

## **PATERNAL IMPACT ON THE UPTAKE OF COVID-19 VACCINE BY THE FAMILY- LESSONS FROM THE COVID-19 PANDEMIC FOR FUTURE EVENTS**

**AUTHORS: ADEYANJU SA, SAANU OO, OBAJIMI GO**

### **ABSTRACT**

**Introduction:** COVID-19 infection which started in China in 2019 reached the end of the earth and became a pandemic. Several interventions in the form of oral or parenteral medications did not produce a significant remedy. Eventually, vaccines were produced which appeared to be the long-awaited solution to the infection, but the next challenge which was vaccine hesitancy emerged. Many of the possible causes of hesitancy were discovered and tackled, however, in Africa; with patriarchal leadership as dominant, it was necessary to assess the paternal impact on the uptake of the COVID-19 vaccine by the family. Though COVID-19 is no longer top on the table in most countries, we can learn some lessons for the future, hence this study.

**Methodology:** In this cross-sectional study, 399 men were interviewed with a semi-structured interviewer-administered questionnaire, and the information obtained was subjected to statistical analysis.

**Results:** The mean age of the studied men was  $41.68 \pm 11.01$  years with the majority Christians (56.51%), Yoruba (80%), with tertiary education (63%), and earning less than one hundred thousand naira monthly (<150USD). Nearly all the men knew about COVID-19 infection (98.20%), its common symptoms (72.70 - 87.60%), and its common preventive measures (78.50 – 93.90%), and the most common sources of information were Television, Radio then social media. About 27.70% of the respondents had received the COVID-19 vaccine while for family vaccination support, about 70.10% for wives, 67.10%, and 66.60% respectively for sons and daughters. Those that refused vaccination had no specific reason (31.95%), while 31.36% of those who accepted it considered it safe. After controlling for confounders, the willingness to support family vaccination was significantly affected by the educational level of the men, their willingness to be tested, and their assurance of the safety of the vaccine.

**Conclusion:** To increase the uptake of COVID-vaccine, education is a key factor. It is important to educate everyone about the disease and the efficacy of vaccination which is the most reliable treatment or prevention for the lethal disease. Furthermore, a deliberate attempt at educating men on the disease and the management option would most probably have a remarkable effect on the acceptance of the vaccine by the family.

**Keywords:** COVID-19, Paternal, Vaccine, Family, hesitancy

## INTRODUCTION:

Background: When Covid-19 infection began in Wuhan City late in 2019(1–3), it was initially thought to be a Chinese or at best white men's disease; but it became a pandemic that touched all the continents of the world and Nigeria was not spared(1,4–6). The first case in Nigeria was detected on the 27<sup>th</sup> of February 2020(7,8) and it spread like wildfire thereafter. The morbidity rate and more worrisome the mortality rate especially among non-blacks was scary(9). The world of science began to engage laboratory techniques to develop diagnostic techniques and a remedy for this pernicious disease(10–14). The World Health Organization and many concerned bodies rose to the challenge. Different classes of drugs were tried initially but with no convincing breakthroughs(13–15). The resurrection of the use of hydroxychloroquine(15) combined with other supplements like zinc and multivitamins(15–21) did not appear to convincingly produce the desired result in many studies(22–31). Eventually, the Covid-19 vaccines surfaced from the effort of several companies including Johnson and Johnson company, Pfizer Inc, BioNtech SE, Novartis, GSK plc, and AstraZeneca plc among many others(32–36). While the hope of survival from vaccine use surfaced, several theories came forth from many communities to discourage the use or acceptance of the covid-19 vaccines(37–44). Some said that a few individuals were attempting to reduce the world's population(45,46), and others thought the vaccine was lethal (45,47), These unpalatable comments and information heightened vaccine hesitancy (39,43). Governments of many nations sprang into action, not only by making the vaccines available for the citizens at no cost but also putting much effort into advocacy, educating the populace on the safety of covid-19 vaccines and why they should receive the vaccine(48–50). Despite all these efforts by the government, vaccine uptake was still poor. At the time of collecting the data for this study, being the 20<sup>th</sup> month of the virus in Nigeria (September/October 2021), the Federal government of Nigeria declared that 6 million Nigerians were already vaccinated, which represented less than 4% of the targeted population(51). The factors affecting the uptake of vaccines are multiple ranging from individual preferences to family decisions, community perspectives, and in certain instances national and international factors.

Most African communities and families are patriarchal in leadership(52–54); the father who is the breadwinner of the family has a tremendous influence on the choices or decisions made by the family members; including the choice of access to healthcare services even when the services are free or worse still during life-threatening emergencies as found in the three delay model that increase maternal mortality(55,56).

Therefore, the purpose of this study is to assess the paternal position on the uptake of Covid-19 vaccines by the family. In many African settings, the influence of the father on the children is still profound even on those children aged 18 years and above, largely because of cultural influence that accords much respect to elders and partly to the fact that many over 18 years still depend on their parents especially the father for their source of livelihood. An important question to have in mind is: Does paternal influence have an impact on covid-19 vaccine uptake by family members? Can any lesson be learnt from this to guard against vaccine hesitancy in future pandemics?

In a study to determine factors affecting covid-19 vaccine uptake in Ghana, Afrifa-Anane et al reported long queues at the vaccination centres, fear of side effects, misconceptions about the vaccines, and shortage of vaccines as the factors affecting uptake(57). In a scoping review of vaccine hesitancy in Africa by Ackah et al, identified causes of hesitancy were; concerns with the

safety of the vaccine and possible side effects, the lack of trust for pharmaceutical companies and misinformation from the media. Factors associated with positive attitudes towards vaccination included male gender, having a higher level of education, and fear of contracting the virus (58). Furthermore, in a systematic review on COVID-19 vaccine hesitancy in Nigeria by Babatope et al, it was found that socio-demographic factors, perception of risk factors, and concerns about the vaccine's safety and efficacy acted interchangeably as facilitators and barriers to the uptake of COVID-19 vaccines, whereas political factors, conspiracy theories, and cost primarily acted as barriers to vaccine uptake(59). Very few studies, if at all have considered the influence of the father on the uptake of vaccines by the family, hence the focus of this study; to evaluate paternal influence on the uptake of COVID-19 vaccine by the family.

**Methodology:** In this cross-sectional study involving 399 men at selected areas in Ibadan North Local Government area in Ibadan the capital city of Oyo state, Nigeria; an interviewer-administered questionnaire was used to obtain information from consenting respondents, and the questionnaire was divided into four sections. The first section obtained sociodemographic characteristics of the men, while the second section obtained a brief family history of the men. The third section assessed their knowledge of COVID-19 infection including symptoms and signs of the disease, and preventive measures while the last section assessed the paternal willingness to support the uptake of COVID vaccine by the family and the possible causes of lack of support. Participants were men who were married at the time of this study or who had a previous marriage and were willing to participate in the study. Men who did not give consent for the study were excluded. Leslie Kish formula was used to determine the sample size for the study and 10% attrition rate was included. The information obtained was imputed to the data page of the statistical package for social sciences version 25, which was also used to carry out the analysis of the data. Data were summarized using frequency tables. Categorical data were compared using Chi- square test, and binary logistic regression was conducted to adjust for confounders.

## Results

Table 1 shows the socio-demographic characteristics of the respondents. The mean age of the studied men was  $41.68 \pm 11.01$  Years, with the majority (70%) between the ages of 30 and 49 years. Nearly all (99.40%) were currently married. Most of them were in a monogamous family setting and about three-fifth (56.51%) were Christians. Nearly 80% were of the Yoruba tribe, and less than half (45.99%) of them were skilled workers and about 63% had tertiary education as well as their wives (60%). About 60 % earned less than one hundred thousand naira per month (<150 USD). More than 90% of the men had at least one living child.

Table 1: Socio-demographic characteristics of the respondents

Variables	Frequency	Percent
<b>AGE (Years)</b>		
20- 29	23	7.20
30 – 39	101	31.60
40 – 49	125	39.10
50 – 59	53	16.60
60 – 69	16	5.00
≥70	2	0.60
Mean Age (X ± SD)	41.68 ± 11.01 Years	
<b>Marital Status</b>		
Married	336	99.40
Separated	1	0.30
Divorced	1	0.30
<b>Family setting</b>		
Monogamous	300	91.20
Polygamous	29	8.80
<b>Religion</b>		
None	7	2.07
Islam	140	41.42
Christianity	191	56.51
<b>Tribe</b>		
Yoruba	269	79.59
Igbo	17	5.02
Hausa	37	10.95
Others (Edo, Kogi & Delta)	15	4.44
<b>Occupation</b>		
Unskilled	38	11.42
Semi-skilled	144	42.59
Skilled	156	45.99
<b>Husband's Highest Educational Level</b>		
No formal Education	19	5.78
Primary	35	10.64
Secondary	68	20.67
Tertiary	207	62.92

<b>Wife's Highest Educational Level</b>		
No formal Education	22	6.83
Primary	27	8.39
Secondary	80	24.84
Tertiary	193	59.94
<b>Husband's Monthly Income (in Naira)</b>		
< 25,000	44	14.29
25,000 - <50,000	65	21.10
50,000 - < 100,000	77	25.00
100,000 - <150,000	55	17.86
150,000 - < 250,000	37	12.01
250,000 - < 500,000	19	6.17
500,000 - < 1,000,000	5	1.62
> 1,000,000	6	1.95

Table 2: Table 2 shows the source of information about and other characteristics of COVID-19.

About 98.20% were aware about COVID-19 infection, and the most common source of information was the television (84%), closely followed by the radio. Less than a quarter of the men obtained information from health facilities, while reading journals was the poorest way of obtaining information amongst the men (5.50%). Majority of the respondents (81.60%) knew that COVID was a viral infection, though 6.10% considered it to be a malarial-like disease. Despite its popular name – Corona Virus, some people still thought that COVID was a bacterium (7.10%), while some others considered it to be a parasite (1.60%).

Most of the men (78.30%) knew that the disease could be contracted from respiratory droplets, though only 43.30% thought that sitting so close and breathing on each other could promote the spread of the infection.

Cough (87.60%) was the commonest symptom of COVID-19 infection the respondents knew. Other symptoms known to the interviewed men included: difficulty with breathing (83.90%), fever (80.40%), tiredness (72.70%), chest pain, sore throat (69.90%), loss of smell (70.10%) and taste (69.70%) (66.70%), headache (67.50%), and body pain (62.50%). Less than half of the participants were aware of the following as possible COVID symptoms: diarrhoea (45.90%), conjunctivitis (40.60%), and skin rash (31.40%).

Table 2: Source of information about, and other characteristics of COVID-19

Variable	Frequency	Percent
<b>Source of information on COVID-19</b>		
Television	275	84.90
Radio	260	81.00
Social media	195	61.90
Family members	140	44.70
Friends	145	46.50

Health facilities	140	44.90
Journals	71	22.70
Others	17	5.50
<b>Nature of COVID-19</b>		
Bacterium	22	7.10
Virus	258	81.60
Parasite	5	1.60
Malaria	19	6.10
Other infection	3	1.00
<b>Mode of spread of Infection</b>		
Breathing on persons	136	43.30
Respiratory droplets	252	78.30
Sexual intercourse (sexually transmitted)	21	6.80
<b>Symptoms of COVID-</b>		
Cough	282	87.60
Fever	259	80.40
Tiredness	234	72.70
Difficulty with breathing	271	83.90
Chest pain	214	66.70
Body pain	200	62.50
Headache	216	67.50
Diarrhoea	147	45.90
Sore throat	233	69.90
Loss of taste	221	69.70
Loss of smell	223	70.10
Conjunctivitis	128	40.60
Skin rash	99	31.40

Table 3 shows the respondents' knowledge of a person(s) infected by COVID-19, and whether the participants had had the screening test for COVID-19 at any time. Despite daily announcement on televisions of the global and local mortalities from COVID, less than half (41.20%) knew a COVID-19-infected person while a lower percentage of 35.30% knew of at least a person who died from COVID-19 infection. Of the total population studied, only 43.80% (126 participants) were willing to present themselves for COVID testing if the need arose. Of these 126 people, 72 had been tested before which represented 22.30% of the total studied population.

Table 3: The respondent's Knowledge of a person(s) infected by COVID-19, their screening status and attitude toward screening for COVID-19

Variables	Frequency	Percent
<b>Knowledge of COVID-19 infection</b>		
I know COVID-19 is real	272	82.70
I know someone admitted for COVID infection	135	41.20
I know someone who died from COVID infection	116	35.30
<b>COVID 19 Screening</b>		
I can submit myself for testing/screening	126	43.80
I have been tested for COVID-19	72	22.30

Table 3 above can be made into a Bar chart for simplicity.

Table 4 depicts the knowledge of preventive measures against COVID–19 and the frequency of use/practice of the available/known preventive measures. The use of facemasks was the preventive measure most known to the participants (92.90%). Generally, the participants had a good knowledge of the preventive measures, even with 80.30% being the percentage that knew staying at home was a protective or preventive measure though the lowest measure known to the respondents was still a good level of awareness. However, this knowledge or awareness did not translate directly to good use or practice of the preventive measures. For example, only 33% of the men said that they used facemasks regularly, while 24.70% thought they always ensured physical distance as recommended. Regular handwashing was practiced by 38% of the men, while less than a third (31.50%) applied alcohol-based hand sanitizer. Less than 30% and about one-quarter (24.40%) respectively regularly coughed into a flexed elbow or regularly stayed at home as preventive measures.

**Table 4: The knowledge of preventive measures against COVID–19 and the frequency of use/practice of the available/known preventive measures.**

Variables	Frequency	Percent
<b>Preventive measures</b>		
Use of facemask	303	92.90
Physical distancing	303	89.60
Hand washing	306	93.90
Hand sanitizer	290	89.50
Cough into elbow	256	78.50
Staying at home	261	80.30
<b>Frequency of use of Facemask</b>		
None	56	18.90
Occasionally	143	48.10
Always/Regularly	98	33.00
<b>Physical Distance</b>		
None	81	27.00
Occasionally	145	48.30
Always/Regularly	74	24.70
<b>Hand washing</b>		
None	65	21.70
Occasionally	121	40.30
Always/Regularly	114	38.00
<b>Frequency of use of Hand Sanitizer</b>		
None	85	28.50
Occasionally	119	40.00
Always/Regularly	94	31.50
<b>Cough into elbow</b>		
None	109	36.70
Occasionally	103	34.70
Always/Regularly	85	28.60
<b>Staying at home</b>		
None	127	43.10

Occasionally	96	32.50
Always/Regularly	72	24.40

Table 5 depicts the knowledge and utilization of the COVID-19 Vaccines, and the willingness to support the vaccination of close relations.

Most of the respondents (85.50%) were aware of vaccines for COVID-19 infection, and nearly half of them (47.70%) considered the vaccine to be safe though more than a third (36.60%) were undecided about the safety of the vaccine. Of the 218 (67.70%) respondents with an open disposition to receiving the COVID-19 vaccine, 90 of them representing 27.70% of the total study population had received the vaccine as of the time of this research.

Most of the men (70.10%) were ready to support the uptake of the vaccine by their wives while 67.10% and 66.60% respectively were willing to support their sons and daughters respectively to receive the COVID vaccine. Almost a similar percentage (67.70%) would motivate their parents to accept the COVID vaccine.

Among the people who were not willing to accept the COVID vaccine, 31.95% had no specific reason, it was like a fear of the unknown; however, about 15.38% considered that there might be a serious side effect while about 3.37% were concerned that the vaccine might cause death. Of the people who were willing to accept the vaccines, 31.36% considered the vaccine a protective intervention.

Table 5: The Knowledge and Utilization of the COVID-19 Vaccine, and willingness to support the vaccination of a close relation.

On COVID-19 vaccine	Frequency	Percent
<b>Awareness of the COVID-19 vaccine</b>	277	85.50
<b>Vaccine Safety</b>		
Not safe	51	15.70
Safe	155	47.70
Undecided/Uncertain	119	36.60
<b>I have received the COVID-19 vaccine</b>	90	27.70
Receive vaccine for self	218	67.70
Support vaccine for wife	227	70.10
Support vaccine for son	216	67.10
Support vaccine for daughter	215	66.60
Support parents for vaccine	217	67.70
<b>Reason for not accepting vaccine</b>		
No specific reason	108	31.95
Fear of serious side effects	52	15.38
Fear of infection/premature death	8	3.37
<b>Reason for acceptance</b>		
Protective	106/338	31.36



© GSJ

Table 6 depicts the effect of the sociodemographic characteristics of the respondents and other factors on the willingness of the husbands to support the vaccination of their wives. Men that were younger than 40 years of age were more willing to support the vaccination of their wives (71.70%), but this was not statistically more significant than 68.30% of the men older than 40 years who also supported their wives' vaccination ( $p = 0.52$ ).

Seventy-two percent of men in monogamous family settings are willing to support the vaccination of their wives and this was significantly higher than 50% among the men in polygamous family settings ( $p: 0.02$ ). More Christian men (71.90%) supported the vaccination of their wives than men of other religions (67.60%), but this difference was not statistically significant ( $p: 0.42$ ).

Men of the Yoruba tribe were more willing (74.10%) to support the vaccination of their wives than men from other tribes (53.80%) and this was statistically significant ( $p: < 0.001$ ). Furthermore, men who had tertiary education (79.20%) were significantly more willing to support the vaccination of their spouses than those who were less educated ( $p: < 0.0001$ ). Men whose wives had tertiary education (77.40%) were more willing to support their wives' vaccination than the husbands of less educated women and this was statistically significant with a p-value of 0.001.

With respect to monthly income, men that earned at least one hundred thousand naira monthly (78.60%) supported their wives' vaccination more than those who earned less than a hundred thousand naira monthly (63.50%) however this was not statistically significant (p-value of 0.006). The number of children in the family did not seem to significantly affect men's decision to support their wives' vaccination ( $p: 0.30$ ).

Men who knew at least one person that has been admitted for COVID-19 infection were more willing to support the vaccination of their wives (81.20%) than 62.40% among those who never knew any admitted COVID patient and this difference was statistically significant with a p-value of  $< 0.0001$ . Furthermore; 80.40% of the men who knew at least somebody that had died from COVID-19 were more willing to support their wives' vaccination compared with 68.50% among those who had no knowledge of any case fatality from COVID-19 infection ( $p: 0.003$ ). Most of the men that were willing to have COVID-19 screening (84.10%) and 88.60% of those that had undergone the COVID-19 test, supported the vaccination of their wives and these were significant with p-values of  $< 0.0001$  each. Of the 155 men who considered the COVID-19 vaccine to be safe, 94.20% were willing to support the vaccination of their wives, and this was significantly higher than 48.20% among the men who thought that the vaccine was not safe ( $p: < 0.0001$ ).

Table 6: The effect of the sociodemographic characteristics and other factors on the husband's support for the wife's vaccination

Variables	Husbands' support for wives' vaccination		p-Value
	No (%)	Yes (%)	
<b>Age of the men (Years)</b>			
<40	36 (28.30)	91 (71.70)	0.52
≥ 40	60 (31.70)	129 (68.30)	
<b>Family Setting</b>			
Monogamous	81 (28.00)	208 (72.00)	0.02
Polygamous	14 (50.00)	14 (50.00)	
<b>Religion</b>			
Christianity	52 (28.10)	133 (71.90)	0.42
Others	45 (32.40)	94 (67.60)	
<b>Tribe</b>			
Yoruba	67 (25.90)	192 (74.10)	0.001
Others	30 (46.20)	35 (53.80)	
<b>Husband's educational level</b>			
Tertiary	41 (20.80)	156 (79.20)	< 0.0001
Below Tertiary	56 (44.10)	71 (55.90)	
<b>Wives' Educational level</b>			
Tertiary	42 (22.60)	144 (77.40)	0.001
Below Tertiary	55 (39.90)	83 (60.10)	
<b>Husband's monthly income (#)</b>			
< 100,000	66 (36.50)	115 (63.50)	0.006
≥ 100,00	25 (21.40)	92 (78.60)	
<b>Number of children</b>			
None	6 (26.10)	17 (73.90)	0.30
1-4	72 (28.90)	177 (71.10)	
>4	18 (40.00)	27 (60.00)	
<b>Knowledge of a person admitted for COVID-19 infection</b>			
No	71 (37.60)	118 (62.40)	< 0.0001
Yes	25 (18.80)	108 (81.20)	
<b>Knowledge of a COVID-19 mortality</b>			
No	75 (35.50)	136 (64.50)	0.003
Yes	22 (19.60)	90 (80.40)	
<b>Willingness of COVID Test for Self</b>			
No	73 (45.10)	89 (54.90)	< 0.0001
Yes	20 (15.90)	106 (84.10)	
<b>Ever done COVID-19 Test for Self</b>			
No	89 (35.50)	162 (64.50)	< 0.0001
Yes	8 (11.40)	62 (88.60)	
<b>Safety of COVID-19 Vaccine</b>			
No	87 (51.80)	81 (48.20)	< 0.0001
Yes	9 (5.80)	146 (94.20)	

Table 7 depicts the binary logistic regression with the husbands’ desire to support the wives’ vaccination as the response variable. An adjustment was made for the family setting, religion, tribe, educational levels of both husbands and wives, monthly income, previous COVID testing, willingness to do COVID testing, and consideration for the safety of the vaccines. The factors that most likely affected the men’s decision or willingness to support the uptake of the COVID vaccines by their wives were the educational level of the men (p: 0.05, 95%CI: 0.09 – 1.01), the willingness of the men themselves to be tested for COVID infection (p: < 0.0001, 95%CI: 0.11 – 0.47), and the men’s consideration of the vaccine as safe (p: < 0.0001, 95%CI: 0.03 – 0.17). Men with tertiary education and or willingness to submit themselves for COVID testing and or considered the COVID vaccine to be safe were more willing to support the vaccination of their wives and by extension the vaccination of their families.

Table 7: Binary logistic regression with the husbands’ desire to support the wives’ vaccination as the response variable.

Variable (reference)	Odd’s ratio	95% CI	p-Value
Family setting (monogamous)	0.42	0.14 – 1.26	0.12
Religion (Christianity)	1.49	0.71 – 3.10	0.29
Tribe (Yoruba)	0.89	0.41 – 1.94	0.77
Educational level (Tertiary)	0.30	0.09 – 1.01	0.05
Wives’ Education (Tertiary)	1.97	0.60 – 6.51	0.26
Monthly income ( $\geq 100,000$ )	1.74	0.82 – 3.71	0.15
Has done COVID test before (Yes)	0.56	0.19 – 1.70	0.31
Willingness to test (Yes)	0.23	0.11 – 0.47	< 0.0001
Safety of Vaccine (Yes)	0.07	0.03 – 0.17	< 0.0001

## Discussion

In this survey of 399 men which assessed their opinion on mobilizing their families for COVID-19 vaccination, the mean age was  $41.68 \pm 11.01$  years. This mean age made the men suitable for the study, because, at this age, most of the children were still under the care of their parents hence the true opinion of the men could be obtained compared with when they are older when most of the children would have left the family. For elderly men like that, their responses may not reflect what their actual intention could have been at the age when they were still active in nurturing their children.

Pertaining to spreading information, especially health information, telecommunication, and social media proved to be better at reaching more people than just waiting to educate the people at the health facilities.

The commonest source of information about COVID was television (84.90%), and almost the same percentage (87.60) knew of cough as a symptom of COVID. It could easily be generalized that the level of awareness or knowledge of diseases among people is directly proportional to the level of public enlightenment on television, radio, and social media.

Knowledge- the possession or lack of it influences decision-making and Fieselmann et al also made this conclusion from their study on the acceptance of COVID vaccination (45). Most of the respondents were aware of COVID-19 infection and even knew it to be a viral infection. The Majority of the men knew that COVID infection largely manifests in the respiratory system and they knew the common symptoms of COVID infection which were cough, fever, tiredness, loss of the sense of taste and smell, and difficulty with breathing, though only a few people knew it could manifest in the eye, skin and in form of diarrhoea. The information media no doubt contributed to this level of knowledge with the television and radio being the major sources of information. Though more than four-fifth of the men knew that COVID infection was real, less than half (43.80%) knew someone that has been admitted for COVID infection, and indeed barely a little more than a third (35.30%) knew someone that had died from COVID infection. These two life experiences- the personal experience of morbidity and or mortality- greatly influence people's attitudes and choices. This may have contributed to the decision of the people who had not just been vaccinated but were willing to support the vaccination of their family members. An average of 90% of the men knew the common COVID infection preventive measures, though they did not adequately use all the interventions. Truly, it may be difficult to comply effectively with the practice of maintaining physical distance, and in the daily pursuit of survival many people may have to draw close to other people especially while shopping at marketplaces. Distancing on the other hand may be realizable in large shopping malls, but there remains the question of affordability in a low resource setting like ours. This alone among other factors is weighty enough to reduce compliance with maintaining physical distance. Despite a high knowledge of preventive methods, the regular practice of those methods was very poor. This demonstrates that it is not enough to educate people on preventive measures, additional measures must be thought about that will improve compliance with those helpful measures.

Among the respondents, only 90 people which represented 27.70% had received the COVID-19 vaccines. Most of the men were willing to support the vaccination of their wives (70.10%), sons (67.10%), daughters (66.60%), and parents (67.70%). This was slightly lower than 73.60% willingness to allow COVID vaccines for the children reported in Malaysia (60). This difference

may be because the Malaysian study interviewed both parents- male and female, whereas; this study interviewed only the male counterpart. It is possible that the emotional nature of women may have contributed to the increased willingness to get the children vaccinated. In a study by Yilmaz and Sahin in Turkey at about the time this study was conducted in 2021, only 36.30% of the interviewed people were willing to permit the vaccination of their children(61), while only 16.28% of the interviewed parents in Saudi Arabia were willing to get their children vaccinated (62). These were really small compared to 67.70% willingness found in this study. This could be because the Turkish study was a survey on Facebook, and it may have been difficult to define the studied population. There may possibly be minors responding to the survey by using their parents' phones among other factors and these may have accounted for the low response among the surveyed audience. The highest support was shown towards the vaccination of their wives; hence this was used for the comparative study in this research. The commonest reason for the support of vaccination was the consideration that it was protective, while among those who refused or did not support vaccination, most of them did not have a reason in particular (31.95%), it was the fear of the unknown that made some of them be opposed to COVID-19 vaccination, though some others considered that COVID vaccine may cause premature death or at least produce some serious side effects. Oguntayo et al also reported the fear of the uncertainty of safety of vaccine among other factors as a cause of hesitancy (63), which is in agreement with the finding in this study. Religion and age did not appear to influence the decision of the men about supporting the vaccination of their spouses, however, the decision to support their spouses' vaccination with the COVID vaccine was significantly and positively influenced by the men's tribe in favour of Yoruba tribe, educational levels of the men and their wives, favouring tertiary education of the couple, the man's estimated monthly income, the knowledge of a person once admitted for COVID-19 infection, willingness to, and actual testing for the COVID infection and assurance of the safety of the COVID vaccine. In a cross-sectional study in Nigeria by Uzochukwu et al, factors found to affect COVID vaccine uptake included age, marital status, and the practice of the Christian religion (64). This study did not find age to be significant, but practicing Christianity increases the likelihood of supporting vaccination. However, this could be because Uzochukwu's study and our own were conducted in Christian-dominated areas. To know the effect of religion on vaccination, there may be the need to purposefully sample a larger number of people with religious differences as a primary factor for vaccine hesitancy. Furthermore, in Germany Fiesemann and co-workers (45) observed in a qualitative analysis that inadequate information and misinformation were considered obstacles to vaccine acceptance. This current study also found that more educated men, and men who are well informed about COVID infection were more willing to accept vaccination which is in line with the submission of Fiesemann. In this case, well informed implied men that knew about COVID infection and knew someone that had been treated for COVID infection or even died from the disease. Adesegun et al also suggested that the better educated a person was, especially medical knowledge, the greater the acceptability of the vaccine (65). Adigwe in Nigeria showed that people who survived COVID-19 infection were more willing to support vaccination (57) and this directly relates to the finding in this study where people who know COVID-19 victims were more willing to accept or recommend the vaccines. Personal experience of the disease or of a person with the disease or worse still mortality from the infection had a positive influence on accepting the vaccine for self or family members. After controlling for confounders, the factors that influenced the willingness of the husband to support the vaccination of the family with COVID vaccines

included higher level of education, willingness of the man to test for COVID-19 infection and assurance of the safety of the vaccine.

**CONCLUSION:** To increase the uptake of COVID 19- vaccination in a low-income setting, education is an important moderating factor. It is important to educate the populace about the disease and the efficacy of vaccination which is currently the most reliable treatment option for the prevention of severe complications of the COVID-19 infection. Furthermore, a deliberate and concerted effort at educating men, especially in Nigeria where a patriarchal family structure is predominant, about the disease and its management options is very likely going to have a remarkable positive effect on the acceptance of the vaccine by the family. It is therefore pertinent that emphasis be made in low-income countries on the education and engagement of men especially fathers with the goal of enlisting their support towards the timely uptake of treatment options such as vaccination in future pandemics.



## REFERENCES

1. WHO. Listings of WHO's response to COVID-19 [Internet]. WHO, June 2020. [cited 2023 May 8]. Available from: <https://www.who.int/news/item/29-06-2020-covidtimeline>
2. Liang H, Zheng L, Xia H, Tang J. Sars-cov-2 infection in china—before the pandemic. *PLoS Negl Trop Dis* [Internet]. 2020;14(8):1–20. Available from: <http://dx.doi.org/10.1371/journal.pntd.0008472>
3. Nkengasong J. China's response to a novel coronavirus stands in stark contrast to the 2002 SARS outbreak response. *Nat Med*. 2020 Mar 1;26(3):310–1.
4. Cucinotta D, Vanelli M. WHO declares COVID-19 a pandemic. *Acta Biomed*. 2020;91(1):157–60.
5. Zhu H, Wei L, Niu P. The novel coronavirus outbreak in Wuhan, China. *Glob Heal Res Policy* [Internet]. 2020 Dec 1 [cited 2023 May 8];5(1):1–3. Available from: <https://ghrp.biomedcentral.com/articles/10.1186/s41256-020-00135-6>
6. Song F, Shi N, Shan F, Zhang Z, Shen J, Lu H, et al. Emerging 2019 novel coronavirus (2019-NCoV) pneumonia. *Radiology*. 2020;295(1):210–7.
7. Adebowale AS, Fagbamigbe AF, Akinyemi JO, Obisesan OK, Awosanya EJ, Afolabi RF, et al. The spread of COVID-19 outbreak in the first 120 days: a comparison between Nigeria and seven other countries. *BMC Public Health*. 2021;21(1):1–8.
8. Amzat J, Aminu K, Kolo VI, Akinyele AA, Ogundairo JA, Danjibo MC. Coronavirus outbreak in Nigeria: Burden and socio-medical response during the first 100 days. *Int J Infect Dis* [Internet]. 2020 Sep 1 [cited 2023 May 8];98:218. Available from: </pmc/articles/PMC7307993/>
9. COVID death rate now higher in whites than in Blacks | News | Harvard T.H. Chan School of Public Health [Internet]. [cited 2023 May 8]. Available from: <https://www.hsph.harvard.edu/news/hsph-in-the-news/covid-death-rate-now-higher-in-whites-than-in-blacks/>
10. Lippi G, Plebani M. The critical role of laboratory medicine during coronavirus disease 2019 (COVID-19) and other viral outbreaks. *Clin Chem Lab Med*. 2020 Jul 1;58(7):1063–9.
11. Dodig S, Čepelak I, Dodig DČ, Laškaj R. SARS-CoV-2 – A new challenge for laboratory medicine. *Biochem Medica*. 2020 Oct 1;30(3):1–9.
12. Tandara L, Filipi P, Domic DS, Kresic B, Ivic I, Stipic SS, et al. Laboratory medicine in pandemic of COVID-19. *Biochem Medica* [Internet]. 2022 Jun 6 [cited 2023 May 8];32(2):20501. Available from: </pmc/articles/PMC8996317/>
13. Christiansen-Bullers A. Ivermectin shown ineffective in treating COVID-19, according to multi-site study including KU Medical Center [Internet]. The University of Kansas. 2022 [cited 2023 May 8]. Available from: <https://www.kumc.edu/about/news/news-archive/jama-ivermectin-study.html>
14. Baldelli S, Corbellino M, Clementi E, Cattaneo D, Gervasoni C. Lopinavir/ritonavir in COVID-19 patients: maybe yes, but at what dose? *J Antimicrob Chemother*. 2020 Sep 1;75(9):2704–6.



15. Lam S, Lombardi A, Ouanounou A. COVID-19: A review of the proposed pharmacological treatments. *Eur J Pharmacol* [Internet]. 2020 Nov 11 [cited 2023 May 8];886:173451. Available from: [/pmc/articles/PMC7406477/](#)
16. Bartoli A, Gabrielli F, Alicandro T, Nascimbeni F, Andreone P. COVID-19 treatment options: a difficult journey between failed attempts and experimental drugs. *Intern Emerg Med* [Internet]. 2021;16(2):281–308. Available from: <https://doi.org/10.1007/s11739-020-02569-9>
17. Horby PW, Mafham M, Linsell L, Bell JL, Staplin N, Emberson JR, et al. Effect of hydroxychloroquine in hospitalized patients with COVID-19: Preliminary results from a multi-centre, randomized, controlled trial. *medRxiv*. 2020;
18. Cavalcanti AB, Zampieri FG, Rosa RG, Azevedo LCP, Veiga VC, Avezum A, et al. Hydroxychloroquine with or without Azithromycin in Mild-to-Moderate Covid-19. *N Engl J Med*. 2020 Nov 19;383(21):2041–52.
19. Tripathy S, Dassarma B, Roy S, Chabalala H, Matsabisa MG. A review on possible modes of action of chloroquine/hydroxychloroquine: repurposing against SAR-CoV-2 (COVID-19) pandemic. *Int J Antimicrob Agents*. 2020 Aug 1;56(2).
20. Firouzi S, Pahlavani N, Navashenaq JG, Clayton ZS, Beigmohammadi MT, Malekhamdi M. The effect of Vitamin C and Zn supplementation on the immune system and clinical outcomes in COVID-19 patients. *Clin Nutr Open Sci* [Internet]. 2022 Aug 1 [cited 2023 May 8];44:144. Available from: [/pmc/articles/PMC9233349/](#)
21. Shah RR. Chloroquine and hydroxychloroquine for COVID-19: Perspectives on their failure in repurposing. *J Clin Pharm Ther* [Internet]. 2021 Feb 1 [cited 2023 May 8];46(1):17–27. Available from: <https://onlinelibrary.wiley.com/doi/full/10.1111/jcpt.13267>
22. Hydroxychloroquine as Postexposure Prophylaxis for Covid-19. *N Engl J Med*. 2020 Sep 10;383(11):1087–9.
23. Principi N, Esposito S. Chloroquine or hydroxychloroquine for prophylaxis of COVID-19. *Lancet Infect Dis*. 2020 Oct 1;20(10):1118.
24. Kim AHJ, Sparks JA, Liew JW, Putman MS, Berenbaum F, Duarte-García A, et al. A rush to judgment? Rapid reporting and dissemination of results and its consequences regarding the use of hydroxychloroquine for COVID-19. *Ann Intern Med*. 2020 Jun 16;172(12):819–21.
25. Yao X, Ye F, Zhang M, Cui C, Huang B, Niu P, et al. In vitro antiviral activity and projection of optimized dosing design of hydroxychloroquine for the treatment of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). *Clin Infect Dis*. 2020 Aug 1;71(15):732–9.
26. Dewey C, Hingle S, Goelz E, Linzer M. Use of Hydroxychloroquine and Chloroquine During the COVID-19 Pandemic: What Every Clinician Should Know. <https://doi.org/107326/M20-1334> [Internet]. 2020 Mar 31 [cited 2023 May 8];172(11):754–5. Available from: <https://www.acpjournals.org/doi/10.7326/M20-1334>
27. Sharif N, Opu RR, Khan A, Alzahrani KJ, Banjer HJ, Alzahrani FM, et al. Impact of Zinc, Vitamins C and D on Disease Prognosis among Patients with COVID-19 in Bangladesh: A Cross-Sectional Study. *Nutrients*. 2022;14(23).

28. Name JJ, Souza ACR, Vasconcelos AR, Prado PS, Pereira CPM. Zinc, Vitamin D and Vitamin C: Perspectives for COVID-19 With a Focus on Physical Tissue Barrier Integrity. *Front Nutr.* 2020;7(March):1–14.
29. Thomas S, Patel D, Bittel B, Wolski K, Wang Q, Kumar A, et al. Effect of High-Dose Zinc and Ascorbic Acid Supplementation vs Usual Care on Symptom Length and Reduction Among Ambulatory Patients With SARS-CoV-2 Infection: The COVID A to Z Randomized Clinical Trial. *JAMA Netw Open* [Internet]. 2021 Feb 1 [cited 2023 May 8];4(2):e210369–e210369. Available from: <https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2776305>
30. Michos ED, Cainzos-Achirica M. Supplements for the Treatment of Mild COVID-19—Challenging Health Beliefs With Science From A to Z. *JAMA Netw Open* [Internet]. 2021 Feb 1 [cited 2023 May 8];4(2):e210431–e210431. Available from: <https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2776299>
31. Rohani M, Mozaffar H, Mesri M, Shokri M, Delaney D, Karimy M. Evaluation and comparison of vitamin A supplementation with standard therapies in the treatment of patients with COVID-19. *East Mediterr Heal J.* 2022 Sep 1;28(9):673–81.
32. Simoneaux R, Shafer SL. Update on COVID-19 Vaccine Development. *ASA Monit.* 2020;84(8):17–8.
33. World Trade Organization (WTO). Developing and Delivering COVID-19 Vaccines Around the World - An Information note about issues with trade impact. *World Trade Organ.* 2020;34.
34. Coronavirus disease (COVID-19): Vaccines [Internet]. [cited 2023 May 12]. Available from: [https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/coronavirus-disease-\(covid-19\)-vaccines?adgroupsurvey=%7Badgroupsurvey%7D&gclid=Cj0KCQjwpPKiBhDvARIsACn-gzDtUKTu6YHAhvYue4\\_Yv-eI2XHI6CneN906Wpsyr4igWdr7JsA](https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/coronavirus-disease-(covid-19)-vaccines?adgroupsurvey=%7Badgroupsurvey%7D&gclid=Cj0KCQjwpPKiBhDvARIsACn-gzDtUKTu6YHAhvYue4_Yv-eI2XHI6CneN906Wpsyr4igWdr7JsA)
35. Top 10 Companies Leading the Race of COVID-19 Vaccine | Intellizence [Internet]. [cited 2023 May 12]. Available from: <https://intellizence.com/insights/top-10-companies-leading-the-race-of-covid-19-vaccine/>
36. Top biopharmaceutical Covid-19 vaccine companies boosted with over 80% revenue growth - Pharmaceutical Technology [Internet]. [cited 2023 May 12]. Available from: <https://www.pharmaceutical-technology.com/comment/covid-vaccine-companies/>
37. Erdem D, Karaman I. Impact of corona-phobia on attitudes and acceptance towards COVID-19 vaccine among cancer patients: a single-center study. *Future Oncol.* 2022 Feb 1;18(4):457–69.
38. Adedeji-Adenola H, Olugbake OA, Adeosun SA. Factors influencing COVID-19 vaccine uptake among adults in Nigeria. *PLoS One* [Internet]. 2022 Feb 1 [cited 2023 May 13];17(2). Available from: <https://pubmed.ncbi.nlm.nih.gov/35202444/>
39. Babatope T, Ilyenkova V, Marais D. COVID-19 vaccine hesitancy: a systematic review of barriers to the uptake of COVID-19 vaccine among adults in Nigeria. *Bull Natl Res Cent* [Internet]. 2023 Mar 21 [cited 2023 May 13];47(1):45. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/36970323>
40. Wu J, Li Q, Silver Tarimo C, Wang M, Gu J, Wei W, et al. COVID-19 Vaccine Hesitancy

- Among Chinese Population: A Large-Scale National Study. *Front Immunol.* 2021 Nov 29;12.
41. King WC, Rubinstein M, Reinhart A, Mejia R. Time trends, factors associated with, and reasons for COVID-19 vaccine hesitancy: A massive online survey of US adults from January-May 2021. *PLoS One.* 2021 Dec 1;16(12 December).
  42. Okai GA, Abekah-Nkrumah G. The level and determinants of COVID-19 vaccine acceptance in Ghana. *PLoS One [Internet].* 2022;17(7 July):1–18. Available from: <http://dx.doi.org/10.1371/journal.pone.0270768>
  43. Hossain MB, Alam MZ, Islam MS, Sultan S, Faysal MM, Rima S, et al. COVID-19 vaccine hesitancy among the adult population in Bangladesh: A nationwide cross-sectional survey. *PLoS One.* 2021 Dec 1;16(12 December).
  44. Naidoo D, Meyer-Weitz A, Govender K. Factors Influencing the Intention and Uptake of COVID-19 Vaccines on the African Continent: A Scoping Review. *Vaccines [Internet].* 2023 Apr 20 [cited 2023 May 13];11(4). Available from: <http://www.ncbi.nlm.nih.gov/pubmed/37112785>
  45. Fieselmann J, Annac K, Erdsiek F, Yilmaz-Aslan Y, Brzoska P. What are the reasons for refusing a COVID-19 vaccine? A qualitative analysis of social media in Germany. *BMC Public Health [Internet].* 2022 Dec 1 [cited 2023 May 13];22(1):1–8. Available from: <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-022-13265-y>
  46. Habersaat KB, Jackson C. Understanding vaccine acceptance and demand-and ways to increase them. *Bundesgesundheitsblatt Gesundheitsforsch Gesundheitsschutz.* 2020 Jan 1;63(1):32–9.
  47. Awijen H, Ben Zaid Y, Nguyen DK. Covid-19 vaccination, fear and anxiety: Evidence from Google search trends. *Soc Sci Med [Internet].* 2022 Mar 1 [cited 2023 May 13];297:114820. Available from: [/pmc/articles/PMC8847077/](https://pubmed.ncbi.nlm.nih.gov/35447077/)
  48. Kaseje N, Walcott D. Global youth advocating for COVID-19 vaccines for all. *Lancet [Internet].* 2021 Sep 25 [cited 2023 May 13];398(10306):1113–4. Available from: <http://www.thelancet.com/article/S0140673621019942/fulltext>
  49. Advocacy for COVID-19 vaccination for the most vulnerable - IASC Newsletter No. 07 - January 2021 - World | ReliefWeb [Internet]. [cited 2023 May 13]. Available from: [https://reliefweb.int/report/world/advocacy-covid-19-vaccination-most-vulnerable-iasc-newsletter-no-07-january-2021?gclid=CjwKCAjwx\\_eiBhBGEiwA15gLN6pa9LbwHULUBrwBN64Z7l-MKlQmSjzJc7OZpmP9nj69JTDDC-YzxBoCQKEQAvD\\_BwE](https://reliefweb.int/report/world/advocacy-covid-19-vaccination-most-vulnerable-iasc-newsletter-no-07-january-2021?gclid=CjwKCAjwx_eiBhBGEiwA15gLN6pa9LbwHULUBrwBN64Z7l-MKlQmSjzJc7OZpmP9nj69JTDDC-YzxBoCQKEQAvD_BwE)
  50. Combining COVID-19 and routine vaccination: Nigeria implements a “whole family” approach | Gavi, the Vaccine Alliance [Internet]. [cited 2023 May 13]. Available from: [https://www.gavi.org/vaccineswork/combining-covid-19-and-routine-vaccination-nigeria-implements-whole-family-approach?gclid=CjwKCAjwx\\_eiBhBGEiwA15gLN3frDbKsADq7Az8HqrbHMhIZurY8T\\_nR-4uQl3RZoHb4Ou4ufrzyaBoCjrsQAvD\\_BwE](https://www.gavi.org/vaccineswork/combining-covid-19-and-routine-vaccination-nigeria-implements-whole-family-approach?gclid=CjwKCAjwx_eiBhBGEiwA15gLN3frDbKsADq7Az8HqrbHMhIZurY8T_nR-4uQl3RZoHb4Ou4ufrzyaBoCjrsQAvD_BwE)
  51. Olu-Abiodun O, Abiodun O, Okafor N. COVID-19 vaccination in Nigeria: A rapid review of vaccine acceptance rate and the associated factors. *PLoS One [Internet].* 2022;17(5 May):1–10. Available from: <http://dx.doi.org/10.1371/journal.pone.0267691>

52. Offiong EE, Eyo EI, Offiong AE. Patriarchy, Culture and the Social Development of Women in Nigeria. *Pinisi J Art, Humanit Soc Stud*. 2021;1(4).
53. Mbah CS, Oti EO. Patriarchy and Women's Political Leadership Position in Nigeria: Issues, Challenges and Prospects. *Niger J Sociol Anthropol*. 2015 Jun 1;13(1).
54. (11) (PDF) Patriarchy and Women's Political Leadership Position in Nigeria: Issues, Challenges and Prospects [Internet]. [cited 2023 May 13]. Available from: [https://www.researchgate.net/publication/343479289\\_Patriarchy\\_and\\_Women's\\_Political\\_Leadership\\_Position\\_in\\_Nigeria\\_Issues\\_Challenges\\_and\\_Prospects](https://www.researchgate.net/publication/343479289_Patriarchy_and_Women's_Political_Leadership_Position_in_Nigeria_Issues_Challenges_and_Prospects)
55. Mgawadere F, Unkels R, Kazembe A, van den Broek N. Factors associated with maternal mortality in Malawi: application of the three delays model. *BMC Pregnancy Childbirth*. 2017 Jul 12;17(1):219.
56. Shah B, Krishnan N, Kodish SR, Yenokyan G, Fatema K, Burhan Uddin K, et al. Applying the Three Delays Model to understand emergency care seeking and delivery in rural Bangladesh: a qualitative study. *BMJ Open* [Internet]. 2020 Dec 1 [cited 2023 May 13];10(12):e042690. Available from: <https://bmjopen.bmj.com/content/10/12/e042690>
57. Adigwe OP. COVID-19 vaccine hesitancy and willingness to pay: Emergent factors from a cross-sectional study in Nigeria. *Vaccine X*. 2021 Dec 1;9:100112.
58. Ackah BBB, Woo M, Stallwood L, Fazal ZA, Okpani A, Ukah UV, et al. COVID-19 vaccine hesitancy in Africa: a scoping review. *Glob Heal Res Policy* [Internet]. 2022 Dec 1 [cited 2023 May 28];7(1):1–20. Available from: <https://ghrp.biomedcentral.com/articles/10.1186/s41256-022-00255-1>
59. Babatope T, Ilyenkova V, Marais D. COVID-19 vaccine hesitancy: a systematic review of barriers to the uptake of COVID-19 vaccine among adults in Nigeria. *Bull Natl Res Cent* [Internet]. 2023 Mar 21 [cited 2023 May 18];47(1):45. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/36970323>
60. Ng DLC, Gan GG, Chai CS, Anuar NAB, Sindeh W, Chua WJ, et al. The willingness of parents to vaccinate their children younger than 12 years against COVID-19: a cross-sectional study in Malaysia. *BMC Public Health* [Internet]. 2022;22(1):1–13. Available from: <https://doi.org/10.1186/s12889-022-13682-z>
61. Yılmaz M, Sahin MK. Parents' willingness and attitudes concerning the COVID-19 vaccine: A cross-sectional study. *Int J Clin Pract*. 2021;75(9):0–2.
62. Al-Qahtani AM, Mannasaheb BA, Shaikh MAK, Alajlan SA, Alayed MSZ, Shaikh IA, et al. Parental Willingness for COVID-19 Vaccination among Children Aged 5 to 11 Years in Riyadh City, Saudi Arabia: A Cross-Sectional Study. *Vaccines* 2022, Vol 10, Page 1979 [Internet]. 2022 Nov 22 [cited 2023 May 28];10(12):1979. Available from: <https://www.mdpi.com/2076-393X/10/12/1979/htm>
63. Oguntayo R, Olaseni AO, Ogundipe AE. HESITANCY PREVALENCE AND SOCIOCOGNITIVE BARRIERS TO CORONAVIRUS VACCINATIONS IN NIGERIA. 2021;14(23).
64. Uzochukwu IC, Eleje GU, Nwankwo CH, Chukwuma GO, Uzuke CA, Uzochukwu CE, et al. COVID-19 vaccine hesitancy among staff and students in a Nigerian tertiary educational institution. *Ther Adv Infect Dis*. 2021;8:1–12.

65. Adesegun OA, Binuyo T, Adeyemi O, Ehioghae O, Rabor DF, Amusan O, et al. The COVID-19 crisis in sub-saharan Africa: Knowledge, attitudes, and practices of the Nigerian public. *Am J Trop Med Hyg.* 2020 Nov 1;103(5):1997–2004.

© GSJ