

# Risk Perception of SARS-CoV-2 Infection and Acceptability of a COVID-19 Vaccine in Nigeria

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## Research

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## Abstract

**Background:** Vaccines are highly anticipated for the control of the ongoing COVID-19 pandemic, however their acceptance is critical for the desired benefit. This study assessed risk perception of COVID-19 and acceptability of its vaccine in Nigeria. It also assessed prediction of vaccine acceptance from risk perception.

**Methods:** A cross-sectional web-based study was conducted among 410 participants in the six geo-political regions of Nigeria using a three-part questionnaire developed using Google forms. The questionnaire link was distributed via snowball method to consenting participants through online platforms. Descriptive and inferential statistics (Chi-square and binomial regression) using Microsoft Excel and SPSS version 24 were used to analyze data, and p-values < 0.05 were considered statistically significant.

**Results:** A total of 410 respondents participated in the study and high risk perception of SARS-CoV-2 infection (COVID-19) was seen in 127(66.1%) of respondents. Vaccine acceptance was high in 233(56.8%) of respondents, and was significantly associated with geo-political region ( $P=0.028$ ). Association between COVID-19 risk perception and vaccine acceptance showed that persons who had high risk perception of COVID-19 may not necessarily accept the vaccine ( $OR=0.450$ ; 95% CI=0.297–0.683;  $P=0.000$ ) and this was seen in persons with tertiary education ( $OR=0.458$ ; 95% CI=0.297-0.706;  $P=0.000$ ), married ( $OR=0.194$ ; 95%CI =0.098-0.386;  $P=0.000$ ), from South-south ( $OR=0.352$ ; 95%CI=0.163–0.760;  $P=0.008$ ) and North-central ( $OR=0.429$ ; 95% CI= 0.189-0.972;  $P=0.043$ ).

**Conclusions:** High risk perception of COVID-19, and vaccine acceptance were relatively average. Regional and socio-demographic variations were associated with this finding, and it was also noted that high risk perception of COVID-19 may not likely result in vaccine acceptance. Strategic and targeted messaging on vaccine acceptance should be prioritised by stakeholders, to ensure successful vaccine implementation.

## Introduction

The coronavirus disease 2019 (COVID-19) pandemic has been a major public health challenge since its initial report in Wuhan, China [1]. Its associated negative effects on the economy and human socialisation have impacted on quality of life and psycho-social health of individuals [2]. Originating from a novel coronavirus, Severe Acute Respiratory Syndrome Coronavirus – 2 (SARS-CoV-2) [1], specific drug treatment has remained a challenge, although several drugs have been associated with improved outcomes of the disease [3, 4]. Therefore, the availability of a safe and effective vaccine against SARS-CoV-2 has become a major public health priority and has been widely anticipated.

Several types of potential COVID-19 vaccines are currently being developed, with a good number of them at the clinical trial phase [5, 6]. Some of these include, inactivated viral vaccines, non-replicating viral vector vaccine, protein subunit vaccine, replicating viral vector vaccine, Ribonucleic Acid (RNA) based vaccine, virus-like particle, among others [7]. Major concerns of COVID-19 vaccines are efficacy and

adverse reactions, especially in vulnerable groups of the populations [5]. A vaccine is potentially sufficient to confer herd immunity in communities and a subsequent control of the pandemic, but this requires high immunisation coverage [8] and a rate of 55 % to 82 % has been estimated for SARS-CoV-2 herd immunity threshold [9]. Therefore, for effective control of COVID-19 through vaccination, it is critical to ensure the readiness of the populace and acceptance of the vaccine by a large proportion of the population. Risk perception of the disease could also appreciably determine the acceptability of a vaccine [10].

About 156, 000 confirmed cases of COVID-19 has been recorded in Nigeria as at 3rd March 2021, since its first confirmed case on 27th February, 2020 [11]. Although COVID-19 remains an ongoing pandemic with significant morbidity and mortality, low mortality and high recovery rates has been recorded in Nigeria [11]. Irrespective of the highly infectious nature of SARS-CoV-2, only a few persons appear to be aware of the possibility of contracting the disease in a Nigerian population, with a good number regarding the disease to be exaggerated [12]. Denial and misplaced ‘religious zealotry’ are also perceived to be negatively associated with COVID-19 – related behaviour in Nigeria [13]. Although, vaccination is a critical tool for preventing and controlling diseases, low rates of vaccine acceptance has been previously noted in Nigeria [14]. Vaccine hesitancy poses a global public health threat, and its acceptance is reportedly associated with the behavioural nature of a people [15]. Studies have shown that vaccine acceptability varies across the globe [16, 17], therefore adequate understanding of key determinants of COVID-19 vaccine acceptability is necessary for the development of effective global vaccination programme.

It is evident that acceptance of a COVID-19 vaccine is a major public health need in the effective control of the disease. Lower risks perceptions of COVID-19 may influence the potential willingness to accept it. This study assessed the risk perception of COVID-19, and acceptability of a COVID-19 vaccine among the Nigerian population. Also studied were associations between respondents' socio- demographic characteristics and vaccine acceptability. Probability of COVID-19 vaccine acceptance as a result of COVID-19 risk perception, was also evaluated. It is hoped that findings from this study will equip public health professionals and policy makers with insights and relevant information that can be used for optimal COVID-19 vaccine rollout.

## Methods

### Study design and study setting

A cross-sectional web-based study was conducted from 20<sup>th</sup> November, 2020 to 28<sup>th</sup> December, 2020 to ascertain the risk perception of COVID-19 and the acceptance of the vaccine in Nigeria. The authors formulated and tested a hypothesis which states that high risk perception of COVID-19 may not imply acceptance of the vaccine.

Nigeria is located in West Africa with over 250 ethnic groups and is divided into six geopolitical zones and the Federal Capital Territory (FCT). Each geo-political region is made up of 6 States, except the northwest and southeast regions which consist 7 and 5 states respectively. It is the most populous Black

Country with a population of over a 200 million. The country had an average life expectancy of 54 years as at 2018 [18] and has been previously faced with several disease outbreaks.

## **Study population**

With a Nigerian population of about 200, 000, 000 [19], a vaccine acceptance of 50 % and margin of error of 5 % (95 % CI), we calculated a sample size of 385 individuals [20], but 10% was added to account for potential non-responses or attrition, and the study was then conducted among 420 participants.

The study included both male and female Nigerians who resided in Nigeria, who had access to internet facilities, and who belonged to online groups. It however excluded persons who did not give informed consent for the study and persons who were less than 18 years of age.

## **Survey Instrument**

Acceptability of a COVID-19 vaccine may be dependent on the associated risk perception of the disease. The questionnaire design was based on this theoretical frame work, and was composed of questions that explored and evaluated the risk perceptions of the respondents about COVID-19 and the willingness to accept the vaccine by the respondents.

A three-part researcher-developed questionnaire which required about 2 minutes to complete was designed using Google forms. The constructs measured by the questionnaire were the respondents' risk perception of COVID-19 and the acceptability of a COVID-19 vaccine. Section A of the questionnaire had 7 questions which obtained information on respondents' basic socio-demographic characteristics. Section B consisted of 5 questions and elicited information on respondents' risk perception of COVID-19. Section C was composed of 5 questions which assessed respondents' acceptability of a vaccine respectively. The questions were anchored on a 5-point Likert scale that ranged from strongly agree to strongly disagree. "SARS-CoV-2 infection" was not used in the questionnaire, "COVID-19" was rather used to facilitate comprehensibility.

The questionnaire was validated by expert evaluations and preliminary tests. Three public health experts assessed their suitability by face validity, and the preliminary testing was conducted among twenty adults who were randomly selected within the six geopolitical regions of Nigeria. This enabled the verification of proper understanding of the questions, and modifications were made to questions that were deemed to be ambiguous. The reliability of the survey tool was also assessed using Cronbach's alpha.

## **Data collection and study outcome measures**

The internet link was distributed to consenting participants through online platforms. Snowball approach was adopted in the distribution of the internet link via social media platforms and the survey was closed after 6 weeks of data collection. The outcome measures for the study were acceptance rates of a COVID-19 vaccine by the study participants and risk perception of COVID-19.

## **Data analysis**

Online survey data were downloaded into Microsoft Excel spreadsheet for data cleaning, validation and descriptive analysis. Determination of the survey sample characteristics was performed by descriptive statistics (frequencies, percentages). The assessment of perceived risk and vaccine acceptability which both had a 5-point Likert scale was interpreted as: "Strongly disagree", "Disagree" and "Undecided" = 0, while "Strongly agree" and "agree" for each question on risk perception and potential vaccine acceptability, was scored as 1 and the scores were added together. Weighted analyses for COVID-19 risk perception and COVID-19 vaccine acceptability were performed. Weighted scores were totaled over 5, and higher scores ( $\geq 3$ ) denoted "high risk perception" and "vaccine acceptance" (pro-vaccination) respectively. Low scores ( $\leq 2$ ) represented "low risk perception" and "vaccine unacceptance" (anti-vaccination).

Data were imported to SPSS version 24 where inferential statistics was performed. Pearson's Chi Square analysis was completed to determine associations between socio-demographics and vaccine acceptability. Binominal logistic regression was also conducted at 95 % confidence interval to evaluate and predict vaccine acceptance from COVID-19 risk perception ( $p \leq 0.05$  was considered significant).

## **Ethical statement**

Ethics approval was obtained from the Ethical unit of the Kwara State Ministry of Health and had the reference number MOH/KS/EU/777/455. Informed consent was obtained from the study participants prior to the study. The first part of the online survey instrument had a clear statement to show that participation in the study was completely voluntary. As also stated on the first part of the survey, consent for study participation was implied by clicking on the link and submitting the completed form. Forms were filled and submitted anonymously and confidentiality of the participants' information was ensured during and after the study.

## **Results**

A total of 420 respondents participated in the survey, but 10 were excluded as the participants did not reside in Nigeria. The Cronbach's alpha showed a reliability of 0.82.

Socio-demographic characteristics of the respondents is shown in Table 1. Majority of the study participants were male 241 (58.8 %), aged between 26–35 years old 175 (42.7 %), single 240 (58.5 %), employed 301 (73.4 %), had tertiary education 371 (90.5 %) and from the North-central region of Country 133 (32.4 %) See Table 1.

Details of respondents' risk perception of SARS-CoV-2 infection are summarised in Table 2. Majority agreed that COVID-19 is a severe disease 358 (87.3 %), associated with stigma 284 (69.3 %) and will affect many Nigerians 247 (60.2 %). Meanwhile, less than half 165 (40.2 %) perceived themselves to be susceptible to SARS-CoV-2 infection (COVID-19) and over half 225 (55.1 %), perceived their close relative

may get infected with SARS-CoV-2. Respondents' total weighted risk perception of SARS-CoV-2 infection was 127 (66.1 %). This implied that 66.1% of the study participants had high risk perception of COVID-19. See Table 2.

Table 3 shows acceptability of COVID-19 vaccine by the respondents, where the total weighted acceptance of the vaccine was 233 (56.8 %), therefore almost half 177 (43.2 %) would not accept it. Majority would accept a COVID-19 vaccine if substantial information accompanied it 260 (63.4 %), if it were recommended by their healthcare provider 283 (69.3 %) and if it was provided at no financial cost 239 (58.3 %). Conversely, less than half 173 (42.2 %) would accept it irrespective of its novelty, and only about a one third of the population 134 (32.7 %) will readily accept the vaccine regardless of its potential adverse effects. See Table 3.

Details of the socio-demographic association of COVID-19 vaccine acceptability is given in Table 4. Acceptability of the vaccine was not significantly associated with gender ( $P = 0.846$ ), age ( $P = 0.073$ ), marital status ( $P = 0.105$ ), employment status ( $P = 0.293$ ) and educational qualification ( $P = 0.556$ ), but was associated with geo-political region ( $P = 0.028$ ). Over half of the males 136 (56.4 %) and females 97 (57.4 %) would accept the COVID-19 vaccine in Nigeria. Meanwhile, more than half of persons between 36–45 years old 49 (54.4%) and persons above 55 years old 5 (62.5%), would not accept the vaccine. Similarly about half 83 (49.7%), of the married respondents would not accept the COVID-19 vaccine, while majority 147 (61.3%) of the single respondents would accept it. Findings from the study show the region with the highest acceptance rate to be the North-east 11 (73.3%) and the region with the least acceptance rate to be the North-west 6 (37.5%). Over half of persons from the South-east 22 (57.9%), South-west 49 (55.1 %), North-central 85 (63.9 %), and almost half of persons in the South-south 55 (48.2 %), would accept the vaccine. See Table 4.

Table 5 consists of the association between high risk perception of SARS-CoV-2 infection and vaccine acceptance. Majority of persons who had "high risk perception" of COVID-19 may likely not accept the vaccine ( $OR = 0.450$ ; 95% CI = 0.297–0.683;  $P = 0.000$ ). This was significantly associated with males and females ( $OR = 0.443$ ; 95% CI = 0.259–0.757;  $P = 0.003$ ) and ( $OR = 0.461$ ; 95% CI = 0.237–0.895;  $P = 0.022$ ) respectively. Similarly, vaccine acceptance among married and employed respondents who had "high risk perception" of COVID-19 was statistically significant ( $OR = 0.194$ ; 95% CI = 0.098–0.386;  $P = 0.000$ ) and ( $OR = 0.194$ ; 95% CI = 0.232–0.618;  $P = 0.000$ ) respectively. Also, persons who had tertiary education and had "high risk perception" of COVID-19 may also not necessarily accept the vaccine ( $OR = 0.458$ ; 95% CI = 0.297–0.706;  $P = 0.000$ ). Persons in the North-central and South-south of the Country also appeared to have "high risk perception" of SARS-CoV-2 infection (COVID-19) and low acceptance of the vaccine ( $OR = 0.429$ ; 95% CI = 0.189–0.972;  $P = 0.043$ ) and ( $OR = 0.352$ ; 95% CI = 0.163–0.760;  $P = 0.008$ ) respectively. See Table 5.

## Discussion

High risk perception of COVID-19 was observed in majority of the respondents. Similarly, findings from a previous study also reported poor perception of COVID-19 in Nigeria [12]. The impact of an infectious disease may be dependent on perceptions about the disease. Therefore, following the high infectivity, and associated morbidity and mortality of SARS-CoV-2, improving its risk perception by health education measures is essential. In an Iranian and a Nigerian study, socio-demographic factors were reported to be determinants of COVID-19 risk perception [21,22], which re-enforces the need for targeted messaging by stakeholders.

Findings from this study indicate that almost half of the study participants will likely not accept a COVID-19 vaccine, which is in congruence with a previous study in Nigeria [23,24]. This level of the vaccine acceptance may not be sufficient for COVID-19 herd immunity. COVID-19 vaccine acceptance in United States of America had higher acceptance rate than ours [25]. This difference may be associated with varying levels of risk perceptions among the populace, and the overall COVID-19 associated morbidities and mortalities in the two countries. Nigeria has recorded about one hundred and fifty thousand confirmed cases, majority of who had been discharged, with very few deaths [11]. A global survey found that potential acceptance of the vaccine varied among countries with China and Russia having the highest and least acceptance rates respectively [16-17].

Our study suggests that majority of persons may be cautious of the potential adverse effects of a COVID-19 vaccine, and this may be a major limiting factor to its acceptance. Similarly, almost half of the persons who would accept the vaccine in China also considered confirmation of vaccine safety as a necessity for receiving a dose of it [17]. Considering that healthcare providers may have a positive influence on the vaccine acceptance through their recommendation as seen in our study, it is pertinent to seek their total commitment regarding information on potential adverse reactions of the vaccine. This may build trust in the public and enhance vaccine acceptance.

In this study, acceptance of COVID-19 vaccine was not significantly associated with gender, age, marital status, employment status and educational qualification, but was associated with geo-political region. In a recent study, age and gender were also reported not to be associated with COVID-19 vaccine acceptance in Nigeria [24]. Conversely, it was reported that gender and marital status could enhance the likelihood of COVID-19 vaccine acceptance in China [17]. Significant differences in socio-demographic associations with COVID-19 vaccine acceptance were also observed in the United States [25]. In our study, vaccine acceptance was majorly noted to be associated with geographic regions, this is suggestive of the need for targeted educational interventions in the regions, with effective COVID-19 vaccine-acceptance detailing, via various media. As a result of varying educational levels in the regions, this significant association is not unexpected. However, without adequate interventions, this could impair the formation of herd immunity threshold for SARS-CoV-2 [9] in the country. Basic interventions may include building trust on the vaccine, through consistent thoughtful and targeted public health information.

The study found that high risk perception of COVID-19 may not necessarily result in COVID-19 vaccine acceptance. This was especially seen across the sexes, persons from the South-south and North-central

region of the country and persons who had tertiary education. In contrast, high risk perception of infection was reported to potentially increase vaccine acceptance in China [17] and in United States of America [26]. Perception of risks of COVID-19 is expected to enhance the uptake of precautionary behaviours [27] including vaccine acceptance, however several factors have been noted to influence this contrast in Nigeria. Among these recognised factors are mistrust of vaccine intentions [14], denial and religious beliefs [13].

The study was faced with some limitations among which may be selection bias, following the online method of data collection which may have excluded persons in rural communities with no internet facility and older adults who may not be friendly with social media applications. Therefore, this may have over-estimated the rate of acceptability of the vaccine, thereby limiting the generalisation of our findings. Also, low response rate recorded in the North-east and North-west regions may limit the generalisation of the findings in this region. Lastly, merging the “undecided” group with the “disagree” and “strongly disagree” groups may have caused losses of some statistical outcomes during dichotomisation of COVID-19 vaccine acceptance. However, the study buttressed the probability of vaccine acceptance from high risk perception of COVID-19, across socio-demographic variables.

## Conclusion

High risk perception of COVID-19 was found in over half of the respondents. Similarly, COVID-19 vaccine acceptance rate was found to be a little over 50%. However, the study noted regional association with vaccine acceptance among the study participants, and also observed that high risk perception of COVID-19 may not likely result in vaccine acceptance among several socio-demographic groups. Therefore, more targeted and strategic educational interventions is necessary to improve risk perception and acceptance of COVID-19 vaccine, in other to break the disease transmission dynamics.

## Abbreviations

SARS-CoV-2: Severe Acute Respiratory Coronavirus 2

COVID-19: Coronavirus Disease 2019

## Declarations

### Acknowledgements

Nil

### Contributions

Chinonyerem Ogadi Iheanacho conceived and designed the study with substantial contributions from Okechukwu Harrison Enechukwu and Chinelo Nneka Ikeanyi-Aguiyi. Data collection was done by all three

authors and data analysis was performed by Okechukwu Harrisson Enechukwu. Chinonyerem Ogadi Iheanacho wrote the initial draft. All authors read and approved the final manuscript for submission.

## **Availability of data and materials**

The data set supporting the conclusions in this article are included within the article and its additional file.

## **Ethical declarations**

### **Ethics approval and Consent to participate**

The study was in accordance with the ethical standards of the institutional research committee, and with the 1964 Helsinki Declaration. Informed consent was also obtained from the respondents.

### **Consent for publication**

The authors all agree to this publication

### **Competing interest**

Authors declare no competing interest

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## Tables

**Table 1**  
**Socio-demographic characteristics of respondents.**

<b>Variables</b>	<b>Frequency (n = 410)</b>	<b>Percentage (%)</b>
<b>Gender</b>		
Male	241	58.8
Female	169	41.2
<b>Age</b>		
18–25 years	117	28.5
26–35 years	175	42.7
36–45 years	90	22.0
46–55 years	18	4.4
> 55 years	8	2.0
N/A	2	0.5
<b>Marital status</b>		
Married	167	40.7
Single	240	58.5
Widowed	1	0.2
Divorced	1	0.2
Separated	1	0.2
<b>Employment status</b>		
Employed	301	73.4
Unemployed	3	0.7
Student	86	21.0
Retiree	3	0.7
N/A	17	4.2
<b>Highest educational qualification</b>		
None	1	0.24
Primary	0	0.0
Secondary	34	8.3
Tertiary	371	90.5

<b>Variables</b>	<b>Frequency (n = 410)</b>	<b>Percentage (%)</b>
Informal	1	0.2
N/A	3	0.7
<b>Geo-political zones</b>		
North-east	15	3.7
North-west	16	3.9
North-central	133	32.4
South-east	38	9.3
South-west	89	21.7
South-south	114	27.8
N/A	5	1.2

Table 2  
Risk perception of SARS-CoV-2 infection (COVID-19) among respondents.

<b>Variables</b>	<b>Risk code (Strongly agree and agree = 1, not sure, disagree and strongly disagree = 0)</b>	<b>Frequency (n = 410)</b>	<b>Percentage (%)</b>
COVID-19 is a severe disease			
	1	358	87.3
	0	52	12.7
COVID-19 prevents regular associations			
	1	284	69.3
	0	124	30.2
	No response	2	0.5
I may likely get COVID-19 in the course of the pandemic			
	1	165	40.2
	0	244	59.5
	No response	1	0.2
There's a chance that my close relative may contract COVID-19			
	1	226	55.1
	0	181	44.2
	No response	3	0.7
COVID-19 will affect many Nigerians			
	1	247	60.2
	0	161	39.3
	No response	2	0.5
<b>Total weighted risk perception</b>			
	High risk	271	66.1
	Low risk	139	33.9
<b>Weighted risk perception (high risk ≥ 3, low risk ≤ 2)</b>			



Table 3  
Acceptability of COVID-19 vaccine among respondents.

<b>Variables</b>	<b>Acceptability (strongly agree and agree = 1, not sure, disagree and strongly disagree = 0)</b>	<b>Frequency (n = 410)</b>	<b>Percentage (%)</b>
If I am offered a COVID-19 vaccine with substantial information on the vaccine, I will accept it			
1	260	63.4	
0	144	34.1	
No response	6	1.5	
I will accept to take COVID-19 vaccine if my healthcare provider recommends it			
1	284	69.3	
0	123	30.0	
No response	3	0.7	
If the vaccine is provided at no financial cost, I will accept it			
1	239	58.3	
0	169	41.2	
No response	2	0.5	
Despite the fact that COVID-19 vaccine is new, I will accept it once it is made available			
1	173	42.2	
0	234	57.1	
No response	3	0.7	
I will accept COVID-19 vaccine regardless of my fears of potential adverse effects			
1	134	32.7	
0	273	66.6	
No response	3	0.7	

**Weighted acceptability (Pro-vaccination  $\geq 3$ , anti-vaccination  $\leq 2$ )**

Variables	Acceptability (strongly agree and agree = 1, not sure, disagree and strongly disagree = 0)	Frequency (n = 410)	Percentage (%)
<b>Total weighted acceptability of COVID-19 vaccine</b>			
	Pro-vaccination	233	56.8
	anti-vaccination	177	43.2
<b>Weighted acceptability (Pro-vaccination <math>\geq</math> 3, anti-vaccination <math>\leq</math> 2)</b>			

Table 4  
Associations between vaccine acceptability and respondents socio-demographic characteristics.

<b>Variables</b>	<b>Total (n = 410)</b>	<b>Anti-vaccination n(%)</b>	<b>Pro-vaccination n(%)</b>	<b><math>\chi^2</math></b>	<b>p-Value</b>
<b>Gender</b>				0.038	0.846
Male	241	105 (43.6%)	136 (56.4%)		
Female	169	72 (42.6%)	97 (57.4%)		
<b>Age</b>				10.086	0.073
18–25 years	117	42 (35.9%)	75 (64.1%)		
26–35 years	175	73 (41.7%)	102 (58.3%)		
36–45 years	90	49 (54.4%)	41 (45.6%)		
46–55 years	18	8 (44.4%)	10 (55.6%)		
> 55 years	8	5 (62.5%)	3 (37.5%)		
N/A	2	0 (0.0)	2 (100%)		
<b>Marital status</b>				7.65	0.105
Married	167	83 (49.7%)	84 (50.3%)		
Single	240	93 (38.8%)	147 (61.3%)		
Widowed	1	1 (100%)	0 (0.0)		
Divorced	1	0 (0.0)	1 (100%)		
Separated	1	0 (0.0)	1 (100%)		
<b>Employment status</b>				4.948	0.293
Employed	301	137 (45.5%)	164 (54.5%)		
Unemployed	3	1 (33.3%)	2 (66.7%)		
Student	86	33 (38.4%)	53 (61.6%)		
Retiree	3	2 (66.7%)	1 (33.3%)		
N/A	17	4 (23.5%)	13 (76.5%)		
<b>Educational qualification</b>				3.012	0.556
None	1	0 (0.0)	1 (100%)		
Primary	0	0 (0.0)	0 (0.0)		

**\*Statistically significant**

<b>Variables</b>	<b>Total (n = 410)</b>	<b>Anti-vaccination n(%)</b>	<b>Pro-vaccination n(%)</b>	<b><math>\chi^2</math></b>	<b>p-Value</b>
Secondary	34	16 (47.1%)	18 (52.9%)		
Tertiary	371	158 (42.6%)	213 (57.4%)		
Informal	1	1 (100%)	0 (0.0)		
N/A	3	2 (66.7%)	1 (33.3%)		
<b>Geo-political zones</b>				<b>14.173</b>	<b>0.028*</b>
North-east	15	4 (26.7%)	11 (73.3%)		
North-west	16	10 (62.5%)	6 (37.5%)		
North-central	133	48 (36.1%)	85 (63.9%)		
South-east	38	16 (42.1%)	22 (57.9%)		
South-west	89	40 (44.9%)	49 (55.1%)		
South-south	114	59 (51.8%)	55 (48.2%)		
N/A	5	0 (0.0)	5 (100%)		

**\*Statistically significant**

Table 5  
Probability of COVID-19 vaccine acceptance from high risk perception of COVID-19.

Variables	Total (n = 410)	High risk perception n (%)	Vaccine acceptance (pro- vaccination) n (%)	OR	95% CI	p - Value
<b>Gender</b>						
Male	241	154 (63.9)	136 (56.4)	0.443	0.259– 0.757	<b>0.003*</b>
Female	169	117 (69.2)	97 (57.4)	0.461	0.237– 0.895	<b>0.022*</b>
<b>Age</b>						
18–25 years	117	86 (73.5)	75 (64.1)	0.488	0.211– 1.129	0.094
26–35 years	175	119 (68.0)	102 (58.3)	0.608	0.320– 1.155	0.129
36–45 years	90	50 (55.6)	41 (45.6)	0.310	0.129– 0.747	**
46–55 years	18	8 (44.4)	10 (55.6)	0.600	0.09– 3.986	0.597
> 55 years	8	6 (75.0)	3 (37.5)	0.000	0.000 -	0.999
N/A	2	0 (0.0)	2 (100)	**	**	**
<b>Marital status</b>						
Married	167	103 (61.7)	84 (50.3)	0.194	0.098– 0.386	< <b>0.001</b> *
Single	240	166 (69.2)	147 (61.3)	0.827	0.473– 1.446	0.505
Widowed	1	1 (100)	0 (0.0)	**	**	**
Divorced	1	1 (100)	1 (100)	**	**	**
Separated	1	0 (0.0)	1 (100)	**	**	**
<b>Employment status</b>						
Employed	301	198 (65.8)	164 (54.5)	0.379	0.232– 0.618	< <b>0.001</b> *

OR = Odds Ratio, \*\* = Cannot be computed, \*Statistically significant, p = Probability

Variables	Total (n = 410)	High risk perception n (%)	Vaccine acceptance (pro- vaccination) n (%)	OR	95% CI	p – Value
Unemployed	3	2 (66.7)	2 (66.7)	**	**	**
Student	86	61 (70.9)	53 (61.6)	0.569	0.221– 1.464	0.242
<b>Educational qualification</b>						
Primary	0	0 (0.0)	0 (0.0)	**	**	**
Secondary	34	29 (85.3)	18 (52.9)	0.542	0.78– 3.745	0.534
Tertiary	371	240 (64.7)	213 (57.4)	0.458	0.297– 0.706	< <b>0.001</b> *
Informal	1	0 (0.0)	0 (0.0)	**	**	**
N/A	3	1 (33.3)	1 (33.33)	**	**	**
<b>Geo-political zones</b>						
North-east	15	11 (73.3)	11 (73.3)	1.125	0.082– 15.506	0.93
North-west	16	11 (68.8)	6 (37.5)	0.3	0.025– 3.626	0.344
North-central	133	102 (76.7)	85 (63.9)	0.429	0.189– 0.972	<b>0.043*</b>
South-east	38	26 (68.4)	22 (57.9)	0.625	0.157– 2.485	0.504
South-west	89	53 (59.6)	49 (55.1)	0.71	0.303– 1.663	0.43
South-south	114	64 (56.1)	55 (48.25)	0.352	0.163– 0.760	<b>0.008*</b>
N/A	5	4 (80.0)	5 (100)	**	**	**
<b>Total</b>	<b>410</b>	<b>271 (66.1)</b>	<b>233 (56.8)</b>	<b>0.450</b>	<b>0.297– 0.683</b>	<b>&lt; 0.001</b> *
OR = Odds Ratio, ** = Cannot be computed, *Statistically significant, p = Probability						

## Supplementary Files

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