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Attitude, Perception and Concern towards Children's Vaccination amidst COVID-19 Pandemic among Selected Workers in a Nigerian Population

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A B S T R A C T

Introduction: The coronavirus disease 2019 (COVID-19) is a vaccine-preventable disease amongst all ages; however, parental attitudes, perceptions and concerns towards children's vaccination can hamper immunization efforts and leave this vulnerable group of the society unprotected. The aim of this study is to assess the attitude, perception and concern towards children's vaccination amidst the COVID-19 Pandemic among selected workers in a Nigerian population. **Methods:** This web-based study was conducted among a selected Nigerian population between the month of February and May 2021 using an online self-administered structured questionnaire hosted by Survey Monkey. The invitation to take part in the poll was sent out to a total of 180 persons through social networking platforms including Facebook, Twitter, and WhatsApp. Version 25 of the Statistical Package for the Social Sciences (SPSS) was used to analyze the data collected and results presented using tables, bar charts and pie charts. The cutoff point was established at a level of significance equal to $P < 0.05$. **Results:** Vaccine hesitant score on childhood acceptance rates shows that 28 (15.6%) had low acceptance rates, 125 (69.4%) had moderate acceptance rates, and 27 (15.0%) had high acceptance rates. There was significant association between age and overall vaccine hesitance on children's vaccination acceptance rates at $\chi 2 = 16.804$, $P = 0.032$. **Conclusion:** More than two-thirds of study participants supported children's vaccination. Those with low compliance may lack a realistic perception of infection risk, poor-quality information about immunizations and the disease, and general understanding.

INTRODUCTION

The COVID-19 pandemic remains a major threat to global public health characterized by an increasing number of confirmed cases, hospitalizations, and fatalities amidst the emergence of new virus strains [1]. Developing and administering vaccines is one of the most effective ways to prevent the COVID-19 virus from spreading. As of July 25, 2021, there had been over 193 million COVID-19 cases reported globally, with 4.2 million fatalities. Nigeria has almost 200 million inhabitants, 42 per-cent of whom are children [2]. Since the first confirmed case on February 27, 2020, more than 250,000 people have been diagnosed with the illness, and 590 have died as of June 2020. Children of all ages (initially thought to be immune to the virus) are among the groups most severely impacted by the Pandemic in terms of epidemiology. They account for 14% of COVID-19 infections [3]. To stop the

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spread of the virus, both children and adults must be vaccinated [4]. Unfortunately, the conspiracy controversies surrounding the virus and the safety of the vaccine have impacted children's vaccination negatively. Although, a number of children and teenagers have been diagnosed with the multisystem inflammatory syndrome, the majority of the severe acute respiratory syndrome virus 2 (SARS-CoV-2) infections in children are mild compared to adult infections [2].

To make an informed decision, it has been reported that parental perception of the severity of the disease was one factor in determining the uptake rate of vaccination, together with information supplied by health professionals [5]. The emergence of a COVID-19 vaccine that is typically safe has been a significant achievement in the fight against the COVID-19 pandemic. However, the administration of COVID-19 vaccines to infants and adolescents has sparked heated debate [6]. The greatest option for halting the spread of COVID-19 and reducing the probability of new variants emerging is universal COVID-19 immunization. In low- and middle-income countries where COVID-19 variants of concern have been found, a large number of children and adults must be vaccinated for immunization efforts to be successful [7]. Parental vaccine hesitancy, which occurs when parents delay choosing whether or not to vaccinate their children despite the availability of vaccines, maybe a significant immunization barrier. Only a few studies have looked at parents' opinions about COVID-19 immunization, with different results. According to a survey, 50% of pregnant moms are ready to vaccinate their children against COVID-19 before the first COVID-19 vaccines were approved in the United States and Australia in December 2020 [8]. In low-income countries such as Nigeria, more than half of expecting moms were ready to vaccinate their children [6]. A study conducted in the United Kingdom showed that around 48% of individuals were willing to immunize their children against COVID-19 [9]. In another Brazilian study, just 2.8% of parents reported concern about immunizations [10].

Although COVID-19 can affect both children and adults, reports indicate that children are more likely than adults to have milder symptoms and fewer cases and fatalities. Children under the age of 14 were involved in 8.1% of global cases and 0.2% of global deaths [11]. However, COVID-19 infection in children has resulted in serious symptoms such as multisystem inflammatory syndrome [12]. Children play a significant role in the spread of diseases within groups and communities. Furthermore, if children were a major source of disease spread, controlling the disease would be more difficult. Previous researches have looked at people's perceptions of the disease's seriousness [13], their concerns about the vaccine's safety, and their doctors' advice [14] to determine whether they are ready to receive the COVID-19 vaccine. Despite the burden of the infection, the percentage of persons who have gotten all recommended vaccines remains below 50% globally. This study aimed to assess attitudes, perceptions and concerns towards children's vaccination among selected workers in a Nigerian population amidst COVID-19 Pandemic.

MATERIALS AND METHODS

Ethics Statement

This study was approved by the Institutional Review Board of the Universitas Syiah Kuala - Zainoel Abidin Hospital and the National Health Research and Development Ethics Commission (KEPPKN) of the Ministry of Health of the Republic of Indonesia (#1171012P). All authors declared that informed consent was obtained from the participants with an assurance of anonymity and confidentiality before the commencement of the study.

Study Setting and Instrument

Between February to May 2021, an online self-administered survey was conducted in Nigeria. The survey was hosted by Survey Monkey and to recruit the participants, the invitations to participate in the survey were distributed on three social media and instant messaging platforms: Facebook, Twitter and WhatsApp. The survey consisted of several sections. The first introductory section consisted of information about the study and an informed consent page. Only those who agreed to participate could open the next sections. The following sections comprised questions collecting information on demographic characteristics, Participants' attitudes, perceptions and concerns toward children's vaccination. It required approximately 10-15 minutes to complete the survey. All respondents gave consent before participating in the survey.

The socio-demographic data entails occupation of the respondents, age, gender, location, socio- economic status and religion of the respondents, attitude towards children's vaccination questions such as the number of children, ever delayed having your child get a vaccination shot for reasons other than illness or allergy, ever decided not to have your child get a vaccination shot for reasons other than illness or allergy if you had another infant today, would you want him/her to get all the recommended vaccination shots and overall, how hesitant about childhood shots would you consider yourself to be were assessed. Also, participants' perception towards children's vaccination were assessed based on research questions such as children get more vaccination shots than are good for them, belief that many of the illnesses that vaccination shots prevent in children are severe and ability to openly discuss my concerns about vaccination shots with my child's doctor, while concerns toward children's vaccination were assessed with the questions such as how concerned are you that your child might have a serious side effect from a vaccination shot, how concerned are you that any one of the children's vaccination shots might not be safe and how concerned are you that a children's vaccination shot might not prevent the disease.

Statistical Analysis

After the collection of data, the instruments were checked for completeness and clarity. Data were analyzed quantitatively based on the study objectives. Quantitative analysis was applied for close-ended questions that were provided by the respondents with alternative responses from which to choose. Data were processed using IBM Statistical Packages for Social Sciences (SPSS) Version 25. Frequency distributions, percentages, mean scores, standard deviation and charts were computed and tabulated. Chi-square was employed for bivariate and regression analysis of the data collected. The level of significance was set at $P<0.05$. The results of these analyses were used to test the hypotheses generated in this study. For each question based on perception and attitude towards children's vaccination among the study participants, a score of one was given for a correct answer, whereas a zero score was given for incorrect responses, and a total score was obtained. The median score was then computed. Therefore, those with a total score equal to or below the median were classified as having a poor perception or attitude towards children's vaccination, whereas those above the median were considered

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to have a good perception or attitude towards children's vaccination.

RESULTS

Demographic Results

A total of 180 respondents were used for this study, 88 (48.9%) were healthcare workers and 92 (51.1%) were non-healthcare workers. The majority of the respondents 53 (29.4%) were within the age range of 21-30 years, the gender of the respondents shows that 83 (46.1%) were females and 97 (53.9%) were males of which 163 (90.6%) were from urban areas of the country (Table 1).

Table 1. Socio-demographic characteristics of the study participants.

Variable	Categories	Frequency	Percentage
Occupation	Healthcare Workers	88	48.9
	Non-Healthcare Workers	92	51.1
Age group (year)	≤20	31	17.2
	21-30	53	29.4
	31-40	46	25.6
	41-50	38	21.1
	>51	12	6.7
Gender	Female	83	46.1
	Male	97	53.9
Location	Rural	17	9.4
	Urban	163	90.6
Average income	$1,000-$1,999 a month (equal: 72001-145000 INR)	19	10.6
	$10,000-$12,999 a month (equal: 730001 - 949000 INR)	3	1.7
	$13,000 a month or more (equal: More than 949000 INR)	7	3.9
	$2,000-$2,999 a month (equal: 145001 -219000 INR)	24	13.3
	$3,000-$4,999 a month (equal: 219001 - 365000 INR)	11	6.1
	$5,000-$7,999 a month (equal: 365001 - 584000 INR)	6	3.3
	$500-$999 a month (equal: 36001 - 72000 INR)	28	15.6
	$8,000-$9,999 a month (equal: 584001 - 730000 INR)	4	2.2
	Less than $500 (equal: Less than 36000 INR)	78	43.3
Religion	Catholic	28	15.6
	Christian/Protestant/Methodist/Lutheran/Baptist	113	62.8
	Muslim	38	21.1
	Other	1	0.6

Perception towards Children's Vaccination

Of the total participants 102 (56.7%) currently have kids, 5 (2.8%) had a delay in having children, 6 (3.3%) had a history of a child getting a vaccination shot for reasons other than illness or allergy, 83 (46.1%) indicated that they wanted their child/children to get all the recommended vaccination shots. The variable based on how hesitant about childhood shots would you consider yourself, show that 24 (13.3%) indicated "Very hesitant" and 33 (18.3%) indicated "Not hesitant at all" (Table 2).

Table 2. Participants' attitude towards children's vaccination.

Variable	Categories	Frequency	Percentage
Do you have a kid (children)	No	102	56.7
	Yes	78	43.3
Ever delayed having your child get a vaccination shot for reasons other than illness or allergy	No	77	42.8
	Not applicable (not have a kid)	98	54.4
	Yes	5	2.8
Have you ever decided not to have your child get a vaccination shot for reasons other than illness or allergy	No	81	45.0
	Not applicable (not have a kid)	93	51.7
	Yes	6	3.3
If you had another infant today, would you want him/her	No	5	2.8

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to get all the recommended vaccination shots	Not applicable (Do not have a kid)	92	51.1
	Yes	83	46.1
Overall, how hesitant about childhood shots would you consider yourself to be	Not hesitant at all	33	18.3
	Not too hesitant	47	26.1
	Somewhat hesitant	41	22.8
	Very hesitant	24	13.3
	Not sure	35	19.4

Perception towards children's vaccination shows that 13 (7.2%) indicated "Strongly agree" and 31 (17.2%) indicated "Agree" to "Children get more vaccination shots than are good for them", 54 (30.0%) indicated "strongly agree" to "Believe that many of the illnesses that vaccination shots prevent in children are severe", 10 (5.6%) indicated "Strongly agree" to "My child should develop immunity by getting sick than getting a vaccination shot", 8 (4.4%) indicated "Strongly agree" to "Better for children to get fewer vaccines at the same time" and 55 (30.6%) indicated "Strongly agree" to "Able to openly discuss my concerns about vaccination shots with my child's doctor" (Table 3).

Table 3. Participants' perception towards children's vaccination.

Variable	Categories	Frequency	Percentage
Children get more vaccination shots than are good for them	Agree	31	17.2
	Disagree	53	29.4
	Neither agree nor disagree	71	39.4
	Strongly agree	13	7.2
	Strongly disagree	12	6.7
I believe that many of the illnesses that vaccination shots prevent in children are severe	Agree	96	53.3
	Disagree	5	2.8
	Neither agree nor disagree	25	13.9
	Strongly agree	54	30.0
My child should develop immunity by getting sick than getting a vaccination shot	Agree	10	5.6
	Disagree	89	49.4
	Neither agree nor disagree	35	19.4
	Strongly agree	4	2.2
	Strongly disagree	42	23.3
Children should get fewer vaccines at the same time	Agree	75	41.7
	Disagree	30	16.7
	Neither agree nor disagree	58	32.2
	Strongly agree	9	5.0
	Strongly disagree	8	4.4

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I trust the information I receive about vaccination shots	Agree	92	51.1
	Disagree	10	5.6
	Neither agree nor disagree	52	28.9
	Strongly agree	22	12.2
	Strongly disagree	4	2.2
I can openly discuss my concerns about vaccination shots with my child's doctor	Agree	87	48.3
	Disagree	6	3.3
	Neither agree nor disagree	32	17.8
	Strongly agree	55	30.6

Concerns about Vaccinations

Variable based on "How concerned are you that your child might have a serious side effect from a vaccination shot", shows that 71 (39.4%) were "very concerned", 53 (29.4%) were "somewhat concerned" and 7 (3.9%) were "not concerned at all". Variable based on "How concerned are you that any one of the children's vaccination shots might not be safe" shows that 57 (31.7%) were "Very concerned" (Table 4).

Table 4. Participants' concerns toward children's vaccination.

Variable	Categories	Frequency	Percentage
How concerned are you that your child might have a serious side effect from a vaccination shot	Not concerned at all	7	3.9
	Not sure	30	16.7
	Not too concerned	19	10.6
	Somewhat concerned	53	29.4
	Very concerned	71	39.4
How concerned are you that any one of the children's vaccination shots might not be safe	Not concerned at all	11	6.1
	Not sure	43	23.9
	Not too concerned	18	10.0
	Somewhat concerned	51	28.3
	Very concerned	57	31.7
How concerned are you that a children's vaccination shot might not prevent the disease	Not concerned at all	13	7.2
	Not sure	39	21.7
	Not too concerned	26	14.4
	Somewhat concerned	48	26.7
	Very concerned	54	30.0

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Participants' response to the question on whether "Following the recommended vaccine shot schedule for children is a good idea or not" is presented in Fig. 1.

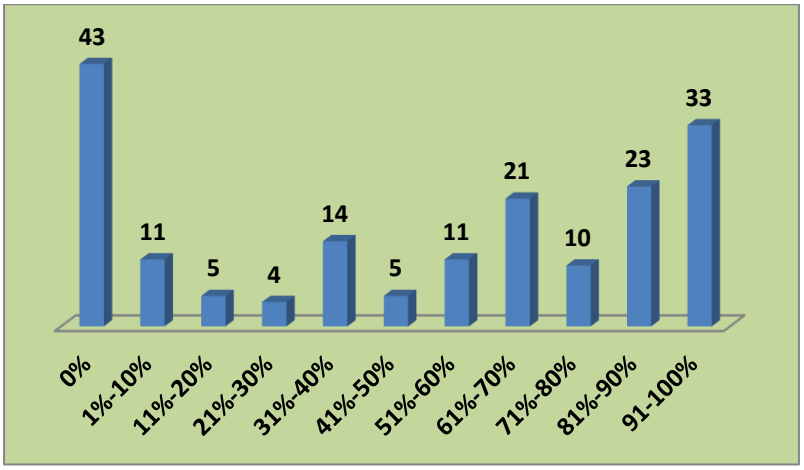

Fig. 1. Following the recommended vaccine shot schedule for children is a good idea.

Forty-three (43) of them showed zero percentage (0%) support for a recommended vaccine shot schedules for children, while 33 showed 91-100% support. The respondents' percentage trust in their child's doctor during vaccination is presented in Fig. 2.

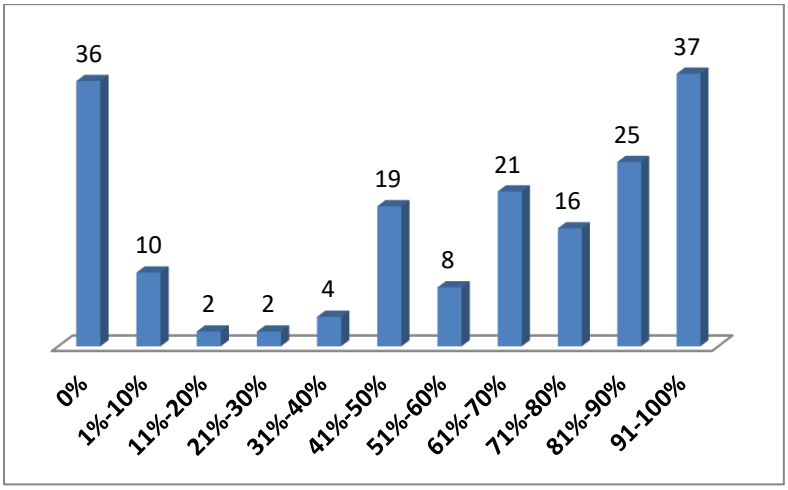

Fig. 2. Percentage trust in child's doctor during vaccination.

Thirty-six (36) of them have zero percentage (0%) trust in child's doctor during vaccination, while 37 have 91-100% trust. The majority of the respondents (51%) had a positive perception of children's vaccination acceptance rates (Fig. 3).

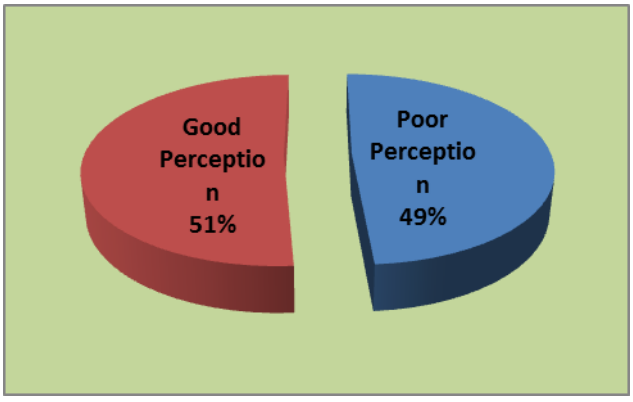

Fig. 3. Perception of childhood acceptance rates.

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Association between the Socio-demographic and the Vaccination Perceptions

The socio-demographic variable based on age, gender, location, average income and religion shows no significant association with the overall perception of childhood acceptance rates among the study participants at ($\chi2 = 8.449$, $P = 0.076$), ($\chi2 = 1.750$, $P = 0.186$), ($\chi2 = 1.880$, $P = 0.170$), ($\chi2 = 7.150$, $P = 0.521$) and ($\chi2 = 2.819$, $P = 0.420$), respectively as $P > 0.05$ in each case as shown in (Table 5).

Table 5. Association between the socio-demographic and overall perception of childhood acceptance rates.

Variable	Categories	Poor Perception N (%)	Good Perception N (%)	Total N (%)	Chi-square ($\chi2$)	*P*-value
Age group (year)	≤20	22(12.2)	9(5.0)	31(17.2)	8.449	0.076
	21-30	26(14.4)	27(15.0)	53(29.4)		
	31-40	20(11.1)	26(14.4)	46(25.6)		
	41-50	16(8.9)	22(12.2)	38(21.1)		
	>51	4(2.2)	8(4.4)	12(6.7)		
Gender	Female	45(25.0)	38(21.1)	83(46.1)	1.750	0.186
	Male	43(23.9)	54(30.0)	97(53.9)		
Location	Rural	11(6.1)	6(3.3)	17(9.4)	1.880	0.170
	Urban	77(42.8)	86(47.8)	163(90.6)		
Average income	$1,000-$1,999 a month (equal: 72001-145000 INR)	8(4.4)	11(6.1)	19(10.6)	7.150	0.521
	$10,000-$12,999 a month (equal: 730001 - 949000 INR)	3(1.7)	0(0)	3(1.7)		
	$13,000 a month or more (equal: More than 949000 INR)	5(2.8)	2(1.1)	7(3.9)		
	$2,000-$2,999 a month (equal: 145001 -219000 INR)	11(6.1)	13(7.2)	24(13.3)		
	$3,000-$4,999 a month (equal: 219001 - 365000 INR)	4(2.2)	7(3.9)	11(6.1)		
	$5,000-$7,999 a month (equal: 365001 - 584000 INR)	3(1.7)	3(1.7)	6(3.3)		
	$500-$999 a month (equal: 36001 - 72000 INR)	11(6.1)	17(9.4)	28(15.6)		
	$8,000-$9,999 a month (equal: 584001 - 730000 INR)	2(1.1)	2(1.1)	4(2.2)		
	Less than $500 (equal: Less than 36000 INR)	41(22.8)	37(20.6)	78(43.3)		
Religion	Catholic	15(8.3)	13(7.2)	28(15.6)	2.819	0.420
	Christian/Protestant/Methodist/Lutheran/Baptist	58(32.2)	55(30.6)	113(62.8)		
	Muslim	15(8.3)	23(12.8)	38(21.1)		
	Other	0(0)	1(0.6)	1(0.6)		
Occupation	Non-Healthcare Workers	52(28.9)	40(22.2)	92(51.1)	4.388	0.036
	Healthcare Workers	36(20.0)	52(28.9)	88(48.9)		

Overall, the vaccine-hesitance score on childhood acceptance rates shows that 28 (15.6%) had low vaccine hesitance, 125 (69.4%) had moderate vaccine-hesitance, and 27 (15.0%) had high vaccine-hesitance on childhood acceptance rates (Fig. 4).

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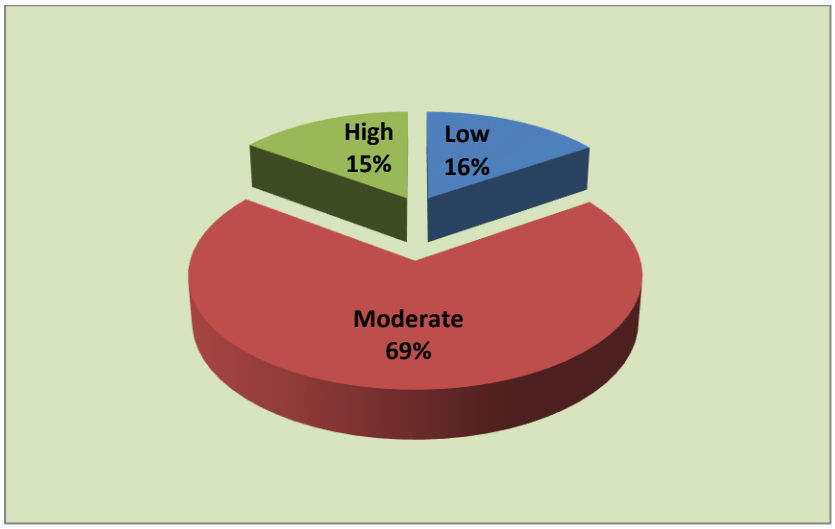

Fig. 4. Overall, vaccine hesitant on childhood acceptance rates.

The association between socio-demographic and overall vaccine-hesitance on childhood acceptance rates based on age shows a significant association with overall vaccine hesitant on childhood acceptance rates at ($\chi2$ = 16.804, P = 0.032), and a non-significant association with gender, location, average income and religion among the study participants at ($\chi2$ = 3.141, P = 0.208), ($\chi2$ = 1.664, P = 0.435), ($\chi2$ = 19.235, P =0.257) and ($\chi2$ = 6.601, P = 0.259), respectively at $P > 0.05$ in each case (Table 6).

Table 6. Association between *socio-demographic* and overall vaccine-hesitance on childhood acceptance rates.

Variable	Categories	Low N (%)	Moderate N (%)	High N (%)	Total N (%)	Chi-square ($\chi2$)	P-value
Age group (year)	≤20	1(0.6)	27(15.0)	3(1.7)	31(17.2)	16.804	0.032
	21-30	7(3.9)	32(17.8)	14(7.8)	53(29.4)		
	31-40	9(5.0)	32(17.8)	5(2.8)	46(25.6)		
	41-50	8(4.4)	28(15.6)	2(1.1)	38(21.1)		
	>51	3(1.7)	6(3.3)	3(1.7)	12(6.7)		
Gender	Female	17(9.4)	53(29.4)	13(7.2)	83(46.1)	3.141	0.208
	Male	11(6.1)	72(40.0)	14(7.8)	97(53.9)		
Location	Rural	2(1.1)	14(7.8)	1(0.6)	17(9.4)	1.664	0.435
	Urban	26(14.4)	111(61.7)	26(14.4)	163(90.6)		
Average income	$1,000-$1,999 a month (equal: 72001-145000 INR)	3(1.7)	12(6.7)	4(2.2)	19(10.6)	19.235	0.257
	$10,000-$12,999 a month (equal: 730001 - 949000 INR)	0(0)	1(0.6)	2(1.1)	3(1.7)		
	$13,000 a month or more (equal: More than 949000 INR)	0(0)	5(2.8)	2(1.1)	7(3.9)		
	$2,000-$2,999 a month (equal: 145001 -219000 INR)	7(3.9)	14(7.8)	3(1.7)	24(13.3)		
	$3,000-$4,999 a month (equal: 219001 - 365000 INR)	3(1.7)	8(4.4)	0(0)	11(6.1)		
	$5,000-$7,999 a month (equal: 365001 - 584000 INR)	1(0.6)	5(2.8)	0(0)	6(3.3)		
	$500-$999 a month (equal: 36001 - 72000 INR)	4(2.2)	22(12.2)	2(1.1)	28(15.6)		
	$8,000-$9,999 a month (equal: 584001 - 730000 INR)	1(0.6)	2(1.1)	1(0.6)	4(2.2)		
	Less than $500 (equal: Less than 36000 INR)	9(5.0)	56(31.1)	13(7.2)	78(43.3)		

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Religion	Catholic	5(2.8)	18(10.0)	5(2.8)	28(15.6)	6.601	0.359
	Christian/Protestant/Methodist/Lutheran/Baptist	16(8.9)	79(43.9)	18(10.0)	113(62.8)		
	Muslim	6(3.3)	28(15.6)	4(2.2)	38(21.1)		
	Other	1(0.6)	0(0)	0(0)	1(0.6)		
Occupation	Non-Healthcare Workers	16(8.9)	61(33.9)	15(8.3)	92(51.1)	0.888	0.641
	Healthcare Workers	12(6.7)	64(35.6)	12(6.7)	88(48.9)		

DISCUSSION

In this study, 48.9% of the respondents were healthcare workers who had at least one history of parity, and a larger proportion (46.1%) were females of which 90.6% were from urban areas of the country. Generally, parents' attitudes towards their children's vaccination were positive. However, similar to the knowledge level, the range of responses from the parents showed enormous variation. Surprisingly, parents' high education levels show that 35.6% and 33.9% had a moderate score for vaccine hesitance on childhood acceptance rates among healthcare workers and non-healthcare workers, respectively. More than two third indicated that following the recommended vaccine shot schedule for children is a good idea. This is in line with the findings of Alabbad *et al*. (15), who also reported similar findings. Alolayan *et al*. (16), reported that a more positive attitude towards seasonal influenza vaccination was associated with those parents who worked in the medical field (P = 0.02). In contrast, however, Alabbad *et al*. (15), reportedly found no significant association between the education levels of parents and their children receiving the influenza vaccination which is indifferent to the findings of this study.

Parental trust in their child's healthcare provider and the number and type of vaccine information sources are important dimensions of vaccine hesitancy (17). In this study, a synergy response was observed in percentage trust in their child's doctor during vaccination as 36% had no trust in child's healthcare provider and 37 % had 91-100% trust in child's healthcare provider. This finding is in line with the submission of Eller *et al.* (17) who revealed that most parents reported their child's pediatrician as their main source of vaccine information, but less trusting (vs. trusting) mothers had both decreased odds of considering their child's paediatrician as their main source of vaccine information and increased number of information sources used.

Several significant correlations between vaccine hesitancy on childhood acceptance rates and participants' age characteristics were found in this study. For instance, older parents showed extremely higher readiness to vaccinate their children against COVID-19 than their younger counterparts. This result is congruent with a previous study which found that parents younger than 40 are more hesitant to vaccinate children (18). However, no significant association was observed based on the gender, location and socio-economic status of the respondents.

More than two third of the respondent in this study had positive concerns toward children's vaccination as most indicated that vaccination shot is safe and not concerned about the side effect of the vaccine. A study by Bell *et al*. (19) reported that COVID-19 vaccine acceptance is influenced by vaccine efficacy and perceptions of disease risk. In a cross-sectional survey conducted in Indonesia, Harapan *et al*. (20), found that 93.3% of participants would receive a COVID-19 vaccine that was 95% effective, but, only 67.0% of participants would accept a vaccine that is 50% effective. The current study has inherent limitations, such as a small sample size, as well as the possibility of sampling bias in favour of persons who are active users of social media platforms and who have reliable internet connections. Nevertheless, the findings are worth sharing with the scientific community. It is recommended that to better understand the attitude, perception and concerns towards children's vaccination among the Nigerian populace, a more robust study with a large sample size should be undertaken by future researchers, with a special focus on the level of education, awareness, trust/reservations on the use of foreign drugs, and potency of local medicines as possible variables of significant interest.

In conclusion, according to the results of the research, more than two-thirds of participants had a supportive attitude regarding children's vaccination. Those with non-compliance may be hampered by a lack of realistic perception of disease risk, poor-quality information about vaccinations and the disease, and a generally lower level of knowledge. These results, which should be replicated in bigger populations and across other geographies, should encourage institutions and stakeholders to implement focused communication strategies to increase confidence in healthcare organizations, particularly among younger people. More research is needed to identify distinct communication strategies for diverse types of vaccine resistance among the Nigerian populace.

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CONFLICT OF INTEREST

The authors declare they have no conflict of interests.

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