaccine Hesitancy and Sociodemographic Predictors of Vaccination in Nigeria: An Online Survey

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Abstract: The purpose of this study was to examine the subjective reasons for hesitancy to receive COVID-19 vaccination and the sociodemographic factors associated with vaccination uptake. An online social media survey was conducted among the general Nigerian population using a self-developed questionnaire. Data were analyzed using binary logistic regression with crude and adjusted odds ratios (AOR) at a 95% confidence interval (CI) and a *p* value of less than 0.05. A total of 576 participants with a mean age of 31.86 years participated in the study. 31.3% (*n* = 180) received one or more doses of the COVID-19 vaccine. Teachers were significantly less likely than health professionals to be vaccinated (AOR = 0.33, 95% CI 0.16–0.69). In addition, unemployed people (AOR = 0.37, 95% CI 0.15–0.89) were less likely to be vaccinated than government employees, and those of intermediate socioeconomic status (AOR = 0.47 95% CI 0.26–0.88) were less likely to be vaccinated than were those of high socioeconomic status. Five main themes emerged regarding participants' subjective reasons for hesitating to receive the COVID-19 vaccine: fear related to vaccine content (e.g., efficacy), negative effects on the body (e.g., blood clots), distrust of the system/government (e.g., politics), psychological concerns (e.g., anxiety), and misconceptions. Sociodemographic variables and vaccine misconceptions were found to play an important role in COVID-19 vaccination coverage in Nigeria.

Keywords: COVID-19; vaccination; predictors; fear; misconception



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1. Introduction

On 11 March 2020, the World Health Organization (WHO) declared a COVID-19 pandemic [1]. A situation assessment showed that 1,098,762 cases of COVID-19 were reported between 31 December and 3 April 2020, including 59,172 deaths [2]. By March 2022, this number increased to 469 million confirmed cases, with more than 6 million deaths [3]. In many countries, the increase in numbers was mainly due to ineffective prevention measures [4,5]. Different strains of coronavirus have been associated with high

numbers of deaths worldwide [6]. Mass vaccination has been the most effective strategy for dealing with such pandemics [7]. Sociodemographic factors [8], as well as social, political, and economic determinants, have been identified as influencing vaccine uptake [9]. In this study, we investigated the influence of sociodemographic variables on vaccine uptake in Nigeria.

In the past, there have been several controversies about vaccines. For example, in the nineteenth century, antivaccine leagues were formed, particularly in the United Kingdom and the United States, raising concerns about the safety and efficacy of tetanus, diphtheria, and pertussis vaccines, as well as rubella, measles, and mumps vaccines claiming that vaccines contained potentially harmful substances such as mercury or the preservative thimerosal [10]. This concern continues today. However, it has been fueled by aggressive marketing by the pharmaceutical companies that manufacture the vaccines and underhanded lobbying by state legislators, undermining many people's confidence in vaccines [11]. Although health scientists and clinicians have hailed vaccination as one of the greatest achievements of the 20th century, the controversy over the COVID-19 vaccines now has more of a left-right political quality than the past vaccines [12]. Another trigger is the continuing spread of the COVID-19 virus around the world, causing political and civil unrest in addition to a global recession [13]. Technological advancement has created a space that favors misinformation and in which aberrations spread quickly [14]. This led to the spread of fake news and a number of myths related to COVID-19 [15]. Although times have changed, the underlying sentiments and deeply held beliefs of vaccination opponents, whether philosophical, political, or spiritual, have remained relatively constant. In conjunction with changing trends, there is a need to further investigate why people are reluctant to accept COVID-19 vaccines.

The WHO has stated that one of the greatest threats to global health is the risk of vaccine hesitancy [16]. To build herd immunity against COVID-19, at least 70 percent of the population must be vaccinated [17]. As the COVID-19 situation changes frequently, so does the perception of COVID-19. The COVID-19 vaccine was launched by Pfizer after the company announced in November 2020 that the vaccine was 95% effective in preventing the disease [18]. As reports of adverse effects of the Pfizer vaccine flooded social media platforms [19], people became more skeptical of the COVID-19 vaccine. Given the increase in information and misinformation about vaccination [20], it was important to acknowledge people's concerns and aggressively target vaccine-shy populations with campaigns that emphasized risk-benefit analysis to build trust and overcome fear. Importantly, the COVID-19 vaccine acceptance studies were conducted primarily prior to vaccine introduction [21]. The federal government of Nigeria has launched campaigns through various media platforms to promote acceptance. Recently, a review found that between 20% and 58.2% of the Nigerian population in the six Nigerian geopolitical zones accepted the COVID-19 vaccine [22]. In this study, we examined the sociodemographic predictors and subjective reasons associated with COVID-19 vaccine hesitancy and how this affects vaccine acceptance. It is expected that the results of this study will contribute to a framework for effective policy implementation to improve vaccination rates in Nigeria.

2. Methods

2.1. Study Design

An online cross-sectional survey was conducted to investigate the perception of COVID-19 vaccination by the general Nigerian population. The study followed the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) statement guide for observational studies [23].

2.2. Setting and Participants

Participants were all Nigerians 16 years and older. Participants under the age of 16 were not included because of the need for parental consent, which could not be ascertained from an online survey. The survey was open to participants from all six geopolitical zones

of Nigeria, comprising the north-central, northeast, northwest, southeast, south-south, and southwest zones.

2.3. Variables

The outcome variable included the uptake of at least one dose of the COVID-19 vaccine since the start of the outbreak in 2019. Predictors comprised of age, sex, education level, socioeconomic status, marital status, employment status, and occupation.

2.4. Instrument

An electronic questionnaire was used. It consisted of three sections, comprising respondents' demographic data, COVID-19 vaccination status, and subjective reasons for being hesitant about COVID-19 vaccination. For the vaccination status question, participants were asked to indicate whether they had already been administered the COVID-19 vaccine and, if not, whether they were willing to be vaccinated and recommend vaccination to others. Regarding subjective reasons for hesitating to take the COVID-19 vaccine, participants were asked to describe their fear of the COVID-19 vaccine (if any) with a "word" that best described their perception of the vaccine.

2.5. Data Collection

Data from this survey were collected online on the social media platforms Facebook and LinkedIn. Facebook was chosen because it is one of the most popular social media platforms in Nigeria, and LinkedIn was chosen because of its relevance to professional networking. The survey tool was created in Google Forms (<https://docs.google.com/forms> accessed on 15 August 2022), and the links were shared via social media platforms from October to December 2021. The survey link was active throughout the data collection period until the survey link was deactivated on 31 December 2021.

2.6. Data Analysis

A frequency table and pie chart were used to summarize the responses of the participants. Binary logistic regression was used to examine each sociodemographic variable predicting COVID-19 vaccine uptake. Multiple logistic regression (MLR) was used to examine the interaction of sociodemographic factors with COVID-19 vaccination. Using the "enter" strategy for model building, we created a model for MLR using variables from the respondents' sociodemographic data. Crude odds ratio (COR) and adjusted odds ratio (AOR) were used as measures of effect size for the bivariate and multivariate logistic regressions, respectively. The alpha level was set at 0.05 with a 95% confidence interval for all outcomes. Data were coded and analyzed using the SPSS statistical package (IBM Corp. IBM SPSS Statistics for Macintosh, version 25.0. Armonk, NY, USA). For subjective reasons for COVID-19 vaccine hesitancy, themes were identified from participants' responses about their fear of the COVID-19 vaccine in a "word" that best described their perception of the vaccine.

2.7. Ethical Considerations

Formal ethical approval to conduct this study was obtained from Shehu Sule College of Nursing and Midwifery, Nigeria (reference: SCON&M/ RC /EC/01/004). All participants received detailed participants information about the study before confirming and agreeing to participate in the survey. Only participants who agreed and signed the consent form electronically were given access to the questionnaire. Participants 16 years of age and older who could read and understand the English language consented and participated in the survey. Respondents were informed that they could skip questions they did not want to answer or opt-out of the survey if they felt inclined to do so. To protect participant privacy, no identifiable information was used in the analysis of the results. However, participants had the option to provide their email addresses at the end of the survey if they wished to receive a summary of the results.

3. Results

A total of 576 participants with an average age of 31.86 years took part in the survey. Most participants were male (68.7%, $n = 390$) and medical professionals (29.2%, $n = 168$). About half of the participants were married (49.5%, $n = 285$), employed (54.8%, $n = 315$), and had a college degree (54.7%, $n = 315$). A large proportion of the participants (42.7%, $n = 245$) indicated they were of high socioeconomic status, and approximately one-quarter (24%, $n = 136$) indicated they were of low socioeconomic status (Table 1).

Table 1. Sociodemographic characteristics of respondents.

Variables	Categories	Responses	Percentage	N
Age (Mean SD)	-	31.86 ± 9.10	-	532
Sex	Female	180	31.3	575
	Male	395	68.7	
Occupation	Health professional	168	29.2	576
	Teacher/lecturer	76	13.2	
	Other civil servants	75	13	
	Business/self-employed	54	9.4	
	Student	162	28.1	
	Others	41	7.1	
Marital status	Single	279	48.4	576
	Others	12	2.1	
	Married	285	49.5	
Educational level	No formal education	20	3.5	576
	Primary or secondary	35	6.1	
	Post-secondary or diploma	80	13.9	
	First degree	315	54.7	
	Postgraduate	126	21.9	
Employment status	Never employed	122	21.3	573
	Self-employed	112	19.5	
	Previously employed	25	4.4	
	Currently employed	314	54.8	
Socio-economic status	High socioeconomic status (Above N85,000 per month)	242	42.7	567
	Middle socioeconomic status (N19,000 to N85,000 per month)	189	33.3	
	Low socioeconomic status (N18,999 or below per month)	136	24.0	

Less than one-third of the participants (28%, $n = 161$) were vaccinated with at least one dose of the COVID-19 vaccine, and a little more than one-third (38%, $n = 219$) were considering COVID-19 vaccination. In response to being asked if they would recommend the vaccine to others, 39% ($n = 224$) of the participants responded with “Yes” (Figure 1).

Participants’ responses to the question about their reasons for hesitating to receive the COVID-19 vaccine with a word that best described their perceptions of the vaccine are summarized in Table 2. This was assessed by asking the participants to state their fear of the COVID-19 vaccine (if any) in a “word” that best described their perception of the vaccine. Overall, less than one-third (28%) indicated “none,” meaning they had no fear or negative perception of the COVID-19 vaccine.

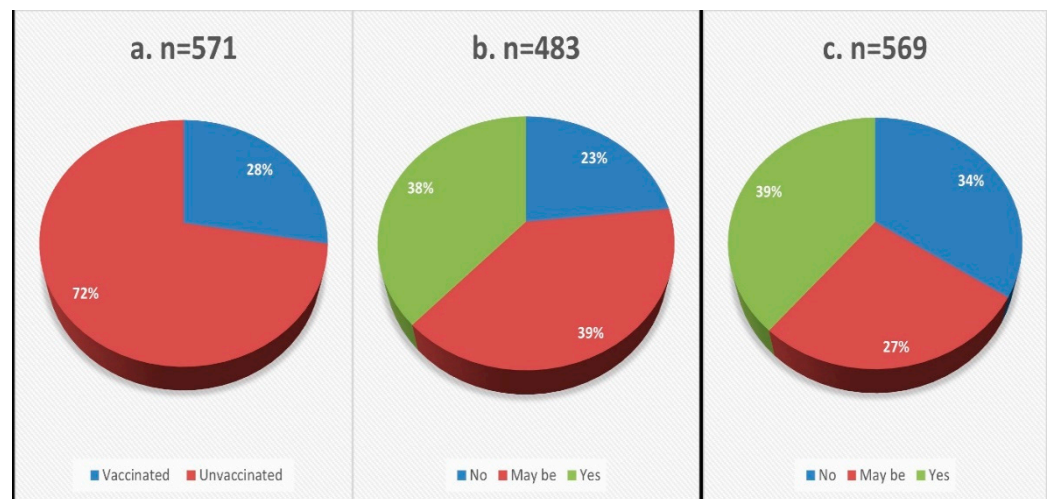


Figure 1. Pie charts indicating (a) COVID-19 vaccination status, (b) willingness to get vaccinated, and (c) recommendation for others to get vaccinated.

Table 2. Subjective description of reasons associated with COVID-19 vaccine hesitancy using one word (*n* = 393).

Variables	Frequency	Percentage
None	110	28
Fear	17	4.3
Afraid	12	3.1
Side effects	45	11.5
Rumors	4	1.0
Xenophobia	5	1.3
Efficacy	22	5.6
Uncertainty	5	1.3
Death	27	6.9
Blood clots	6	1.5
Infections	11	2.8
Safety	7	1.8
Dangerous	8	2.0
Uncomfortable	4	1.0
Trust	7	1.8
Politics	3	0.8
Doubt	4	1.0
Fake	4	1.0
Anxious	4	1.0
Don't believe	4	1.0
Terrifying	3	0.8
Others	81	20.6

Others gave various reasons using a word or phrase that indicated a negative perception of the vaccine (Table 2). Five major themes emerged from these reasons. These were negative perceptions related to the content/essence of the vaccine (e.g., efficacy, doubt, prematurity, danger, and uncertainty), adverse effects of the vaccine on the body (e.g., blood clots, side effects, safety, infection, and death), lack of trust in the government/system (e.g., trust, sincerity, and politics), psychological concerns (afraid, anxious, fearful, terrifying, and uncomfortable), and general misconceptions (e.g., xenophobia, rumor, falsification, and not believing). Others described their reasons for hesitating about COVID-19 vaccination with phrases such as ‘body becoming like a magnet after vaccine’, ‘health professionals’, ‘infertility’, ‘not a priority’, ‘time will tell’, and ‘hmmm’. To explore whether these reasons (Table 2) had a significant association with vaccination uptake, we regressed the various reasons as predictors of COVID-19 vaccination (Supplemental Table S1). The significant

factors identified were fear of side effects, the efficacy of the vaccine, and ‘others’ (Table 2). However, this analysis (Supplemental Table S1) was not used in reaching any conclusion in this survey due to the insufficient data used for the analysis.

As shown in Table 3, COVID-19 vaccine uptake was not significantly predicted by sex or age. However, occupational background, education level, employment status, marital status, and socioeconomic status were significant predictors of COVID-19 vaccination in bivariate analyses. After controlling for the effects of other variables (Table 3), teachers/lecturers were significantly less likely to be vaccinated than medical professionals (AOR = 0.33, 95% CI 0.16–0.69). In addition, participants who were unemployed (AOR = 0.37, 95% CI 0.15–0.89) or self-employed (AOR = 0.32, 95% CI 0.13–0.79) compared with participants who were employed and participants of middle socioeconomic status (AOR = 0.47, 95% CI 0.26–0.88) compared with participants of high socioeconomic status, were less likely to be vaccinated against COVID-19.

Table 3. Logistic regression indicating sociodemographic predictors of the COVID-19 vaccine in Nigeria (*n* = 512).

Variables	Categories	Crude OR (95% CI)	Adjusted OR (95% CI)
Age	-	1.02 (1.00–1.04)	0.98 (0.95–1.02)
Gender	Male	0.79 (0.53–1.16)	0.98 (0.62–1.55)
	Female	1	1
Occupation	others	0.28 (0.12–0.66) **	0.56 (0.21–1.49)
	Business	0.55 (0.28–1.08)	1.40 (0.48–4.09)
	Student	0.29 (0.17–0.48) ***	0.63 (0.27–1.46)
	Teacher or lecturer	0.33 (0.18–0.63) **	0.33 (0.16–0.69) **
	Other civil servants	0.57 (0.32–1.03)	0.71 (0.37–1.34)
	Health professionals	1	1
Educational level	Primary or secondary	0.38 (0.12–1.23)	0.74 (0.15–3.74)
	Diploma or post-secondary	0.67 (0.25–1.81)	1.22 (0.32–4.70)
	First degree	0.39 (0.16–0.99) *	0.52 (0.15–1.78)
	Postgraduate	0.51 (0.20–1.34)	0.66 (0.18–2.38)
	No formal education	1	1
Employment status	Never employed	0.57 (0.35–0.94) *	0.37 (0.15–0.89) *
	Self-employed	0.61 (0.30–0.85) *	0.32 (0.13–0.79) *
	Previously employed	0.50 (0.18–1.37)	0.50 (0.15–1.67)
	Currently employed	1	1
Marital status	single	0.63 (0.43–0.92) *	0.92 (0.53–1.64)
	others	1.06 (0.313.60)	1.39 (0.37–6.18)
	Married	1	1
Socioeconomic status	Middle	0.49 (0.31–0.76) **	0.47 (0.26–0.88) *
	Low	0.67 (0.42–1.08)	1.03 (0.47–2.23)
	High	1	1

* *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001.

4. Discussion

In this study, we examined the impact of sociodemographic factors on vaccination propensity in Nigeria and the subjective reasons for hesitancy to receive COVID-19 vaccination. Participants who were self-employed, unemployed, and of intermediate socioeconomic status were less likely to be vaccinated against COVID-19 than those of high socioeconomic status or government employees. Teachers and lecturers were also less likely to be vaccinated against COVID-19 than health professionals. Five factors were associated with fear of COVID-19 vaccination. These included fear of content (e.g., efficacy, doubt, prematurity, danger, and uncertainty), fear of negative effects on the body (e.g.,

the possibility of blood clots, side effects, safety, infection, and death), lack of trust in the government/system (e.g., trust in authorities, honesty, and politics), psychological concerns (e.g., fearful, anxious, anxiety, and fear), and general misconceptions (e.g., xenophobia, fake, and rumor), including the belief that their body would be like a magnet after vaccination.

Comparable studies also showed that high income was associated with acceptance of the COVID-19 vaccine [24], whereas low income was associated with rejection of the COVID-19 vaccine [25]. Employment status was found to be a determinant of individual income levels, and the majority of the financially disadvantaged were not employed [26]. Accordingly, individuals employed in public service (state or local government and businesses) were more likely to be vaccinated against COVID-19 [27]. This could be due to the introduction of compulsory vaccination in the workplace, with penalties for unvaccinated workers [27]. However, unemployed individuals reported low uptake of the COVID-19 vaccine [28]. There was evidence of higher acceptance of COVID-19 vaccine among health professionals [29,30]. This could be due to their familiarity with vaccines and knowledge of their benefits, their susceptibility to infection and the consequences of infection, and the fact that some hospital authorities mandate those caring for the sick to “do no harm” based on ethical principles. This is for the safety of the public and their comrades-in-arms [31]. On the contrary, acceptance of COVID-19 vaccination among lecturers and teachers was found to be low [32,33]. This may be because they are not a priority in national vaccine introduction plans in some countries, including Nigeria.

According to the theory of reasoned action, a person’s attitude toward the consequences of his or her actions and subjective norms (opinions about a person’s social environment) predict a person’s behavioral intentions [34]. COVID-19 is more likely to be adopted if people have a positive attitude about vaccination. Vaccination against COVID-19 is seen as beneficial by those who want to protect themselves and those around them, resulting in a high vaccination rate [35]. A valuable tool in the fight against disease and social injustice is raising public and individual awareness [36,37]. However, many people do not know that vaccination programs exist or are afraid of vaccination. Hesitancy about COVID-19 vaccination is exacerbated by rumors and conspiracy theories [38]. The source of most conspiracies is external and goes beyond observable events [39]. There has been a problem with vaccinations because of popular belief in conspiracy theories. There was a time when vaccines were rejected because of false claims, such as containing infertility drugs or spreading infectious agents such as human immunodeficiency virus (HIV) [40]. In many countries, polio cases continued to rise because of rumors that polio vaccines caused infertility. Conspiracy theories that COVID-19 was a hoax or a bioweapon developed in a Chinese lab began circulating on social media almost immediately after the virus was first reported [41]. Bertin et al. [42] found that the more participants believed in COVID-19 conspiracy theories, the less likely they were to support vaccination. Sallam et al. [43] reported a high prevalence of COVID-19 vaccination hesitancy among college students who believed in conspiracy theories, such as COVID-19 being an unnatural disease.

It could be argued that COVID-19 vaccines were rejected because of mistrust in their efficacy and lack of confidence in the health care system, the government, and the vaccine manufacturers [44–46]. Moreover, those who believed in sociopolitical conservatism were more likely to oppose the COVID-19 vaccines [47,48]. On the other hand, those who trusted their (institutional) health care system and the government were more willing to accept the vaccine [44,49]. The content and/or type of COVID-19 vaccine had previously influenced its acceptance or rejection. In particular, the use of different types of COVID-19 vaccines in countries with different safety profiles has led to public rejection [50]. However, it could be argued that people are more likely to accept vaccines if competent authorities increase their confidence in the safety and efficacy of vaccines by providing them with adequate information in a language they understand.

Certain characteristics of the COVID-19 vaccine, such as efficacy, safety, side effects, and adverse effects, influenced public opinion about acceptance or rejection [51]. Some may have accepted the vaccine because of uncertainty about the outcome in case of COVID-19

infection [52]. In addition, doubts about the technology used to produce COVID-19 vaccines, as well as fear about unforeseen adverse effects and their efficacy, had led to hesitation and rejection [46,53,54]. The perception of premature usage of the vaccine because of questionable reliability and other vaccine-specific concerns may have contributed to the hesitancy and rejection [45,55]. Concern about unforeseen negative effects of the vaccine, such as toxicity and fear of the vaccine's side effects, were also cited as factors contributing to hesitancy about COVID-19 vaccination [55,56]. Fear of a possible next wave, knowledge of higher transmission routes, and perceived risk of infection and severity of the disease are factors contributing to vaccine acceptance [57–59]. In addition, those who fear that the COVID-19 vaccine could lead to infection and other health risks are likely to reject it [60]. Because of inadequate education and myth-busting in public health campaigns, conspiracy theories, misinformation, and disinformation may have contributed to a reluctance to be vaccinated.

Misconceptions or misinformation, such as conspiracy theories or general antivaccine beliefs, as well as rumors that vaccines might benefit people who produce the virus or that people might get COVID-19 from the vaccine [24,45,47,55], are known to affect the acceptance and distribution of the COVID-19 vaccine. Other factors, such as biased information about vaccination messages, inadequate health literacy or poor knowledge about vaccines, poor quality of vaccine components, and the belief that vaccines are intended to inject recipients with microchips or cause infertility [46,61–63] also contribute to hesitancy about COVID-19 vaccines. Nigerian authorities may have failed to inform the public that the COVID-19 vaccines under development will not contain microchips or tracking software. Antivaccine messages disseminated via the Internet and traditional media channels could influence hesitation or rejection of COVID-19 vaccination [46,64]. This is likely due to unchecked social media reporting and the unfettered operation of the Internet, where people promulgate stories that could harm social security and public health systems. In addition, a belief in conspiracy theories and reaction to new information is likely to influence acceptance or rejection of COVID-19 vaccines [65]. The country of origin of the vaccine, the novelty of the vaccine, the cost, the short/unknown duration of immunity, concerns about faulty/falsified vaccines, and personal concerns, e.g., lack of belief in the vaccine, could also influence the acceptance of the COVID-19 vaccine [66–69]. The above factors indicate that vaccination refusal in Nigeria must be viewed as a multifaceted phenomenon that requires the implementation of interventions to promote vaccination rates.

4.1. Limitations

This study has several limitations. First, it was an online survey that did not describe the population to which it was distributed. Second, the response rate was low, and the generalizability of the results may be a challenge because it was difficult to reach individuals who did not have access to the Internet. The language barrier, reluctance to use technology/computers, and lack of accessibility for certain populations (elderly or women) could also be important factors contributing to bias in this study. Furthermore, it has been shown that surveys are only valuable if the results of the sample studied can be generalized to a meaningful population [70]. However, if the population covered by the survey cannot be explained and the sample is contaminated with biased respondents, the results cannot be generalized because they may be misleading. Again, the small sample size of this survey may not accurately reflect the general population, given Nigeria's diverse and vast population. A large sample survey is needed to validate these results as general trends. In addition, the lack of a high-quality sampling technique coupled with the lack of validation of the regression model can affect confidence in our statistical analyses. Therefore, the results should be taken with caution. Finally, this study did not use a standardized instrument to collect data. Instead, a self-developed questionnaire was used that was not pretested. However, the instrument used was appropriate to achieve the study objective of collecting demographic variables, COVID-19 vaccination status, and a single question to assess subjective reasons for hesitating about COVID-19 vaccination.

4.2. Implications

Our survey after the development of the COVID-19 vaccine allowed us to assess how perceptions of COVID-19 evolved, including hesitancy toward vaccination and the influence of sociodemographic factors. Therefore, policymakers, stakeholders, and other government officials involved in public health should consider the findings of this study when designing interventions to promote vaccine acceptance in the country (including COVID-19 vaccines). In addition, healthcare workers involved in vaccine administration should consider the results of this study to promote vaccine acceptance. Future study should examine the contributions of stress-related and socioeconomic factors. This can be done using the hybrid survey model.

4.3. Conclusions

According to the results of the study, the most important factors contributing to vaccination hesitancy were beliefs in conspiracy theories that undermine acceptance of COVID-19, and it is likely that willingness to vaccinate decreases because of individual fears of uncertainty. Others include doubt about the COVID-19 vaccine, its potential adverse effects or associated hazards, and misconceptions about its development, as well as lack of confidence in the public system and the nature of the vaccine and its components, and other psychological concerns. Vaccination success can be jeopardized by spreading these negative thoughts and behaviors in social media groups, communities, and affiliation circles. Therefore, public health and government experts should rethink the type of messages and campaigns that need to be developed to address the challenge of high vaccination hesitancy and low acceptance rates among Nigerians.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/covid2100097/s1>, Table S1: Association between subjective reasons of covid-19 vaccine hesitancy and COVID-19 vaccine uptake ($n = 388$).

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