

COVID-19 VACCINE HESITANCY IN A RURAL COMMUNITY OF NIGERIA

ABSTRACT

Introduction: Vaccine hesitancy is a major challenge to public health, particularly in the context of the COVID-19 pandemic. This research was aimed at examining COVID-19 vaccine hesitancy in the Idumebo Community, Irrua, Edo State, Nigeria, to understand the factors influencing vaccine acceptance and refusal.

Objective: The primary objective of this research was to determine the level of knowledge, uptake, and reasons for vaccine hesitancy among residents of Idumebo, Irrua Edo State. By exploring these factors, the study aimed to provide insights that can inform targeted interventions to improve vaccine acceptance rates in the community.

Method: A descriptive cross-sectional study was done among residents of age 18-60 years in Idumebo, utilizing structured questionnaires to gather data on socio-demographic characteristics, knowledge of COVID-19, and attitudes towards vaccination. Ethical considerations were prioritized, with institutional and community consent obtained before data collection.

Results: The findings showed a high degree of awareness of COVID-19 among participants, with a majority acknowledging the contagious nature of the disease. However, vaccine hesitancy was observed among a subset of respondents, with reasons ranging from concerns about safety and efficacy to misinformation and mistrust. These results underscore the need for targeted educational campaigns and community engagement to address vaccine hesitancy effectively.

Conclusion: It was concluded that the study brought to light the complex dynamics of COVID-19 vaccine hesitancy in the Idumebo Community, revealing the necessity of tailored interventions to address barriers to vaccine acceptance. By fostering a better understanding of community attitudes and concerns, public health authorities can develop strategies to enhance vaccine uptake and combat the spread of COVID-19 in the region.

KEY WORDS: VACCINATION, COVID-19, HESITANCY, COMMUNITY, IMMUNIZATION

1.0 INTRODUCTION

1.1 BACKGROUND

Vaccination is regarded as one of the most important success in public health. Immunization programs have played an all important role in bringing the rate of deaths and diseases from several infectious diseases to its barest minimum and have nearly eliminated some diseases in certain nations [1]. Vaccination programs are effective in reducing the occurrence and spread of vaccine-preventable diseases (VPD) especially when there is a high rate of vaccine acceptance. Beyond protecting those who receive the vaccines directly, extensive vaccination coverage also offers indirect benefits to the whole community through herd immunity. This reduces the transmission of VPDs, consequently reducing the infection risk among those who are still vulnerable in the community.[1]

Vaccine hesitancy occurs when individuals resist and are not willing to get vaccinated in spite of the availability of vaccines. Vaccine hesitancy is a worldwide issue that has significant effect on immunization effort [2].

The refusal to take vaccines long before now has been associated with the outbreak of many diseases both in advanced and developing countries. For instance, the **SAGE REPORT (2014)** in Northern Nigeria revealed that in 2003/2004 the failure to take polio vaccine due to its rejection did not only multiply polio incidence five times the previous data in Nigeria but also led to outbreaks across three continents. The rejection was empowered by rumors and lack of trust which are foundations of vaccine hesitancy[3]. It

is a serious problem not only for the persons that reject it but also for the community as a whole as refusal to be vaccinated hinders communities to be incapacitated in achieving a high level of uptake that confers herd immunity in the communities, thus leading to the increase in the risk of an outbreak of a vaccine-preventable organism starts circulating in that community [4].

Several factors contribute to vaccine hesitancy, as identified by the World Health Organization and expanded upon by various authors. These include complacency, confidence, convenience, risk assessment, and a sense of collective responsibility [5]. As per confidence, creating personal trust and vaccination acceptance implies that hope in the vaccines should be earned via a good delivery system, and the policy made[6]. For Convenience, factors such as physical access to vaccines, their availability, affordability, and willingness to pay; geographical accessibility; the ability to understand the language used in immunization services; and the overall appeal of these services all contribute to vaccine hesitancy [6]. In curtailing vaccine hesitancy, the "2030 Agenda" for sustainable development was adopted on September 25, 2015. This agenda includes 17 Sustainable Development Goals (SDGs) and 169 targets, which were established to follow up on the Millennium Development Goals (MDGs)[7]. The Sustainable Development Goal 3, which is to "Ensure healthy lives and promote well-being for all at all ages"; inscribed within this goal are targets related to Universal Health Coverage (UHC), which focus on accomplishing comprehensive health coverage. This includes financial risk protection, access to quality essential healthcare services, and ensuring that everyone has access to safe, effective, quality, and affordable essential medicines and vaccines[7].

After thorough study, the Strategic Advisory Group of Experts (SAGE) working group concluded that the efficiency of immunization could be improved by identifying and analyzing factors contributing to vaccine hesitancy, alongside implementing evidence-based strategies to increase vaccine uptake[8].

The most effective interventions for increasing vaccine uptake include strategies that: focus directly on populations that are unvaccinated or under-vaccinated; aim to improve knowledge and awareness about vaccines, which have shown considerable practical breakthrough; improve easy accessibility to vaccination services; are channeled to specific groups such as local communities and healthcare workers (HCWs) [8].

Communications is a major tool in the goal to address vaccine hesitancy; however, this alone will not solve the vaccine hesitancy challenge [8]. The process of educating and passing the knowledge about vaccines in younger individuals (children, adolescents, and young adults) may provide a good avenue to sharpen the future of vaccine acceptance behavior of parents and adults and minimize the rise of hesitancy [8].

Coronavirus disease 2019 (COVID-19) is an acute illness from a novel coronavirus known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2; previously referred to as 2019-nCoV). This virus was first discovered in an outbreak of respiratory illnesses in Wuhan City, Hubei Province, China [9]. The initial report of the outbreak to the World Health Organization (WHO) was made on December 31, 2019. Subsequently, on January 30, 2020, the WHO declared the COVID-19 outbreak a global health emergency. [10,11]. On March 11, 2020, the World Health Organization (WHO) declared

COVID-19 a global pandemic, marking the first time it had issued such a declaration since it classified H1N1 influenza as a pandemic in 2009 [12].

Coronaviruses belong to a large family of viruses, with seven types known to infect humans. Some coronaviruses that usually infect animals have adapted to infect humans as well. [13] SARS-CoV-2 is likely one such virus, postulated to have originated from a sea food market [13].

The major way people contract SARS-CoV-2 is due to the exposure to respiratory droplets that houses the virus, especially within a distance of 6 feet. Other transmission routes include contact transmission, such as through handshakes, and airborne transmission from droplets that remain in the air and travel long distances, generally exceeding 6 feet [14,15,16]. By February 15, 2022, there were more than 412 million confirmed cases of COVID-19 globally, resulting in close to 6 million deaths. [17]

COVID-19 can present in various ways, from displaying no symptoms or mild symptoms to severe illness and death. Typical symptoms include fever, cough, and shortness of breath. Other reported symptoms include general discomfort and respiratory distress. [20,21]. To help combat the menace, it was seen that mRNA vaccine from Pfizer, Johnson and Johnson and Moderna were subsequently approved by the Food and Drug Administration Agency (FDA) in the USA [44].

The benefits of immunization are beyond doubts proven to be true with relevant documentations. Immunization is among the most effective and economical health interventions available, saving numerous lives and enhancing health and well-being worldwide. However, to mitigate the morbidity and mortality associated with vaccine-

preventable diseases and their complications, and to effectively manage these diseases in communities, it is crucial to achieve high vaccination uptake rates. [22]

Although numerous studies have been done on vaccine hesitancy, that on the hesitancy on a disastrous wide spreading pandemic like COVID has not be exhausted. This study is thus directed toward the residents in a COVID-19 endemic area, using Idumebo,Irrua. Edo State as a case study.

An endemic community and not just any community is best suited for this research as it gives an access to numerous data and due to the fact that the greatest impact of the disease is felt by the residents in this area, they stand to gain more from vaccination as it can lift the burden of the disease from them. Also, this study can add knowledge on vaccine hesitancy since there are very few researches conducted on the topic in sub-Saharan Africa and even Nigeria.

The general objective of the study was to assess vaccine hesitancy in a COVID-19 endemic community in IdumeboIrruaEsan Central Local Government Area Edo State, Nigeria.

The specific objectives in the study were to determine the knowledge, uptake and to ascertain why COVID-19 was not accepted by those who refused to take the vaccine of COVID-19 among the residents of Idumebo,IrruaEsan Central Local Government Area.

2.0. METHODOLOGY

2.1 STUDY DESIGN AND POPULATION

The study was a descriptive cross-sectional study carried out among residents living in Idumebo community of Irrua Esan central local government area of Edo state. Idumebo is a quarter in Irrua town where the prestigious Specialist Teaching Hospital (ISTH) and Mudiame University are located.

The study participants were from Idumebo Community which cut across the adolescents, youths and the elderly in different areas of profession or irrespective of status.

The study duration lasted from March 2022 to September 2022.

2.2a INCLUSION CRITERIA

- Persons who are 18 years of age and above who have resided in Idumebo community of Irrua for more than one year.
- Residents who stay permanently in the community.

2.2b EXCLUSION CRITERIA

- Visitors to the community
- Those who are not present on the day of administration of questionnaire.
- Those who were ill and bedridden (speech defect)

Sample size is estimated using Cochran's formula for cross-sectional surveys [51]

The estimated sample size from the formula is 79.

Sample size formula $n = \frac{Z^2 Pq}{d^2}$

2.3 MEASURES

A random sampling technique was made use of in the study in which each participant had an equal chance of being chosen for the study so that an unbiased representation of the total population was achieved. The houses that made up the sample were chosen by balloting, after which the questionnaires was distributed. Data was collected using interviewer administered questionnaire, having obtained informed consent from the Hospital Research Committee, Local Government Council, Community head and participants. The questionnaires covered knowledge, awareness, uptake and possible reasons for rejection.

2.4 DATA ANALYSIS

Statistical analysis to examine the association between proportions was conducted using the appropriate statistical tests in Statistical Package for the Social Sciences (SPSS) version 25. The significance level was established at $p < 0.05$, with the construction of 95% confidence intervals and odds ratios where relevant. The relationship between the dependent and independent variables was assessed using the Chi-square test.

The data was analyzed using the descriptive statistical methods which was represented in frequency distribution tables, percentage and bar chart. A scoring system of 70% and above was assigned for good knowledge while below 70% was assigned to poor knowledge.

3.0 RESULTS

From the socio- demographic characteristics of respondents, the age at which participants had their last birthday ranged from 18-60 years, with most of the respondents (22.2%) belonging to age group 41-45. The mean age was 38. There are

more singles (59.7%). Most participants (68.1%) had tertiary level of education, majority (76.4%) are Christians and most respondent (33.3%) are students.

TABLE 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS.

VARIABLE	FREQUENCY (n= 72)	PERCENT (%)
AGE AS AT LAST BIRTHDAY		
18-25	8	11.1
26-30	18	36.1
31-35	12	16.7
36-40	10	13.9
41-45	16	22.2
46-50	1	1.4
51-60	7	9.7
TOTAL	72	100

Mean age of 31.8 + Standard deviation of 10.5

VARIABLE	FREQUENCY (n= 72)	PERCENT (%)
GENDER		

MALE	55	76.4
FEMALE	17	23.6
TOTAL	72	100

VARIABLE	FREQUENCY (n= 72)		PERCENT (%)
MARITAL STATUS			
SINGLE	43		59.7
MARRIED	19		26.4
DIVORCED	6		8.3
SEPERATED	2	2.8	
WIDOWED	2	2.8	
TOTAL	72	100	

VARIABLE	FREQUENCY (n= 72)		PERCENT (%)
LEVEL OF EDUCATION			
PRIMARY	6		8.4
SECONDARY	17		23.6
TERTIARY	49		68.1
TOTAL	72		100

VARIABLE	FREQUENCY (n= 72)		PERCENT (%)
RELIGION			

CHRISTIAN		55	76.4
ISLAM	10		13.9
AFRICAN TRADITIONAL RELIGION		7	9.7
TOTAL	72		100

VARIABLE	FREQUENCY (n= 72)		PERCENT (%)
OCCUPATION			
UNSPECIFIED	6	8.3	
BUSINESS	5	6.9	
CARPENTER	2	2.8	
CIVIL SERVANT	2	2.8	
DOCTOR	6	8.3	
ENGINEER	2	2.8	
FARMER	6		8.3
LAB SCIENTIST	2	2.8	
LECTURER	2	2.8	
NURSE	2	2.8	
PHARMACIST	1	1.4	
STUDENT	24	33.3	
TEACHER	6	8.3	
TRADER	6	8.3	
TOTAL	72		100

Based on the assessment of respondent on the knowledge of COVID-19, a vast majority(100%) of participants have heard of COVID-19,and (100%) believe that it is

contagious, also, (100%) know that it is transmitted, about (88.9%) believe that it is transmitted through contact with an infected person, another (88.9%) believe that it is contacted from secretions of an infected person, a vast majority of respondents(90.3%) believe that none use of face mask and protective equipment increases the chances of getting infected and spread of the disease.(97.2%) of respondents believe that regular hand washing reduces the spread of the disease and (95.8%) also acknowledge that the use of hand sanitizer reduces infection spread.

TABLE 2: ASSESSMENT OF KNOWLEDGE OF COVID-19

VARIABLE	FREQUENCY (n= 72)	PERCENT (%)
HAVE YOU HEARD OF COVID-19 BEFORE		
YES	72	100
NO	0	0
CONTAGIOUS		
YES	72	100
NO	0	0
TRANSMISSION OF THE DISEASE		
YES	72	100
NO	0	0
CONTACT WITH INFECTED PERSONS		
YES	64	88.9
NO	8	11.1

**CONTACT WITH THE SECRETION OF AN
INFECTED PERSON**

YES	64	88.9
NO	8	11.1

**NONE USE OF FACE MASK AND PROTECTIVE
EQUIPMENT**

YES	65	90.3
NO	7	9.7

VARIABLE	FREQUENCY (n= 72)	PERCENT (%)
TRANSMISSION AIRBORNE		
YES	71	98.6
NO	1	1.4
PROTECT YOURSELF FROM THE DISEASE USE OF FACE MASK		
YES	69	95.8
NO	3	4.2
AVOID CONTACT WITH INFECTECTED PERSONS		
YES	72	100
NO	0	0

REGULAR WASHING OF HANDS

YES	70	97.2
NO	2	2.8

USE OF HAND SANITIZER

YES	69	95.8
NO	3	4.2

REPORTING INFECTED CASES

YES	69	95.8
NO	3	4.2

A cross-sectional study on the assessment of the uptake of COVID-19 vaccine show that (88.9%) have reservation on the COVID-19 vaccine, a vast majority of respondents(66.7%) expresses concern on the pain felt during the vaccination process, (65.3%) expresses discomfort on the use of needle/injection during vaccination,(65.3%)expresses fear of being infected with the virus through vaccination, and majority of respondent(80.6%) doubt the potency of the vaccine and lastly, about (50%) of participants do not accept the vaccine for reasons such as; fear of reactions, conspiracy theories, religious reasons and dislike for the vaccine, etc.

TABLE 3: ASSESSMENT OF THE UPTAKE OF COVID-19 VACCINE.

VARIABLE	FREQUENCY	PERCENT
FEAR OF THE COVID-19 VACCINE	(n= 72)	(%)
YES	64	88.9

NO	8	11.1
PAIN		
YES	48	66.7
NO	8	11.1

NEEDLES/INJECTIONS

YES	47	65.3
NO	9	12.5

BEING INFECTED WITH THE VIRUS

YES	47	65.3
NO	11	15.3

FAILURE OF POTENCY OF THE VACCINE

YES	58	80.6
NO	4	5.6

**CONGENITAL MALFORMATION OF THE
BABIES[WOMEN OF REPRODUCTIVE AGE]**

YES	28	38.9
NO	24	33.3

CAUSES STERILITY

YES	30	41.7
NO	24	33.3

REACTIONS LIKE FEVER

YES	51	70.8
NO	11	15.3
DO YOU THINK THE VACCINE WILL BENEFIT YOU IN ANY WAY		
YES	53	73.6
NO	15	20.8
LIFE IMMUNITY AGAINST THE DISEASE		
YES	23	31.9
NO	27	37.5
REDUCED SEVERITY OF THE DISEASE		
YES	62	86.1
NO	6	8.3
ACCEPTANCE THIS VACCINE		
YES	36	50.0
NO	34	47.2
REASONS		
FEAR OF REACTIONS	21	29.2
CONSPIRACY THEORIES	14	19.4
IT IS AGAINST MY FAIT	1	1.4
I DON'T LIKE THE VACCINE	2	2.8
NO TIME	2	2.8

From the chart average participants were willing to accept the vaccine, just below average were unwilling to accept it while the remainder were undecided.

Fig 1: Pie chart showing Acceptance of COVID-19 Vaccine

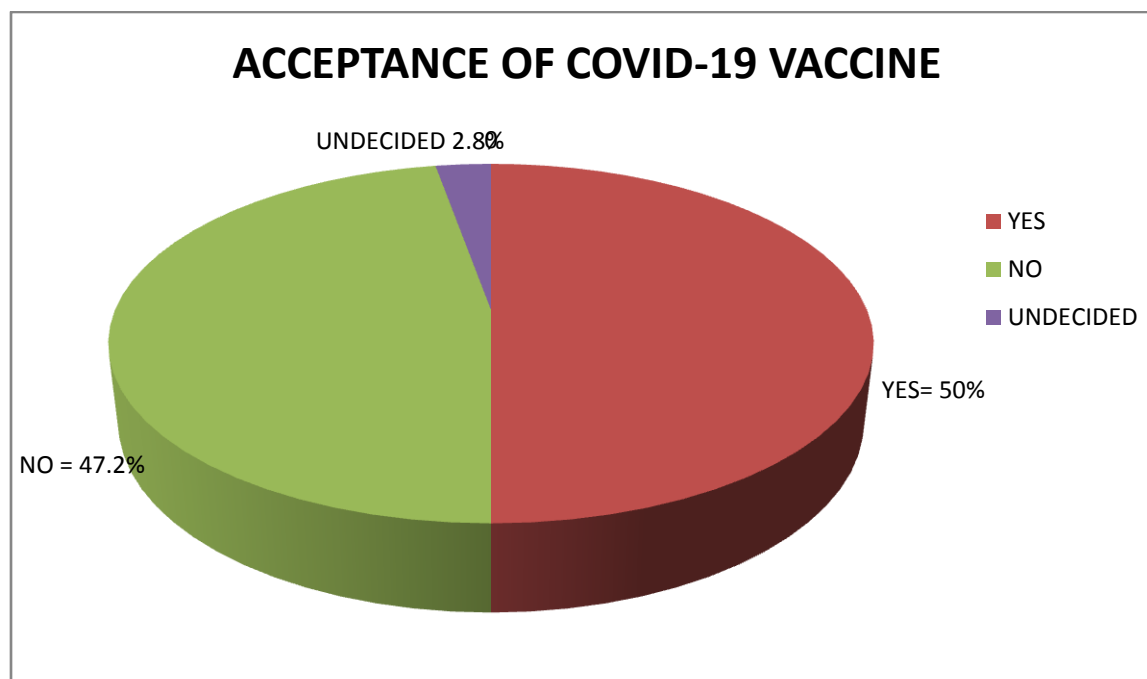


Table 4 shows the association between socio-demographic factors and the uptake of the vaccine. It was observed that there was no statistical significance between uptake of vaccine and the age group of respondents ($p=0.421$) as the level of statistical significance is greater than the set level of statistical significance of $p=0.05$. However there was no statistical significance between uptake and other socio-demographic factors.

TABLE 4: ASSOCIATION BETWEEN SOCIAL DEMOGRAPHIC FACTORS AND UPTAKE OF COVID-19 VACCINE

VARIABLE	UPTAKE			P-VALUE
	YES	NO	TOTAL(%)	
FEARS OR WORRIES ON THE USE OF COVID-19 VACCINE				
AGE VALUE				P-

18-25			6	2	8(11.1)
0.421					
26-30			18	0	18(25.0)
31-35			10	2	12(16.7)
36-40			8	2	10(13.9)
41-45			14	2	16(22.2)
46-50			1	0	1(1.4)
51-60	7	0	7(9.7)		
TOTAL	64	8	72(100)		

Table 5 shows the association between COVID-19 acceptance and non-acceptance of the vaccine. It was observed that there was statistical significance between receptiveness of vaccine and non-receptiveness of respondents ($p=0.015$) as the level of statistical significance is less than the set level of statistical significance of $p=0.05$.

TABLE5:ASSOCIATION BETWEEN COVID-19 VACCINE ACCEPTANCEAND UPTAKE

VARIABLE P-VALUE	UPTAKE			
	VACCINEACCEPTANCEMAYBE	YES	NO	TOTAL(%)P-VALUE
YES 0.015*		2	32	2 36 (50.0)
NO		2	19	13 34(47.2)
TOTAL	4	53	1572(100)	

3.6 DISCUSSION

The global COVID-19 vaccination strategy outlining the steps to achieving effective and equitable distribution of vaccine have met with some reservations within Africa most especially within the sub-sahara Africa and in Nigeria to be precise.

From this study, to assess Covid-19 hesitancy in Idumebo Community Irrua, Edo State, a descriptive cross-sectional study was employed for this research, the socio-demographic characteristics of respondents residing at Idumebo, Irrua, Esan central local government area of Edo state. The age at which participants had their last birthday ranged from 18-60 years, with most of the respondents (22.2%) belonging to age group 41-45. The mean age was 38. There are more singles (59.7%). Most participants (68.1%) had tertiary level of education, majority (76.4%) are Christians and most respondent (33.3%) are students.

A cross-sectional assessment of respondent on the knowledge of COVID-19, a vast majority (100%) of participants have heard of COVID-19, and (100%) believe that it is contagious, also, (100%) know that it is transmitted, about (88.9%) believe that it is transmitted through contact with an infected person, another (88.9%) believe that it is contacted from secretions of an infected person, a vast majority of respondents (90.3%) believe that none use of face mask and protective equipment increases the chances of getting infected and spread of the disease. (97.2%) of respondents believe that regular hand washing reduces the spread of the disease and (95.8%) also acknowledge that the use of hand sanitizer reduces infection spread. A comparable study was carried out with 2,083 undergraduate students from various public and private universities in Jordan during the early phase of the disease (March 19-21, 2020). This survey aimed to evaluate their knowledge of COVID-19. Results indicated that 56.5% of the participants demonstrated good knowledge, 40.5% had moderate knowledge, and 3.0% displayed poor knowledge about COVID-19. The average knowledge score among the students was 80.1%, which falls within the range of good knowledge [30].

A cross-sectional study on the assessment of the uptake of COVID-19 vaccine show that (88.9%) have reservation on the COVID-19 vaccine, a vast majority of respondents (66.7%) expresses concern on the pain felt during the vaccination process, (65.3%) expresses discomfort on the use of needle/injection during vaccination, (65.3%) expresses fear of being infected with the virus through vaccination, and majority of respondent (80.6%) doubt the potency of the vaccine and lastly, about (50%) of participants do not accept the vaccine for reasons such as; fear of reactions,

conspiracy theories, religious reasons and dislike for the vaccine. A self-reporting electronic survey and questionnaire-based study was conducted at vaccination centers across various cities in Pakistan with 502 participants. The findings showed that the majority of respondents had a positive attitude towards the vaccine. About 47.4% confidently believed in the vaccine's efficacy. However, 49.8% of respondents expressed a fear of injection site pain, followed by concerns about asthenia (43.0%), muscle pain (29.5%), and swelling (24.5%) at the vaccination site. Additionally, female participants reported a greater fear of experiencing these symptoms compared to males.[35].

In a cross-sectional study done among college students in USA regarding the receptiveness of the vaccine, over 1600 student participated, half reported being vaccinated of those not vaccinated, 49% did not intend to get vaccinated and 22% were indecisive. Reasons for hesitancy includes: not trusting if the vaccine was fully tested, fear of potential side effects, not trusting the US government and having read negative report from the media about the vaccine [38].

An overview cross-sectional study done among African countries and middle East countries to ascertain the acceptances, attitude, and belief relating to vaccines in general and the COVID-19 vaccine revealed that 66.81% of respondent would like to be vaccinated against COVID-19, while 33.19% refuse vaccination. Reasons for vaccine hesitancy includes: concerns regarding vaccine side effects, fear of getting sick from uptake of the vaccine, religious belief, and absence of accurate vaccine promotion news [39].

4.1 CONCLUSION

The growing evidence of increasing vaccination non-receptiveness remains a menace in curbing the spread of COVID-19 among the populace; hence effort targeted at vaccine sensitization and improving vaccination coverage particularly among the priority group should be of utmost necessity. From the study, it was observed that majority demonstrated good knowledge but only just average agreed that accepting the vaccine will benefit them, with many participants expressing their various fears ranging from

mistrust, congenital anomalies, needle prick et cetera. There was a significant relationship uptake and COVID-19 vaccine acceptance.

The authors therefore recommended that the government should ensure a proper sensitization and enlightenment of the populace of the benefits of vaccines through an effective, organized and informative media campaign should be promoted. Also, the government needs to form a coalition with W.H.O on the best practices of vaccine storage and administration. Lastly, an improvement on the already impoverished health system to the met global best practices should be ensured.

As per the community, the researchers advised that compliance to the rules and guidelines of government on covid-19 vaccination and control should be adhered to.

Health workers were commended thus far but also much more is expected as they are at the fore front on combating the pandemic. Therefore, they have to be readily available as concerning the process of vaccine administration and enlightenment of the general populace of the effectiveness and benefit of the COVID-19 vaccine and also educating the populace on the safe and effective ways of preventing spread of the disease.

ACKNOWLEDGEMENTS

The researchers' expresses gratitude to the community in which this study was conducted, research assistants and participants involved in the study and the entire authors contributions and supervisors of the study.

COMPETING INTERESTS

There are no conflict interests amongst the authors as study was done with utmost cooperation and diligence.

Authors' Contributions

All authors contributed in playing their part in the study ranging from task distribution to final vetting of the manuscript.

ETHICAL APPROVAL AND CONSENT

The consent for this research was sought for from the department of Community Medicine Ambrose Alli University Ekpoma. Ethical approval for the study was sought

from the ethical review board Irrua Specialist Teaching Hospital. Consent was also gotten from the Medical Officer of Primary Health Care from Esan Central Local Government Area, Irrua. Community entry was done by obtaining permission from the community leader. Both verbal and written informed consents were obtained from respondents before the questionnaires were administered. The purpose of the research was explained to the respondents as best as possible and they were made to understand that information gotten was going to be strictly confidential and stored in files, kept away from unauthorized access and soft copy stored in pass-worded laptops which will be available to only the researchers

REFERENCES

1. Fine P, Eames K, Heymann DL. "Herd immunity": a rough guide. *Clinical Infectious Diseases* 1 April 2011, Volume 52, Issue 7, doi :10.1093/cid/cir007, 911–916. Available at <https://doi.org/10.1093/cid/cir007> Accessed on April 2022.
2. Hammond, Jordan, "Vaccine Confidence, Coverage, and Hesitancy Worldwide: A Literature Analysis of Vaccine Hesitancy and Potential Causes Worldwide" (2020). *Senior Theses*. 344. https://scholarcommons.sc.edu/senior_theses/344. Accessed on April 2022
3. Report of the SAGE working group on vaccine hesitancy. Available at: https://www.who.int/immunization/sage/meetings/2014/october/SAGE_working_group_revised_report_vaccine_hesitancy.pdf Accessed on April 2022
4. Ghinai I, Willott C, Dadari I, Larson HJ. Listening to the rumours: what the northern Nigeria

polio vaccine boycott can tell us ten years on. Glob Public Health. 2013;8(10):1138-50.
doi:

10.1080/17441692.2013.859720. Accessed on April 2022

5. Paul Fine, Ken Eames, David L. Heymann, “Herd Immunity”: A Rough Guide, Clinical Infectious Diseases .2011,52(7), doi: 10.1093/cid/cir007, 911– 916. Available at

<https://doi.org/10.1093/cid/cir007> Accessed on April 2022

6. Cornelia Betsch, Robert Böhm, Gretchen B. Chapman Using .Behavioral Insights to Increase

Vaccination Policy Effectiveness. 2015 , 2(1), 61-73. Available at

<https://doi.org/10.1177/2372732215600716>. Accessed on April 2022

7. Ogundele OA, Ogundele T, Beloved O. Vaccine hesitancy in Nigeria: Contributing factors –

way forward. Niger J Gen Pract [serial online] 2020 ;18:1-4. Available at

<http://www.nigp.org> .Accessed on April 2022.

8. World Health Organization: Sustainable Developmental Goals. Available at

https://www.who.int/health-topics/sustainable-development-goals#tab=tab_1 Accessed

on

April 2022.

9. CDC. 2019 Novel Coronavirus, Wuhan, China. CDC. Available

at <https://www.cdc.gov/coronavirus/2019-ncov/about/index.html>. January 26, 2020;

Accessed: April 2022

10. Gallegos A. WHO Declares Public Health Emergency for Novel Coronavirus.

Medscape

Medical News. Available at <https://www.medscape.com/viewarticle/924596>. January 30, 2020; Accessed April 2022.

11. Ramzy A, McNeil DG. W.H.O. Declares Global Emergency as Wuhan Coronavirus Spreads.

The New York Times. Available at <https://nyti.ms/2RER70M>. January 30, 2020;

Accessed

April 2022

12. The New York Times. Coronavirus Live Updates: W.H.O. Declares Pandemic as Number of

Infected Countries Grows. The New York Times. Available

at <https://www.nytimes.com/2020/03/11/world/coronavirus-news.html#link-682e5b06>.

March 11, 2020; Accessed: April 2022

13. David J. "Corona Virus Disease 2019". Medscape search

<https://emedicine.medscape.com/article/2500114-overview#a9>. Accessed April 2022

14. CDC. Coronavirus Disease 2019: Scientific Brief: SARS-CoV-2 and Potential Airborne

Transmission. Centers for Disease Control and Prevention. Centers for Disease Control and

Prevention. Available at <https://www.cdc.gov/coronavirus/2019-ncov/more/scientific-brief-sars-cov-2.html>. 2020 Oct 05; Accessed: April 2022

15. Morawska L, Milton DK. It is Time to Address Airborne Transmission of COVID-19. *Clin*

Infect Dis. 2020 Jul 6. [[QxMD MEDLINE Link](#)]. : April 2022

16. World Health Organization. Transmission of SARS-CoV-2: implications for infection prevention precautions. World Health Organization. Available at <https://www.who.int/news-room/commentaries/detail/transmission-of-sars-cov-2-implications-for-infection-prevention-precautions>. July 9, 2020; Accessed: April 2022

17. van Doremalen N, Bushmaker T, Morris DH, Holbrook MG, Gamble A, Williamson BN, et al. Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1. *N Engl J Med*. 2020 Mar 17. [[QxMD MEDLINE Link](#)]. : April 2022

18. WHO Coronavirus Disease (COVID-19) Dashboard. World Health Organization. Available at <https://covid19.who.int/>. 2022 Feb 15; Accessed: April, 2022.

19. Statista Nigeria On COVID-19 .Published by Doris D
<https://www.statista.com/statistics/1110879/coronavirus-cumulative-cases-in-nigeria/>
Accessed: April, 2022.

20. CDC. Symptoms of Coronavirus. CDC. Available at <https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>. May 13, 2020; Accessed on April 2022.

21. Hui DS, I Azhar E, Madani TA, Ntoumi F, Kock R, Dar O, et al. The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health - The latest 2019 novel coronavirus outbreak in Wuhan, China. *Int J Infect Dis*. 2020 Jan 14. 91:264-266. [[QxMD MEDLINE Link](#)]. Accessed on April 2022
22. Nigeria Centre for Disease Control: 2018 Lassa fever outbreak in Nigeria Available at <https://ncdc.gov.ng/themes/common/files/sitreps/7b122e4047446980c5e4755437e5bee2.pdf>. Accessed on April 2022
- 23 .World Health Organization. International Travel and Health: Vaccine preventable diseases
Available at <https://www.who.int/ith/ITH-Chapter6.pdf> . Accessed on April 2022
24. . World Health Organization news release.Vaccine hesitancy: A growing challenge for Immunization Programmes. Available at <https://www.who.int/news-room> Accessed on April 2022
- 25.WHOCOVID-19 vaccines.<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/covid-19-vaccines> Accessed on April 2022
26. Africa Centres for Disease Control and Prevention Framework for fair, equitable and timely allocation of COVID-19 vaccines in Africa.<https://africacdc.org/download/framework-for-fair-equitable-and-timely-allocation-of-covid-19-vaccines-in-africa/> Date: Jan 31, 2021 Accessed on April 2022

27. Strategic Advisory Group of Experts (SAGE) on vaccine hesitancy.

https://www.who.int/immunization/sage/meetings/2014/1_Report_WORKING_GROUP_vaccine_hesitancy_final.pdf. Accessed on April 2022

28. Reuben RC, Danladi MMA, Saleh DA, Ejembi PE. Knowledge, Attitudes and Practices Towards COVID-19: An Epidemiological Survey in North-Central Nigeria. J Community Health. 2021 Jun;46(3):457-470. doi: 10.1007/s10900-020-00881-1. PMID: 32638198; PMCID: PMC7338341. Accessed May 2022.

29. Maria F, Carvalho M, LuzLima M et al (2020) “Knowledge, attitudes and practices towards COVID-19: A cross-sectional study in the resident cape-verdean population” <https://www.sciencedirect.com/science/article> Accessed May 2022.

30. Amin O. Iman A, Richard H. et al (2020) “Knowledge and Information Sources About COVID-19 Among University Students in Jordan: A Cross-Sectional Study” <https://doi.org/10.3389/fpubh.2020.00254>. Accessed May 2022.

31. Halimat A. Olubuseola O. Adeosun S. (2022) “Factors influencing COVID-19 vaccine uptake among adults in Nigeria” <https://doi.org/10.1371/journal.pone.0264371>. Accessed May 2022.

32. Meseles M. “Awareness and Attitude Towards COVID-19 Vaccination and Associated

Factors in Ethiopia: Cross-Sectional Study” June 2021. <https://doi.org/10.2147/IDR.S316461>

Accessed May 2022.

33. Fahad A.A, Dayeb A. Sultan K. et al Assessment of health awareness and knowledge toward SARS-CoV-2 and COVID-19 vaccines among residents of Makkah, Saudi Arabia 2022 <https://www.sciencedirect.com/science/article>. Accessed May 2022.
34. S. S Dawodu, R.S Eweida, Z. Ibrahim. March 2022. "older adults perceived risk regarding COVID-19 and intention to vaccinate" <https://doi.org/10.3928/19404921-20220218-02> Accessed May 2022.
35. M. Beg, Tariq H, Mehmood A March 2022 "Perceived risk and perceptions of COVID-19 vaccine: A survey among general public in Pakistan" <https://doi.org/10.1371/journal.pone.0266028> Accessed May 2022.
36. Patterson, N.J., Paz-Soldan, V.A., Oberhelman, R. et al. Exploring perceived risk for COVID-19 and its role in protective behavior and COVID-19 vaccine hesitancy: a qualitative study after the first wave. *BMC Public Health* **22**, 503 (2022). <https://doi.org/10.1186/s12889-022-12900-y> Accessed May 2022.
37. Amyan Malik, JadElharake, Saad B Omar. Determinants of Covid 19 vaccine acceptance in the U.S. August 12, 2020. <https://doi.org/10.1016/j.eclinm.2020.100495> Assessed May 2022.
38. Wotring AJ, Hutchins M, Johnson MK, Ferng SF, Strawser C, Pfrank H, Warner M,

Behrendt L. COVID-19 Vaccine Uptake Among College Students at a Midwest University. J

Community Health. 2022 Apr;47(2):292-297. doi: 10.1007/s10900-021-01051-7. Epub 2021

Nov 20. PMID: 34800214; PMCID: PMC8605783. Accessed May 2022.

39. Moussa S. Amadou O. Mohammed N. May 2021 "Peoples' attitude toward COVID-19 vaccine,

acceptance, and social trust among African and Middle East countries".

DOI:10.34172/hpp.2021.21

Accessed May 2022.

41. Adedeji-Adenola, Halimat et al. "Factors influencing COVID-19 vaccine uptake among adults in Nigeria." *PloS one* vol. 17,2 e0264371. 24 Feb. 2022, doi:10.1371/journal.pone.0264371

42. Okegualle J. Ekaete T, Eramen I. Perception of facility readiness and health worker willingness to participate in the COVID-19 pandemic response in a treatment centre in Nigeria. *Research Journal of Health Sciences* 9(1):30-43 DOI:10.4314/rejhs.v9i1.4 Project: COVID-19 response

43. Ekate T. Health literacy and preparedness of health workers in the private health sector towards the COVID-19 pandemic: Need for integration into the nationwide response. <https://doi.org/10.4081/aamr.2020.145>

44. Bailey EV, Wilson FA. Vaccine Uptake in the US After Full Food and Drug Administration Approval of the BNT162b2 mRNA COVID-19 Vaccine. *JAMA Netw Open*. 2022 Apr 1;5(4):e226108. doi: 10.1001/jamanetworkopen.2022.6108. PMID: 35385093; PMCID: PMC8987898.

ABBREVIATIONS

FDA: Food and Drug Administration Agency

SARS: Severe Acute Respiratory Syndrome

SDGs: Sustainable Development Goals

SAGE: Strategic Advisory Group of Experts

VPDs: Vaccine Preventable Diseases