

Original Article

# Misconceptions and Acceptability of Covid-19 Vaccines Among Residents of Osogbo Community in Osun State, Nigeria

Osunmakinwa OO<sup>1</sup>, Adebimpe WO<sup>1</sup>, Ibirongbe DO<sup>1</sup>, <sup>2</sup>Osho P.O.

1. Department of Community Medicine, University of Medical Sciences, Ondo

2. Department of Haematology and Immunology, University of Medical Sciences, Ondo

\*Correspondence: Osho Patrick Olanrewaju : Email: [droshopo@unimed.edu.ng](mailto:droshopo@unimed.edu.ng)

## Article History

Submitted: 27/05/2022; Accepted: 27/07/2022; Published: 22/06/2023

## ABSTRACT

The Coronavirus disease (COVID 19), an emerging infectious disease, poses complex challenges to global public health. Vaccines are now available but misconceptions and myths brew poor knowledge, hence hesitancy to get vaccinated. The aim of this work is to assess the misconceptions and acceptability of COVID-19 vaccines among residents of Osogbo community, Nigeria. It was a community-based descriptive cross-sectional study of 420 subjects. Data was collected with semi-structured interviewer-administered questionnaire, and analyzed using SPSS version 25. The mean age was 24.7±6.5years and 57.4%(n=241) were females. All 420 participants have heard about COVID-19, mostly through Television (94.3%, n=396). About two third 276(65.7%) had good knowledge. More than half 248(59.1%) had positive attitude towards COVID-19 vaccination. Close to half (48.2%, n=202) would like to be vaccinated when the vaccines are available. Close to half (46.8%, n=197) were willing to accept the vaccine. Common misconceptions about COVID-19 vaccine were reported with age, marital status, and educational background found to be statistically significant with positive knowledge about COVID-19 (p value<0.05). Also, respondent's employment status and religion were statistically significant with knowledge about COVID-19 vaccine (p value<0.05). People that were educated were two times more likely to have good acceptance than the uneducated (OR: 2.75, CI: 1.31-5.74, p 0.003). The study concluded that misconceptions are common. This calls for enlightenment campaign by stakeholders to reach the entire community in the study area, using appropriate communication strategies informed by the findings of this and other studies.

**Keywords:** Acceptance, COVID-19, Misconception, Vaccine.

## INTRODUCTION

COVID-19, an emerging disease caused by the highly infectious Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) virus, has been declared a public health emergency of international concern by the World Health Organization.<sup>1</sup> The disease's urgency is highlighted by its ability to infect, hospitalize, and kill a large number

of people in a short period of time. Worse, some procedures aimed at preventing disease in emergency situations, such as the lockdown technique, may destroy the economy and hence raise poverty levels in the affected communities. The pandemic's spread has impacted numerous countries, producing issues in practically every facet of daily life. For all health-care systems around the world, the pandemic poses an unprecedented challenge of worrisome magnitude.

### Article Access



Website: [www.wjmb.com](http://www.wjmb.com)

 10.5281/zenodo.7748870

### How to cite this article

Osunmakinwa OO, Adebimpe WO, Ibirongbe DO, Osho P.O. Misconceptions and Acceptability of Covid-19 Vaccines among Residents of Osogbo Community in Osun State, Nigeria. *West J Med & Biomed Sci.* 2023;4(1-2):1-9. DOI:10.5281/zenodo.7748870

Vaccine hesitancy has been identified as one of the top ten challenges to global health.<sup>2</sup> Several studies have discovered a number of factors that influence vaccine acceptability when a new vaccine is introduced. In one of such studies, these difficulties include vaccine safety and efficacy, negative health impacts, misconceptions about the importance of vaccination and a lack of community awareness regarding vaccine-preventable diseases. However, there is dearth of information on how the general public feels about COVID-19 vaccine.<sup>3</sup>

The development of a new and unique COVID-19 vaccine is viewed as a pressing necessity.<sup>4</sup> Although the fast development of vaccinations sparked excitement and hope among the public, a growing number of illegal sources disseminating wrong and misleading information have altered the public's view and heightened public anxieties, leading to vaccination refusal or deferral. On social media, incorrect information regarding the pandemic has been extensively circulated, such that 5G mobile networks are linked to the virus, that vaccine trial volunteers have perished after receiving a candidate COVID-19 vaccine, and that the pandemic is a bioweapon. Such information can exacerbate pre-existing anxieties by sowing doubt and cynicism about new vaccines, limiting public acceptance of COVID-19 vaccines.<sup>5</sup> People are also likely to believe that a pandemic vaccine is more dangerous because it is new or hasn't been extensively tested. Public opinions of vaccine safety may impact vaccine acceptance.<sup>6</sup>

Widespread immunization is critical for controlling COVID-19 transmission. However, the present pandemic is taking place against a backdrop of widespread global distrust in vaccine safety and effectiveness. Thousands of people have marched to the streets around the world to oppose COVID-19's social segregation policies and the possibility of mass vaccinations. This is because public perceptions of vaccine safety, significance, and effectiveness are all linked to vaccine uptake.<sup>7</sup> This can limit attainment of herd immunity or effective control of the pandemic.

Vaccine demand in low- and middle-income countries (LMICs) is less well-studied, and the populace may have different concerns than in high-income ones.<sup>6</sup>

Acceptance challenges with the COVID-19 vaccination are currently evident in numerous parts of the world, particularly Africa. As a result, a risk communication-based study of relevant determinants is required to assess its acceptability and design effective health promotion strategies to boost COVID-19 immunization rates.<sup>8</sup> This study therefore aims to assess the misconceptions and acceptability of COVID-19 vaccines among residents of Osogbo community in Southwestern Nigeria.

## MATERIALS AND METHODS

### Study Area

The study was carried out in Osogbo, capital city of Osun State in Southwestern Nigeria. Osogbo city seats the Headquarters of both Osogbo Local Government Area and Olorunda Local Government Areas. Osogbo is easily accessible from any part of the state because of its central location. The city had a population of about 499,999 people and an approximate land area of 2875 km<sup>2</sup>. Osun state has three major centres for the testing and treatment of COVID-19, of which one is located at Osogbo. These centres serve as the referral centre for other adequately sensitized healthcare facilities. The screening and treatment at these centres are free while the option of screening for a fee is also available.<sup>9</sup>

### Study Design

A descriptive cross-sectional design was used in this study.

### Study Population

This includes male and female age 18 and above who reside in Osogbo community. Residents who have been staying in Osogbo for at least six (6) months and people who are 18 years and above were included in the study, while people who were not physically fit to fill the questionnaire at the time of data collection were excluded.

### Sample Size Calculation

Leslie fishers formula was used to estimate the sample size for this study ( $N = Z^2Pq/d^2$ ), using a Prevalence rate of Covid-19 vaccine acceptability of 52%.<sup>10</sup> A sample size of 384 was calculated, which was increased to 420, after adding and adjusting for an

assumed non response rate (10%).

### Sampling Technique

This study utilized a multi-stage sampling technique. This involved six stages as follows: In stage one, simple random sampling was employed to select the two out of 3 local Governments in Osogbo (Osogbo and Olorunda local government) by simple balloting. In stage two, five wards per local government were selected by simple random sampling. Stage three involved selection of five Enumeration Areas (EA) per ward by simple random sampling. In stage four, selection of three streets per Enumeration Area (EA) by simple random sampling was done. Stage five involved selection of one in three odd numbered houses per street on the left and right by systematic random sampling after obtaining a sampling frame, while in the last stage, selection of eligible residents per house was done using simple random sampling.

### Study Instrument

Data was collected out with the aid of a pre-tested, semi-structured self-administered questionnaire. The questionnaire comprised six sections which elicited information on socio-demographic characteristics of respondents, their knowledge of COVID-19 vaccine, their attitude towards COVID-19 vaccine, their acceptance of covid-19 vaccine, common misconceptions of COVID-19 vaccine among residents, and factors affecting willingness to accept COVID-19 vaccine among residents of Osogbo community respectively. The questionnaire was pretested in Egbedore Local Government Area, Osun State, among twenty-one (21) respondents.

The questions on knowledge and attitude to COVID-19 vaccination were scored. Every correct response was given a score of 1 and an incorrect response got 0. The individual knowledge or attitude score was thereafter computed and a mean knowledge or attitude score was obtained for the respondents. Respondents whose knowledge or attitude score is equal to or more than the mean score were regarded as having good knowledge or good attitude while those with scores lower than the mean score was regarded as having poor knowledge or poor attitude. Similar scoring was done for the acceptance of COVID-19 vaccine.

### Data Analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS) 25th edition after data entry and cleaning. Uni-variate analysis was done using frequency distributions and presented in tables and charts. Bi-variate analysis using chi-square test to examine the association between two categorical variables was done, while binary logistic regression was used to check for predictors of outcome variables. Statistical significance was set at P-value less than  $<0.05$  (95% confidence limits).

### Ethical Consideration

Ethical approval was obtained from the Health Research and Ethics Committees (HREC) of the College of Health Science, Osun State University, Osogbo. Also, verbal informed consent was taken from the respondents having explained the aim and goals of the research to them, and assuring them of confidentiality and non-maleficence. Confidentiality following data collection was ensured at data processing and storage.

### RESULTS

Table 1 shows the Socio-demographic characteristics of respondents. The mean age of the respondents was  $24.7 \pm 6.5$  years; higher proportions 241 (57.4%) of the respondents were female, 378 (90.0%) belong to Yoruba ethnic group, 192 (45.7%) were married and 245 (58.3%) reside in rural areas. Half 209 (49.8%) of the respondents had attained up to tertiary education while two third 290 (69.0%) were employed.

Table 2 depicts general knowledge about COVID-19 among respondents of the study and shows that all the respondents had heard about COVID-19, and that a higher proportion 396 (94.3%) and 377 (89.8%) heard of it on television. Majority 399 (95%) believed the disease is deadly while 359 (85.5%) knew a vaccine exists for the disease. Only 144 (34.3%) knew that the vaccine is effective. Figure 1 depicts the sources of information about COVID 19 vaccine and it showed that majority of respondents heard about the COVID-19 pandemic through television and radio.

Table 3 revealed respondents' willingness to accept COVID-19 Vaccine. Only 80 (19.0%) of the respondents were vaccinated. A little above half 231

(55.0%) of the respondents were not vaccinated because they do not trust the vaccine. Nearly half 159 (46.8%) of the respondents were willing to take the COVID-19 vaccine, while more than one-third of 127 (37.4%) of the respondents agreed to take the vaccine no matter the route of administration. Figure 2 showed respondents' overall knowledge and acceptance of COVID-19 vaccine. It showed that majority (65.7%, n=276) and (60.6%, n=255) had good knowledge about the COVID-19 pandemic and were willing to accept the vaccine, respectively.

Table 4 (N=340) showed the common misconception of COVID-19 vaccine. Two-third 223(65.6%) of the respondents believed that COVID-19 vaccine is dangerous, but only few 39(11.5%) of the respondents accepted that all vaccinated individuals would die shortly. Very low percentage 14(4.1%) of the respondents believed that it is a way of enslaving them by the white compared to majority 326(95.9%) of the respondents who disagreed. Least proportion 22(6.5%) of the respondents agreed that there is a chip inside linked to 5G network to monitor us while higher proportion 318(93.5) of the respondents were incognizant of the misconception. Also, few 67(19.7%) of the respondents believed that the vaccine is not effective.

Close to half 153(45.0%), 172(50.6%), 182(53.5%) and 154(45.3%) disagreed that vaccine not being readily available, route of administration, distance to where the vaccine can be taken and side effects are not factors that affected their willingness to accept the vaccine, respectively. Also, most 181(53.2%), 221(65.0%), 213 (62.6%), 293(67.6%) and 204 (60.0%) of the respondents disagreed that long queue at vaccination venue, attitude of the health workers, cultural belief, lack of information and waiting time were none of the factors affecting their willingness to take the vaccine, respectively. (Table 5, N=340)

Table 6 showed the association between respondents' socio-demographic characteristics and acceptance of Covid-19 vaccine and the logistic regression of predictors of good acceptance of COVID-19 vaccine. None of the socio-demographic characteristics was significantly associated with good acceptance of COVID-19 vaccine. People who were employed were two times (OR=2.0) more likely to have good

acceptance of COVID-19 vaccine than the unemployed and it is statistically significant. Also, people that were educated were almost three times (OR=3.0) more likely to have good acceptance of COVID-19 vaccine than the uneducated and it is statistically significant. Figure 2 depicts the knowledge and acceptance of the Covid-19 vaccine among respondents of the study. It showed that the relatively high proportion (65.7%, n=420) of respondents with good knowledge of the Covid-19 vaccine translated into a relatively high (60.6%, n=420) proportion acceptance of the vaccine.

Table 1: Socio-demographic characteristics of respondents (N=420)

Variables	Frequency	Percentage
<b>Sex</b>		
Male	179	42.6
Female	241	57.4
<b>Age</b>		
<20	86	20.5
21-30	185	44.0
31-40	75	17.9
41-50	41	9.8
>50	33	7.8
<b>Mean age=24.7±6.5years</b>		
<b>Religion</b>		
Christianity	207	49.3
Islam	213	50.7
<b>Ethnicity</b>		
Yoruba	378	90.0
Igbo	31	7.4
Hausa	4	1.0
Others	7	1.7
<b>Marital status</b>		
Single	218	51.9
Married	192	45.7
Divorced	6	1.4
Widowed	4	1.0
<b>Educational background</b>		
No formal education	25	6.0
Primary	27	6.4
Secondary	159	37.9
Tertiary	209	49.8
<b>Employment status</b>		
Employed	290	69.0
Unemployed	130	31.0
<b>Residence</b>		
Rural	245	58.3
Urban	175	41.7

**Table 2: General knowledge on COVID-19** N=420

Variable	Frequency	Percentage
<b>Have you ever heard about COVID-19</b>		
Yes	420	100.0
No	0	0
<b>Is it a deadly disease?</b>		
Yes	399	95.0
No	4	1.0
I don't know	17	4.0
<b>Is it curable?</b>		
Yes	257	61.2
No	31	7.4
I don't know	132	31.4
<b>Does the vaccine exist</b>		
Yes	359	85.5
No	16	3.8
I don't know	45	10.7
<b>Do you know if the vaccines are effective?</b>		
Yes	144	34.3
No	34	8.1
I don't know	242	57.6
<b>Where are the COVID 19 vaccinations taking place in your area</b>		
State hospital Asubiaro	209	49.8
UTH	87	20.7
PHC Ilesha-Aghara	113	26.9
I don't know	11	2.6
<b>Do you think the vaccine fully protects against COVID 19</b>		
Yes	132	31.4
No	59	14.0
I don't Know	229	54.6
<b>Can the vaccine guarantee that there will not be any infection if the prevention measure is stopped?</b>		
Yes		
No	84	20.0
I don't Know	59	14.0
	277	66.0
<b>Does the vaccine give life-long immunity?</b>		
Yes	44	10.5
No	82	19.5
I don't Know	294	70.0
<b>Does the vaccine have side effects?</b>		
Yes	128	30.5
No	88	21.0
I don't know	204	48.5

\*Multiple responses

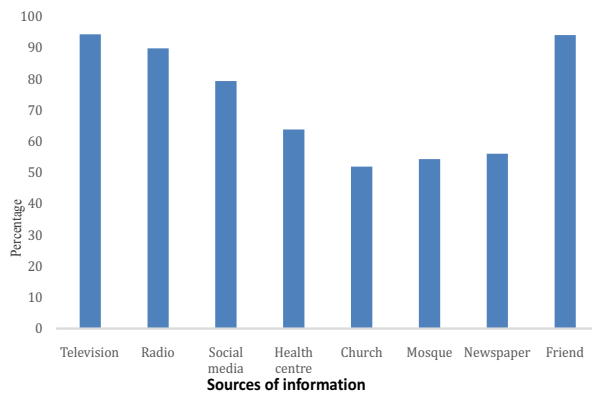


Figure 1: Sources of information about COVID 19 vaccine

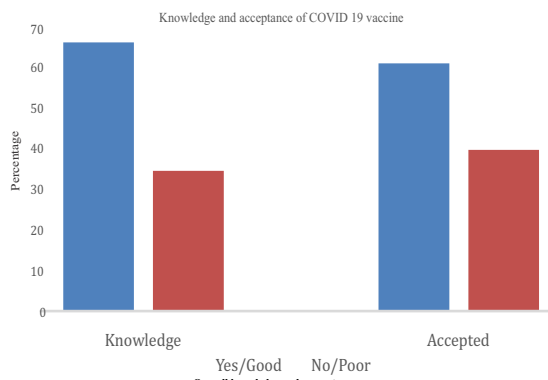


Figure 2: Overall knowledge on and acceptance of COVID-19 Vaccine

**Table 3: Respondents' willingness to accept COVID-19 Vaccine** N=420

VARIABLES	Frequency	Percentage
<b>Have you been vaccinated?</b>		
Yes	80	19.0
No	340	81.0
<b>I'm willing to collect the vaccine</b>		
Yes	164	48.2
No	176	51.8
If no, reasons		
I don't trust the vaccine	76	43.1
Fear of side effect	45	25.6
Not interested	38	21.6
Nothing	17	9.7
<b>I will take the vaccine no matter the route of administration</b>		
Yes	127	37.4
No	213	62.6
<b>I will encourage my family members to take the COVID-19 vaccine</b>		
Yes		
No	161	47.4
	179	52.6
<b>I trust the vaccine</b>		
Yes	114	33.5
No	226	66.5
<b>I am willing to pay for the vaccine</b>		
Yes	79	23.2
No	261	76.8

\*Multiple responses

**Table 4: Respondents' view on common misconceptions of covid-19 Vaccine** N=340

Variable	Yes	No
Covid -19 vaccine is dangerous	117(34.4)	223(65.6)
All vaccinated will die shortly	39(11.5)	301(88.5)
All vaccinated will soon lose their sexual performance	31(9.1)	309 (90.9)
You would be monitored by the white once you are vaccinated	12(3.5)	328(96.5)
It is a way of enslaving us by white	14(4.1)	326(95.9)
There is a chip inside linked to 5G network to monitor us	22(6.5)	318(93.5)
Vaccine is not effective	67(19.7)	273(80.3)
The vaccine was developed too fast	42(12.4)	298(87.6)
It has not been tested on enough people	43(12.6)	297(87.4)
The vaccine gives you Covid-19	38(11.2)	302(88.8)
It can affect women's fertility	37(10.9)	303(89.1)
It can kill	67(19.7)	273(80.3)
The side effect of the vaccine are dangerous	116(34.1)	224(65.9)
The vaccine is given to eliminate some youths	46(13.5)	294(86.5)

Table 5: Factors associated with willingness to take COVID-19 vaccine N=340

Variable	Yes	No	I Don't Know
Not readily available	130(38.2)	153(45.0)	57(16.8)
Long queue at vaccination venue	98(28.8)	181 (53.2)	61(18.0)
Attitude of health workers	58(17.1)	221(65.0)	61(17.9)
Route of drug administration	107(31.5)	172(50.6)	61(17.9)
Distance to where it can be taken	105(30.9)	182(53.5)	53(15.6)
Cultural belief	80(23.5)	213(62.6)	47(13.8)
Lack of information	147(43.2)	156(45.9)	37(10.9)
Too much bureaucracy data collection	44(12.9)	230(67.6)	66(19.4)
Waiting time to take the vaccine	76(22.4)	204(60.0)	60(17.6)
Side effects	154(45.3)	118(34.7)	68(20.0)



Table 6: Association between respondents' socio-demographic characteristics and willingness to accept Covid-19 vaccine N=340

VARIABLE	Acceptance toward Covid-19 vaccine		X <sup>2</sup>	P-value
	Well Acceptable	Not Acceptable		
<b>Sex</b>				
Male	88(60.3)	58(39.7)	1.011	0.918
Female	118(60.8)	76(39.2)		
<b>Age</b>				
<20	42(55.3)	34(44.7)	2.376	0.667
21 -30	97(63.4)	56(36.6)		
31 -40	33 (60.0)	22(40.0)		
41 -50	20(66.7)	10(33.3)		
>50	14(53.8)	12(46.2)		
<b>Marital status</b>				
Single	115(59.3)	79(40.7)	0.360	0.948
Married	86(62.3)	52(37.7)		
Divorced	3(60.0)	2(40.0)		
Widowed	2(66.7)	1(33.3)		
<b>Educational background</b>				
No formal education	14(66.7)	7(33.3)	0.886	0.829
Primary	14(58.3)	10(41.7)		
Secondary	82(62.6)	49(37.4)		
Tertiary	96(58.5)	68(41.5)		
<b>Employment status</b>				
Employed	143(63.8)	81(36.2)	2.906	0.088
Unemployed	63(54.3)	53(45.7)		
<b>(B) Logistic regression</b>				
Variables	Odd ratio (OR)	Confidential interval		P-values
		Lower	Upper	
<b>Age (years)</b>	0.68	0.09	5.12	0.544
<30(Ref)				
>30				
<b>Marital status</b>	1.00	0.36	2.76	0.500
Never married				
Married				
<b>Employment status</b>	2.00	3.83	12.78	<0.001*
Employed				
Unemployed				
<b>Educational status</b>	2.75	1.31	5.74	0.003*
Educated				
Not educated				

\*Statistically significant &lt;0.05

## DISCUSSION

In this study, all the respondents had heard about COVID-19, while most of them were aware that the disease is lethal. This high level of (OR=2.0) awareness supports similar findings about the pandemic.<sup>11,12,13</sup> Also, that most of the respondents reported television and the radio as their primary source of awareness about the pandemic underscores the significance of the television and radio as media that could be used to effectively reach the larger population of similar towns and cities with relevant messages in the current fight against the pandemic. Television and radio as channels of communication are under strict regulation by the government. This finding therefore gives insight into the possibility for government to leverage the strength of television and radio as major sources of information in the study area to curb myths, misconception and falsehood about the pandemic; negative trends that thrive very well through other media (internets, social media, interpersonal communication, etc.) of which the government has very little or no control over.<sup>13</sup>

While respondents' knowledge about the existence of vaccines against the SARS-Cov-2 is high, only about one-third of them know that the vaccines are effective

or that it fully protects against the COVID-19 virus. This implies that about two-thirds of the community may not expect any derivable benefits from taking the vaccine, hence constituting a major militating factor in the COVID-19 vaccine uptake. Eight in ten of the respondents had not received the vaccine (this was about 9 months after the vaccines were approved for use in the country), with about half of them unwilling to take the vaccine because they did not trust the vaccine. If this level of unwillingness to take the vaccine significantly translate to actual vaccine uptake, it portends a grave challenge to effective control of the SARS-Cov-2 in the country. This finding differs from the report of other studies by Eze et al. in Nigeria and Abdelhafiz et al. in Egypt in which about two-thirds of the respondents were willing to take the COVID-19 vaccine.<sup>15,16</sup> The study participants in these other studies however spread across 3 regional zones (north, east and south) and this may contribute to the observed difference in the respondents' willingness to take the vaccine. Our findings also shows that the high level of awareness among the participants of the study did not translate into high uptake of the vaccine.

It is noteworthy that while the study shows that between half and two-thirds of the respondents reported determinant factors of health services uptake (distance, cultural belief, lack of information about the vaccine, etc.), as not contributing to their willingness to take the COVID-19 vaccines, it also showed that only about one-third of the unvaccinated respondents know that the vaccines are effective or that it fully protects against the COVID-19 virus while about half of the unvaccinated group reported lack of trust in the vaccine as the reason for their unwillingness to be vaccinated.

Misconceptions and myths about the vaccine ranged between 1 in 20 to about 1 in 5 depending on the question that was asked. This differs from the report of a similar study by Ahmad et al in which misconceptions and myths ranged from 1 in 10 to 1 in 3 among respondents<sup>17</sup>. None of respondents' socio-demographic characteristics was significantly associated with acceptance of Covid-19 vaccine. This finding, with those stated above further emphasize the significance of respondents' poor perceived

knowledge of potential benefits of taking the vaccine and the consequences of doing otherwise as two important determinants of the vaccine uptake in this study area.

Juxtaposing above findings would suggest the need to lay information, education and communication (IEC) emphasis on potential benefits of taking the vaccines and the consequences of doing otherwise. This underscores the relevance of the health-belief model and the extended parallel process model of health education and promotion as important IEC strategies to employ in conveying relevant vaccine education and general preventive messages about the pandemic to the larger community of the study area. Uptake of the Covid-19 vaccine would be expected to improve with increase in the knowledge of the risks of being infected, the potential benefits of taking the vaccines and the consequences of doing otherwise in the community, as studies have shown that 'people who believed that they would definitely not get infected were 6 time more likely to show vaccine hesitancy compared to people who perceived higher likelihood of COVID-19 infection'.<sup>18</sup>

The correlations between respondents' education level and being employed as positive predictors of good acceptance of COVID-19 aligns with findings from several others that have demonstrated amongst others, that education of respondents is a positive predictor of good acceptance of COVID-19.<sup>19,20</sup>

The study area of this research covers only one of six regional zones in the country. This would limit the generalizability of its findings and recommendations, considering the cultural and socio-demographic variations known to exist across the regions.

## CONCLUSION

High level of awareness and knowledge about the covid-19 vaccine, amidst some misconceptions and myths about the pandemic, were recorded among the residents of Osogbo community in Osun State, Nigeria. The high level of awareness and knowledge did not translate into high level of vaccine uptake in the community. While commonly identified socio-demographic factors and other determinants of health services uptake were reported as not influencing or significantly associated with respondents' vaccine

uptake, poor knowledge of benefits of taking the vaccine and the likely consequences of not being vaccinated was reported among the respondents. This should inform program managers and policy makers on vaccine education and to focus on appropriate health education and promotion strategy to deploy in the process.

## Acknowledgment

We appreciate all our respondents in the various communities who gave consent into participating in this study.

## Conflicts of Interest

There is no conflict of interest to declare on this study.

## Funding

No external funding from any source was received for the conduct of this study.

## REFERENCES

1. Omaka-Amari LN, Aleke CO, Obande-Ogbuinya NE, Ngwakwe PC, Nwankwo O, Afoke EN. Coronavirus (COVID-19) pandemic in Nigeria: Preventive and control challenges within the first two months of outbreak. *Afr J Reprod Health*. 2020;24(2 Special Edition COVID-19):87–97.
2. Bălan A, Bejan I, Bonciu S, Eni CE, Ruță S. Romanian Medical Students' Attitude towards and Perceived Knowledge on COVID-19 Vaccination. *Vaccines* 2021, Vol 9, Page 854 [Internet]. 2021 Aug 4 [cited 2022 May 12];9(8):854. Available from: <https://www.mdpi.com/2076-393X/9/8/854/htm>
3. (14) (PDF) COVID-19 Risk Perception Among U.S. Adults: Changes from February to May 2020 [Internet]. [cited 2022 May 12]. Available from: [https://www.researchgate.net/publication/343824791\\_COVID-19\\_Risk\\_Perception\\_Among\\_US\\_Adults\\_Changes\\_from\\_February\\_to\\_May\\_2020](https://www.researchgate.net/publication/343824791_COVID-19_Risk_Perception_Among_US_Adults_Changes_from_February_to_May_2020)
4. Abu-Farha RK, Alzoubi KH, Khabour OF. <p>Public Willingness to Participate in

- COVID-19 Vaccine Clinical Trials: A Study from Jordan
- [Internet]. 2020 Dec 14 [cited 2022 May 12];14:2451–8. Available from: <https://www.dovepress.com/public-willingness-to-participate-in-covid-19-vaccine-clinical-trials--peer-reviewed-fulltext-article-PPA>
5. Ijioma NE, Nze C, Ijioma NE, Nze C. Evaluating the Influence of Social Media Use in COVID-19 Vaccine Hesitancy of Residents of Owerri Metropolis. *Adv Journal Commun* [Internet]. 2022 Jan 11 [cited 2022 May 12];10(1):10–24. Available from: <http://www.scirp.org/journal/PaperInformation.aspx?PaperID=114744>
  6. Harapan H, Wagner AL, Yufika A, Winardi W, Anwar S, Gan AK, et al. Acceptance of a COVID-19 Vaccine in Southeast Asia: A Cross-Sectional Study in Indonesia. *Front public Heal* [Internet]. 2020 Jul 14 [cited 2022 May 12];8. Available from: <https://pubmed.ncbi.nlm.nih.gov/32760691/>
  7. Paul E, Steptoe A, Fancourt D. Attitudes towards vaccines and intention to vaccinate against COVID-19: Implications for public health communications. *Lancet Reg Heal - Eur* [Internet]. 2021 Feb 1 [cited 2022 May 12];1. Available from: <http://www.thelancet.com/article/S2666776220300120/fulltext>
  8. Wirsiy FS, Nkfusai CN, M, Ebot Ako-Arrey D, Dongmo EK, Manjong FT, et al. Acceptability of COVID-19 Vaccine in Africa. *Int J Matern Child Heal AIDS* [Internet]. 2021 Apr 8 [cited 2022 May 12];10(1):134–8. Available from: <https://mchandaid.org/index.php/IJMA/article/view/482>
  9. NCDC Coronavirus COVID-19 Microsite [Internet]. [cited 2022 May 12]. Available from: <https://covid19.ncdc.gov.ng/laboratory/>
  10. Perception of Covid-19 and Acceptance of Vaccination in Delta State Nigeria | Josiah | The Nigerian Health Journal [Internet]. [cited 2022 May 19]. Available from: <http://www.tnhjph.com/index.php/tnhj/article/view/510>
  11. Loomba S, de Figueiredo A, Piatek SJ, de Graaf K, Larson HJ. Measuring the impact of COVID-19 vaccine misinformation on vaccination intent in the UK and USA. *Nat Hum Behav*. 2021 Mar 1;5(3):337–48.
  12. Zhong BL, Luo W, Li HM, Zhang QQ, Liu XG, Li WT, et al. Knowledge, attitudes, and practices towards COVID-19 among chinese residents during the rapid rise period of the COVID-19 outbreak: A quick online cross-sectional survey. *Int J Biol Sci*. 2020;16(10):1745–52.
  13. Adebimpe WO, Adeomi AA, Adegboire AK, Osunmakinwa O, Oladejo AR, Adebimpe AA, et al. Risk Communication and Community Attitude to Corona Virus Disease 2019 Outbreak in Southwestern Nigeria. *J Heal Med Sci*. 2022;5(1).
  14. Eze UA, Ndoh KI, Ibisola BA, Onwuliri CD, Osiyemi A, Ude N, et al. Determinants for Acceptance of COVID-19 Vaccine in Nigeria. *Cureus* [Internet]. 2021 Nov 22 [cited 2022 May 13];13(11). Available from: <https://www.cureus.com/articles/70950-determinants-for-acceptance-of-covid-19-vaccine-in-nigeria>
  15. Abdelhafiz AS, Mohammed Z, Ibrahim ME, Ziady HH, Alorabi M, Ayyad M, et al. Knowledge, Perceptions, and Attitude of Egyptians Towards the Novel Coronavirus Disease (COVID-19). *J Community Health* [Internet]. 2020 Oct 1 [cited 2022 May 13];45(5):881. Available from: </pmc/articles/PMC7173684/>
  16. Bitar AN, Zawiah M, Al-Ashwal FY, Kubas M, Saeed RM, Abduljabbar R, et al. Misinformation, perceptions towards COVID-19 and willingness to be vaccinated: A population-based survey in Yemen. *PLoS One* [Internet]. 2021 Oct 1



- [cited 2022 May 13];16(10):e0248325.  
Available from:  
<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0248325>
17. Khubchandani J, Sharma S, Price JH, Wiblehauser MJ, Sharma M, Fern , et al. COVID-19 Vaccination Hesitancy in the United States: A Rapid National Assessment. [cited 2022 May 13]; Available from: <https://doi.org/10.1007/s10900-020-00958-x>
  18. Gomes da Silva J, Silva CS, Alexandre B, Morgado P. Education as a Predictor Factor for Knowledge of COVID-19 in Portugal. *Front Public Heal.* 2021 Sep 29;9:1383.
  19. Habib MA, Dayyab FM, Iliyasu G, Habib AG. Knowledge, attitude and practice survey of COVID-19 pandemic in Northern Nigeria. *PLoS One [Internet].* 2021 Jan 1 [cited 2022 May 19];16(1). Available from: <https://pubmed.ncbi.nlm.nih.gov/33444360/>