Assessment of Factors Causing COVID-19 Vaccine Hesitancy and Improving Uptake in Anambra State South-East Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Authors MCO and CI conceptualized the work, while authors MCO, EM, MA, CI, AHA and NO did literature search. Authors EM, UC, MCO, ABO and AHA developed the questionnaire for the study and supervised it`s administration. Authors MCO, UC, MA and NO did the analysis and wrote the draft paper. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Aim: This study assessed the factors causing vaccine hesitancy and ways to mitigate it. This bordered on knowledge gaps responsible for vaccine hesitancy and uptake, determined factors responsible for vaccines hesitancy, and evaluated the roles of communities, governments, and key stakeholders in promoting vaccine acceptance of the new COVID-19 vaccines.

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Methodology: A cross-sectional analytic study was carried out. Using questionnaires on 840 respondents, which bordered on Socio-demographics, Knowledge gaps, factors responsible for COVID vaccine hesitancy, and roles of government and stake holders in mitigating vaccine hesitancy was employed. The 21 LGAs had 40 questionnaires each out of which 839 was retrieved. This was administered through 81 validators across the Local Government Areas. The research took place across the 21 LGAs in Anambra State, South East Nigeria. The study lasted from April –September 2022.

Results: About 99.2% have heard about COVID via radio/television and social media being the most frequent (56.3%, 21.2%). Another 76.1% does not believe it is real while 71.9% thinks it could be prevented by vaccination. More than half (55.3%) have not taken the COVID vaccine due to fear (13.1%), side effects (15.1%), lack of believe in the disease (12.2%), misinformation & conspiracies (14.2%) among others. Further factors to hesitancy were vaccine seen as biological weapon to reduce population (27.2%), inadequate information (25.4%), no COVID in Nigeria (24.7%) and other issues. Majority (57.4%) thinks these could be resolved by awareness creation, health education (6.3%), with government/ stake holders' commitment.

Conclusion: Knowledge The decision to delay vaccination or the refusal to vaccinate is indeed a major factor to accepting COVID vaccination. Furthermore, knowledge gaps, socio-behavioural factors, information's gaps, and government commitment affected immunization and vaccine acceptance. Continuous advocacy, awareness creation and right information should be made available to the population to reduce and eliminate COVID-19 vaccine hesitancy.

1. INTRODUCTION

Immunization protects against an estimated 2-3 million deaths every year. It is one of the most successful public health interventions worldwide. Global coverage on routine immunization dropped from 86% in 2019 to 83% in 2020, while an estimated 23 million children under the age of one year did not receive basic vaccines, which is stipulated to be the highest number since 2009 [1]. This drop may be due to COVID-19 impact which has in itself affected COVID 19 vaccine acceptance by the populace. The global burden of the vaccine preventable diseases is indeed becoming alarming, as about 2.5 million children die each year as a result of these diseases [2,3]. This situation is even worse due to recent adverse impacts from the COVID-19 pandemic on local communities bedeviled by lots of conspiracy theories regarding vaccination that will indeed impact on vaccine uptake.

On 31 December 2019, WHO was alerted to several cases of pneumonia in Wuhan City, Hubei Province of China. About one week after, precisely on 7 January 2020, Chinese authorities confirmed that a new Corona virus, has been identified as the causative agent [2-6]. The WHO declared COVID-19 as a pandemic on March 11, 2020 and more than 200 countries across the world have reported cases. Yet the acceptance of the COVID vaccine and complexities surrounding the viral classification and management has remained an enigma to the scientific world [7].

Vaccine hesitancy has been defined as "the decision to delay vaccination or the refusal to vaccinate despite available vaccination services" [8]. It is indeed a major factor to accepting COVID vaccination that have also impacted on routine immunization activities as people are afraid due to misinformation, beliefs, and several conspiracy theories. Furthermore, lack of knowledge and attitude has also been seen as a factor that exacerbates this vaccine hesitancy in several populations. People either lack knowledge about the disease and preventive measures including treatment or are distracted because of the security and economic situations, hence may not see vaccination as a dire issue [8-9].

In Nigeria, the Federal Ministry of Health confirmed Corona virus disease (COVID-19) case in Lagos, an Italian who entered the country. The index case was confirmed on the 27th of February 2020, is the first case to be reported in Nigeria since the beginning of the outbreak in China in January 2020. Since then Nigeria has recorded several cases with 254,525 confirmed and 3,142 deaths as at 28th February, 2022 [10].

Anambra State reported its index case on the 10th of April 2020 and followed up 49 contacts that exited contact tracing after exit testing was conducted. Several samples have been tested so

far in Anambra State with 2,825 cases confirmed and 19 deaths as at 28th February 2022 [10]. Following the easing of the lockdown, there has been influx of people into the state and this creates the need for community and facility active case search and increase vaccination exercises but hesitancy worsened with misinformation has hampered vaccination in the populace.

The WHO, UNICEF and other partners have been able to join government of different countries including Nigeria to expand immunization coverage while making it part of the child survival strategies and improve acceptability to newer vaccines like the COVID-19 vaccine introduced to the population. However, there are still larger pockets of low coverage of COVID-19 vaccination in Nigeria and indeed Anambra State; hence the dire need for this research to sought the possible reasons for vaccine hesitancy and proffer solutions. Premised on this, the study assessed the knowledge gaps responsible for vaccine hesitancy and uptake in Anambra State, determined factors responsible for vaccines hesitancy and misinformation in Anambra State, as well as evaluated the roles of communities, governments, and key stakeholders of places of Domicile in promoting vaccine acceptance, particularly the new COVID-19 vaccines.

2. METHODOLOGY

2.1 Study Area

The study was conducted in Anambra State located in South East, Nigeria. This is one of the 36 States in the country. It has 21 Local Government areas (LGAs). This study was across the 21 LGAs accessing COVID-19 vaccines.

2.2 Study Design

A cross-sectional survey was carried out.

2.3 Study Population

The participants were male and females. The age range was 18-65 years. These included teachers, students, business men and women as well as those engaged in the non-formal sectors. They are all consenting adults who were eligible for COVID-19 vaccination or had received any of the vaccines.

2.4 Sample Size Determination

There are 21 Local Government Areas(LGAs) in Anambra State and forty questionnaires were administered to respondents across each of the 21 LGAs. This gave 840(21x40) questionnaires. We utilized 81 validators as research assistants. Out of the 840 respondents 839 questionnaires was completely filled and returned. This gave a response rate of 99.8%.

2.5 Data Collection and Measurement of Variables

A simple random sampling in each LGA was done and data collected through interviewer administered questionnaire adapted from several studies [11-16]. The 81 validators administered 40 questionnaires to 40 respondents in each of the 21 LGAs and 839 was completely filled and retrieved.

Data was entered, cleaned for double entry, coded, and analyzed with SPSS version 25 software. Frequency table was generated for socio-demographics, knowledge, and socio-behavioural factors responsible for vaccine hesitancy. Roles of government and stakeholders were also assessed. Odds ratio and logistic regression employed for multi-variate analysis. Level of significance was set at $P \leq 0.05$.

2.6 Inclusion Criteria

All eligible male and females who were within the age range above, were present at the time of the study, and consented to participate were recruited for this study.

2.7 Exclusion Criteria

Those who were ill, mentally or emotionally unstable were excluded.

3. RESULTS

Table 1 shows that the commonest age group ranges was 18-25(35.99%), followed by 26-30(20.38%) as well as 31-35(12.15%) and 36-40(12.40%) years. It further showed male preponderance (54.5%) with secondary and tertiary levels of education being common; 43.9% and 45.3% respectively. The commonest occupations were being a trader/businessman (31.8%), student (29.0%), and others at (17.8%). Table 2 shows that 99.2% of the respondents have heard about COVID-19

while 0.7% has not. The commonest source of information was the radio or television (56.3%), followed by social media (21.2%) while others and health care workers were 10.1% & 5.8% respectively. Another 76.4% stated that COVID-19 is real while 14.9% did not believe it existed. Also 4.2 % did not know anything about it while reasons for not believing it existed bordered on 8.9% of the respondents not seeing anyone with COVID, 1.2% believe it is not a Nigerian disease, others believe it is a Chinese invention or a way of reducing the population (0.1% & 0.6% respectively). A total of 39.6% stated that the disease could be prevented by vaccination while 33.4% agreed that it could be prevented by social distancing and other safety protocols. The table also shows that 13.9% of the respondents did not know the disease could be prevented against 6.9% who believe there is no prevention for COVID. A total of 71.9% agreed that vaccination can prevent it while 26.2% disagreed and 1.9% does not know.

The Table 2 further shows that less than half 44.7% of the respondents have taken COVID-19 vaccine and 38.1% agreed it was for protection, while more than half 55.3% who have not taken the vaccine stated that fear, not needing it, no COVID in Nigeria, and the vaccine does not cure COVID (13.1%, 13.2%, 6.4%, & 6.2% respectively) among other reasons was why they have not taken the vaccine. The main reasons for refusing the vaccine was fear of death 21.1%, side effects 15.1%, rumours & misconceptions etc 14.4%, and not believing the disea exists 12.2% amidst others. The respondents agreed the hesitancy to vaccination can be solved by creation of awareness 57.4%, health education 6.3%, and government dispelling rumours. However, 27.4% of the respondents do not know how this hesitancy could be resolved.

Table 3 shows that among factors responsible for hesitancy, 41.4% bordered on safety concerns as the vaccine can kill them while 27.2% believed it is used as a biological weapon to reduce African population. Another 25.4% stated that they do not have enough information about this vaccine while 24.7% responded that there is no Corona virus in Nigeria. Religious belief (14.4%) was also a factor whiles the vaccine not curing the disease, and too many doses (22.1% &19.5%) were also factors responsible for hesitancy among others.

The Table 4 shows the roles of government and stakeholders in reducing vaccine hesitancy. A total of 45.8% of respondents thinks the government and other stakeholders are doing well in stopping vaccine hesitancy. Another 42.8% thinks there should be more awareness creation and sensitization to improve on COVID vaccine acceptance while incentivizing the process or giving palliatives to vaccines will improve acceptance.

The Table 5 shows that there is statistically significant relationship with the age range of 18-25 years and stating that there is no Corona virus in Nigeria, as well as vaccine used as biological weapon. This age range was also significant with the vaccine not protecting against the virus as well as preference of people with taking local herbs.

The both sexes showed statistically significant relationship with the variable stating that there is no Corona virus in Nigeria. Also those in primary school cadre stated that the vaccine is used as a biological weapon, the vaccine does not cure Corona virus, and the vaccine not protecting against the disease and these were all statistically significant. Among the post-graduate level, there was statistically significant relationship with the vaccine not curing Corona Virus (0.57).

The table further showed that is statistically significant relationship with the religious belief of civil servants, non-existence of Corona virus in Nigeria, and the thought that the vaccine does not cure the disease as factors supporting vaccine hesitancy. Among the students, religious beliefs and vaccine sites being far also encouraged vaccine hesitancy, while traders/ business men did not believe Corona virus existed and rather preferred local herbs to vaccination even if it occurred. Too many doses of the vaccine deter farmers and teachers while safety concerns also borders health care workers and these were significant factors. Further significant variables supporting hesitancy among domestic staff and other workers are religious belief, no Corona virus existing, as well as the vaccine being used as a biological weapon.

4. DISCUSSION

This study provided an insight to factors militating against COVID-19 vaccine hesitancy and proffered ways to mitigate these. The participants spanned 18-65 years with a median age of 32 years, however, the youthful age being more compared to the elderly. Age as a socio-

demographic inclination plays a significant role as the younger populace may reject the vaccine more than the elderly because they believe they still have much to offer to the society unlike the elderly. However, this contradicts the study by Marzo et al. [17] that older people are more likely to express hesitancy to COVID-19 vaccination compared to the youths. The hesitancy to COVID-19 vaccination however, is also premised on several factors worldwide and socio-demographics are quite preponderance indeed. There were more males and business men among respondents. These are decision makers in the homes and can also influence who partakes in any activity including vaccinations at most times. They could opt out on behalf of the family when there is no clear information regarding a new product being introduced. Thus the adult populations unlike the youths may likely accept COVID vaccines with interplay of religious and socio-cultural push factors [18-22].

The literacy rate among the population of Anambra State is medium to high rate and this could reduce hesitancy. This thus corroborates the findings that COVID-19 vaccination intention among literate healthcare workers increased acceptance among such population, which in turn reduced vaccine hesitancy and improved uptake as well [17,23]. This is possible because the population being literate will seek the right

information and also pass same to other members of the populace to prevent the disease and build herd immunity. However, some of these literate populations may also rely on the social media which might be unverified news sources to hamper vaccine acceptance and therefore hesitate to take the vaccine or encourage others to do so. Further studies also reiterated that some students who are indeed educated still do not believe on the COVID vaccines and this negative knowledge attitude will as a factor worsen hesitancy [24].

This study also found out that knowledge and information plays an important role to vaccine acceptance or rejection in the population. Rahman et al 2022 on the knowledge, attitude, and hesitancy towards COVID-19 vaccine among university students of Bangladesh corroborated our findings that social media, internet among others were the commonest sources of information's to respondents. It was further stipulated that the positive knowledge will enhance attitude towards the acceptance of COVID-19 vaccine. This therefore entails that when correct information about the safety and effectiveness of a vaccine is passed to the population, they will accept and embrace it. Hence sensitization through these channels and other means like the use of IEC materials are highly solicited.

Table 1. Socio-demographic characteristics of respondents

Variable	Frequency (*f*)	Percentage (%)
Age		
18-25	302	35.99
26-30	171	20.38
31-35	102	12.15
36-40	104	12.40
41-45	64	7.63
46-50	42	5.00
51-55	18	2.15
56-60	15	1.79
61-65	21	2.50
Median age 32±2 years		
Sex		
Male	382	45.5
Female	457	54.5
Level of education		
Informal	5	0.6
Primary	82	9.8
Secondary	368	43.9
Tertiary	380	45.3
Post graduate	1	0.1

Variable	Frequency (*f*)	Percentage (%)
Occupation		
Civil servant	59	7.0
Student	243	29.0
Trader/businessman	267	31.8
Teacher	39	4.6
Farmer	52	6.2
Health workers	30	3.6
Others (Carpenter, driver, housewife *etc*.)	149	17.8

Table 2. Knowledge & socio-behavioural factors of respondents on COVID-19

Variable	Frequency(*f*)	Percentage(%)
Have you heard about COVID-19?		
No	6	0.7
Yes	833	99.2
Source of information		
Hospital	13	1.5
News on radio/television	472	56.3
Social media	178	21.2
Friends	13	1.5
Health worker	49	5.8
Church	22	2.6
Others	85	10.1
No answer	7	0.8
What do you know about COVID-19? Is it real?		
No	125	14.9
Yes	641	76.4
Don't know	35	4.2
Not sure	23	2.7
No answer	15	1.7
If it doesn't exist, why do you think so?		
Have not seen anyone with COVID-19	74	8.9
Don't know	10	1.2
Government is deceiving us	8	0.9
A way of reducing the world population	5	0.6
It is not a Nigerian disease/has not killed any Nigerian	10	1.2
Because it is not real	17	2.0
A Chinese invention	1	0.1
Do you think it can be prevented and how?		
Yes by vaccination	332	39.6
Yes by medicine	25	3.0
Yes by educating the public	13	1.5
Yes by observing social distancing and other safety protocols	280	33.4
Yes by taking natural herbs	4	0.5
Maybe (no obvious reason)	10	1.2
No	58	6.9
Don't know	117	13.9
Do you think vaccination can prevent it?		
No	220	26.2
Yes	603	71.9
Don't know	16	1.9
Have you taken COVID-19 vaccine?		
No	464	55.3
Yes	375	44.7

Variable	Frequency(*f*)	Percentage(%)
If yes, why?		
For protection	320	38.1
Don't want to die of the virus	5	0.6
The vaccine helps destroy the virus	3	0.4
Because of family/health worker advisory	16	1.9
To lower the risk of infection	19	2.3
Just want to take the vaccine	5	0.6
Don't know	2	0.2
No answer	5	0.6
If no, why?		
Because of fear	110	13.1
Because I don't believe in it/religious beliefs	26	3.1
Don't need it	111	13.2
Have not seen anyone infected by it	13	1.5
There is no COVID-19 in Nigeria	54	6.4
Don't like the vaccine	16	1.9
The vaccine does not cure COVID-19	51	6.2
Don't know where to go and vaccinate	31	3.7
No reason/nothing	52	
Why do think people are refusing vaccination?		
They don't believe in the disease	103	12.2
They are afraid of the vaccine	19	2.3
Because of side effects	127	15.1
Don't think the vaccine can cure the disease	34	4.1
Because of fear of death	177	21.1
Lack of proper knowledge/education on the vaccine	73	8.7
They believe it can kill	77	9.2
Rumors/misinformation/conspiracies/controversies/fake news about the vaccine	121	14.4
Don't know	108	12.8
What ways do you think this vaccine refusal can be solved?		
Create awareness/enlightenment	482	57.4
Health education	53	6.3
By giving some incentives/palliatives	23	2.7
When govt clears the air around misconception	26	3.0
Make the vaccine available	22	2.6
Force people to take it	3	0.4
Don't know	230	27.4

Table 3. Factors responsible for vaccine hesitancy

Variable	Frequency (*f*)	Percentage (%)
Religious belief	121	14.4
There is no coronavirus in Nigeria	207	24.7
Safety concerns as the vaccine can kill	347	41.4
The vaccine used as biological weapon to reduce Africa population	228	27.2
I do not have enough information about this vaccine	213	25.4
Not aware of the availability of the vaccine	151	18.0
Vaccination site is far from my home	156	18.6
Too many doses of the vaccine	164	19.5
The vaccine does not cure Corona virus	185	22.1
The vaccine does not protect one against the Corona virus	151	18.0
I prefer to take local herbs to protect myself against the vaccine	139	16.5

Table 4. Roles of government and stakeholders in reducing COVID vaccine hesitancy

Variable	Frequency (*f*)	Percentage (%)
What roles do you think the government and stakeholders can play to improve vaccine uptake in the population?		
Create awareness/sensitize the masses on the vaccine	359	42.8
Distribute and avail the vaccine	52	6.2
Encourage and advise the people	16	1.9
Provide incentives/palliatives	266	31.7
Don't know	146	17.4
Do you think the government and stakeholders are doing enough to stop vaccine hesitancy in the communities?		
No	276	32.9
Yes	384	45.8
Not sure/don't really know/maybe	179	21.3

Table 5. Factors associated with vaccine hesitancy among respondents (OR; 95% CI)

Variable	Religious belief	There is no Coronavirus in Nigeria	Safety concerns as the vaccine can kill	The vaccine used as a biological weapon	I do not have enough information about this vaccine	Not aware of the availability of the vaccine	Vaccination site is far from my home	Too many doses of the vaccine	The vaccine does not cure coronavirus	The vaccine does not protect against coronavirus	I prefer to take local herbs
Age											
18-25	0.98 (0.96-1.00)	**1.02 (1.00 – 1.03)***	1.00 (0.99 – 1.01)	**1.02 (1.01 - 1.04)***	1.00 (0.99 – 1.01)	0.99 (0.98 – 1.01)	0.98 (0.97 – 1.00)	0.99 (0.97 – 1.01)	1.01 (0.99 – 1.03)	**1.02 (1.00 – 1.03)***	**1.02 (1.00 – 1.03)***
26-30	0.78 (0.72 – 1.05)	1.13 (0.24 – 1.92)	1.72 (0.52 – 3.32)	1.23 (0.50 – 2.54)	1.33 (0.77 – 2.18)	1.04 (0.72 – 1.24)	1.01 (0.64 – 1.23)	1.30 (0.42 – 1.72)	1.17 (0.32 – 1.95)	0.91 (0.31 – 1.15)	1.11 (0.75 – 1.57)
31-35	0.68 (0.64 – 1.12)	1.42 (0.72 – 2.12)	1.85 (0.27 – 2.05)	1.47 (0.47 – 2.03)	1.97 (0.88 – 2.03)	2.11 (1.04 – 2.99)	1.07 (0.65 – 1.13)	1.04 (0.70 – 1.35)	1.09 (0.54 – 1.55)	1.11 (0.48 – 1.52)	0.98 (0.43 – 1.12)
36-40	1.01 (0.94 – 1.34)	2.83 (1.04 – 3.16)	1.24 (0.36 – 1.91)	2.82 (0.57 – 3.12)	1.95 (0.57 – 2.24)	2.23 (1.11 – 3.44)	2.05 (1.07 – 3.75)	1.83 (0.59 – 2.01)	1.66 (0.63 – 2.44)	0.97 (0.31 – 1.14)	1.27 (0.43 – 1.55)

Variable	Religious belief	There is no Coronavirus in Nigeria	Safety concerns as the vaccine can kill	The vaccine used as a biological weapon	I do not have enough information about this vaccine	Not aware of the availability of the vaccine	Vaccination site is far from my home	Too many doses of the vaccine	The vaccine does not cure coronavirus	The vaccine does not protect against coronavirus	I prefer to take local herbs
41-45	1.09 (0.88 – 1.33)	1.14 (0.97 – 2.65)	1.44 (0.48 – 2.71)	1.94 (0.47 – 2.11)	2.03 (0.66 – 3.04)	1.05 (0.87 – 1.93)	2.03 (0.98 – 2.77)	1.17 (0.44 – 1.35)	1.32 (0.11 – 1.69)	1.48 (0.75 – 2.01)	2.11 (1.01 – 2.53)
46-50	0.92 (0.87 – 1.43)	1.52 (0.52 – 2.12)	2.82 (0.99 – 3.13)	1.73 (0.33 – 2.94)	2.56 (0.92 – 2.99)	1.97 (0.93 – 2.01)	1.72 (0.86 – 3.01)	1.93 (0.72 – 2.32)	1.88 (0.99 – 2.04)	1.37 (0.55 – 1.78)	2.42 (1.11 – 2.73)
51-55	0.87 (0.77 – 1.13)	0.57 (0.23 – 3.81)	1.87 (0.23 – 2.05)	2.05 (0.22 – 2.92)	2.88 (1.03 -	2.81 (1.12 – 34.48)	1.87 (0.79 – 2.11)	0.92 (0.49 – 1.15)	0.92 (0.45 – 1.78)	0.75 (0.21 – 1.10)	2.21 (0.99 – 3.14)
56-60	1.32 (0.97 – 1.43)	0.68 (0.79 – 4.57)	2.75 (0.71 – 3.02)	2.11 (0.76 – 2.78)	1.92 (0.78 – 2.22)	2.11 (1.15 – 3.03)	2.12 (0.73 – 2.25)	1.52 (0.17 – 2.11)	0.81 (0.30 – 1.73)	0.29 (0.11 – 1.03)	2.98 (1.05 – 4.52)
61-65	1.13 (0.93 – 1.25)	2.08 (0.77 – 5.12)	2.22 (0.56 – 3.21)	2.87 (1.01 – 3.27)	1.73 (1.05 – 2.14)	1.97 (0.93 – 2.24)	2.54 (1.07 – 4.28)	1.89 (0.70 – 2.01)	1.81 (0.44 – 2.00)	0.22 (0.10 – 1.15)	2.78 (1.03 – 3.04)
Sex											
Male	0.89 (0.61 – 1.31)	**0.67 (0.47 – 0.91)***	1.06 (0.80 – 1.39)	1.12 (0.83 – 1.53)	1.16 (0.85 – 1.59)	1.09 (0.76 – 1.56)	0.91 (0.64 – 1.29)	0.93 (0.66 – 1.31)	1.12 (0.81 – 1.56)	1.23 (0.86 – 1.76)	1.08 (0.75 – 1.57)
Female	0.58 (0.43 – 1.03)	**0.55 (0.51 – 0.90)***	0.98 (0.77 – 1.02)	1.05 (0.78 – 1.64)	1.07 (0.92 – 1.43)	0.97 (0.72 – 1.47)	0.87 (0.58 – 1.13)	0.90 (0.70 – 1.29)	0.91 (0.70 – 1.17)	1.14 (0.75 – 1.67)	0.99 (0.68 – 1.32)
Level of education											
Informal	0.51 (0.28 – 0.91)	0.79 (0.46 – 1.34)	0.31 (0.11 – 0.76)	0.44 (0.30 – 0.72)	0.50 (0.45 – 0.85)	0.32 (0.21 – 0.67)	0.32 (0.30 – 0.79)	0.45 (0.39 – 1.12)	0.40 (0.27 – 0.98)	0.33 (0.21 – 0.74)	0.44 (0.23 – 0.82)

Variable	Religious belief	There is no Coronavirus in Nigeria	Safety concerns as the vaccine can kill	The vaccine used as a biological weapon	I do not have enough information about this vaccine	Not aware of the availability of the vaccine	Vaccination site is far from my home	Too many doses of the vaccine	The vaccine does not cure coronavirus	The vaccine does not protect against coronavirus	I prefer to take local herbs
Primary	0.43 (0.24 – 0.79)	0.66 (0.39 – 1.13)	0.67 (0.41 – 1.08)	**0.57 (0.34 – 0.97)***	1.08 (0.62 – 1.92)	0.87 (0.47 – 1.62)	0.97 (0.50 – 1.87)	0.88 (0.48 – 1.62)	**0.56 (0.33 – 0.96)***	**0.39 (0.22 – 0.69)***	0.70 (0.38 – 1.28)
Secondary	1 (0.00 – 1.00)	0.57 (0.33 – 0.88)	**0.61 (0.38 – 0.992)***	0.82 (0.49 – 1.33)	1.23 (0.70 – 2.16)	1.10 (0.59 – 2.03)	1.55 (0.82 – 2.94)	1.13 (0.62 – 2.06)	0.65 (0.38 – 1.11)	0.72 (0.42 – 1.25)	0.76 (0.42 – 1.38)
Tertiary	0.99 (0.00 – 1)	1 (0.00 – 1.00)	1 (0.00 – 1.00)	1 (0.00 – 1.00)	1 (0.00 – 1.00)	1 (0.00 – 1.00)	1 (0.00 – 1.00)	1 (0.00 – 1.00)	1 (0.00 – 1.00)	1 (0.00 – 1.00)	1 (0.00 – 1.00)
Postgraduate	1.12 (0.57 – 1.30)	0.99 (0.00 – 1)	3.81 (0.41 – 35.55)	0.99 (0.00 – 1)	0.99 (0.00 – 1)	0.99 (0.00 – 1)	0.99 (0.00 – 1)	1.03 (0.10 – 9.85)	**0.57 (0.06 – 5.36)***	1.81 (0.28 – 11.62)	0.99 (0.00 – 1)
Occupation											
Civil servant	**0.01 (0.12 – 0.62)***	**0.17(0.19 – 0.76)***	1.31 (0.72 – 2.39)	0.60 (0.32 – 1.14)	1.00 (0.52 – 1.90)	0.99 (0.46 – 2.12)	0.62 (0.32 – 1.18)	0.96 (0.48 – 1.91)	**0.53 (0.27 – 1.03)***	0.42 (0.21 – 0.86)	0.46 (0.22 – 0.95)
Student	**0.35 (0.17 – 0.70)***	1.26 (0.63 – 2.52)	1.13 (0.62 – 2.05)	0.85 (0.46 – 1.59)	0.75 (0.39 – 1.41)	1.15 (0.54 – 2.43)	**0.38 (0.19 – 0.74)***	0.81 (0.41 – 1.62)	0.88 (0.46 – 1.67)	0.57 (0.30 – 1.13)	0.85 (0.43 – 1.70)
Trader/businessman	0.84 (0.23 – 3.11)	**0.53 (0.18 – 1.78) ***	1.67 (0.73 – 3.82)	0.78 (0.32 – 1.95)	1.19 (0.49 – 2.90)	0.89 (0.29 – 2.68)	0.63 (0.24 – 1.66)	0.91 (0.33 – 2.46)	0.92 (0.36 – 2.32)	0.88 (0.34 – 2.27)	**0.52 (0.17 – 1.59)***
Teacher	0.96 (0.30 – 3.09)	2.25 (0.96 – 5.27)	1.80 (0.84 – 3.88)	1.11 (0.49 – 2.47)	1.30 (0.57 – 2.95)	0.52 (0.16 – 1.64)	**0.32 (0.11 – 0.89)***	**0.29 (0.90 – 0.97)***	0.72 (0.29 – 1.73)	0.78 (0.32 – 1.91)	0.46 (0.16 – 1.32)

Variable	Religious belief	There is no Coronavirus in Nigeria	Safety concerns as the vaccine can kill	The vaccine used as a biological weapon	I do not have enough information about this vaccine	Not aware of the availability of the vaccine	Vaccination site is far from my home	Too many doses of the vaccine	The vaccine does not cure coronavirus	The vaccine does not protect against coronavirus	I prefer to take local herbs
Farmer	**0.53 (0.10 – 2.72)***	1.67 (0.61 – 4.58)	1.95 (0.79 – 4.77)	1.32 (0.52 – 3.33)	1.34 (0.52 – 3.48)	1.22 (0.39 – 3.76)	0.75 (0.27 – 2.07)	**0.39 (0.10 – 1.50)***	0.53 (0.17 – 1.64)	1.25 (0.47 – 3.33)	0.88 (0.29 – 2.62)
Health workers	1.35 (0.54 – 3.35)	2.10 (1.02 – 4.30)	**1.87 (1.00 – 3.50)***	1.08 (0.56 – 2.08)	0.79 (0.39 – 1.584)	1.34 (0.61 – 2.93)	0.70 (0.35 – 1.39)	1.04 (0.50 – 2.16)	0.88 (0.44 – 1.75)	0.77 (0.38 – 1.56)	0.11 (0.01 – 1.03)
Others (Carpenter, driver, housewife *etc.*)	**0.34 (0.18 – 0.65)***	**0.42 (0.32 – 1.01)***	0.57 (0.38 – 0.97)	**0.47 (0.32 – 0.88)***	0.63 (0.41 – 1.24)	1.13 (0.65 – 1.38)	0.54 (0.14 – 0.93)	0.99 (0.45 – 1.13)	0.67 (0.45 – 1.05)	0.85 (0.23 – 1.25)	0.78 (0.37 – 1.64)

values are significant at p < 0.05

Greater percentages have not taken the vaccine from our study. The reasons stated were in consonance with other studies that fear, side effects, poor information, religious beliefs, biological weapon, vaccine does not cure COVID, and COVID does not exist, among others [24-25]. Several studies also consolidated our findings that paucity of information, not needing the vaccine, convenience of location, timing of vaccination especially when other more pressing issues bothering on hunger, insecurity, and politico-religious matters are bedeviling the populace [26-29]. The respondents however agreed that the hesitancy to vaccination can be solved by creation of awareness, health education, and government dispelling rumours.

Further findings that more than 70% had not received this vaccine were also reiterated in several studies. It agreed with the fact that fear, unknown efficacy, vaccine neither curing nor protecting against the disease, used as a biological weapon, and other significant factors caused this hesitancy and rejection [14,30-32]. This therefore cast doubts and caused rejection to COVID vaccination.

The roles of government and stakeholders in reducing vaccine hesitancy cannot be over-emphasized. The respondents agreed that the government and other stakeholders are doing well in stopping vaccine hesitancy. However, there should be more awareness creation and sensitization to improve on COVID vaccine acceptance while incentivizing the process or giving palliatives to vaccinees to improve acceptance.

5. CONCLUSION

Factors such as fears, knowledge gaps, lack of awareness, and government commitment among others that hinders immunization and vaccine acceptance, as well as identifying role of the various key stakeholders in promoting and improving vaccination will stem further decline in immunization acceptance and uptake in Anambra State. Furthermore, continuous advocacy should be made across the six geopolitical zones in Nigeria for the recommendations of this formative study to be implemented as policy decisions at Local, State and Federal Government levels.

6. RECOMMENDATIONS

6.1 Government and Stakeholders

The Government, partners, FBOs, CBOs, CSOs, NGOs, and other stake holders should create more awareness on COVID-19 vaccination in the state. They should dispel rumors and conspiracy theories in the population and ensure correct information is passed.

The Government and partners should adequately mobilize and incentivize teams to reach zero dose, key populations, as well as hard-to-reach areas.

6.2 Community

The vaccination exercise should be brought close where people live and work. COVID-19 vaccination should be integrated into other vaccination outreaches so as to increase coverage and get to target population.

There should be no coercion or forced vaccination in other not to raise sinister ideologies in the population, rather people should be encouraged. Those who have been vaccinated should speak up as good ambassadors to encourage others get vaccinated.

CONSENT AND ETHICAL CONSIDERATIONS

Ethic approval was sought and obtained from the Anambra State Ministry of Health (Ref No. MH/COMM/552) Informed consent was also acquired from the participants after explaining purpose of the research, study procedures, discomforts and risks, potential benefits, privacy and confidentiality. Voluntary participation without respondents' information was also maintained.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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