

**ASSESSMENT OF COVID-19 VACCINE UPTAKE AMONG TRADERS  
FROM SELECTED MARKETS IN BENIN-CITY, EDO STATE.**

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**MAY, 2023**

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**MAY, 2023**

## DECLARATION

I hereby declare that this work is original and was carried out by the under-listed researchers under appropriate supervision.

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## **CERTIFICATION**

This is to certify that this research study titled “**ASSESSMENT OF COVID-19 VACCINATION UPTAKE AMONG TRADERS FROM SELECTED MARKETS IN BENIN CITY, EDO STATE**” was carried out by **UMOLU EFUA OFURE** with matriculation number: **MED1404742** under supervision in the Department of Community Health, College of Medicine, University of Benin as part of the requirements for the award of Bachelor of Medicine, Bachelor of Surgery (MBBS).

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## **DEDICATION**

This work is dedicated to all healthcare workers at the forefront of the fight against diseases especially those who lost their lives in the COVID -19 era.

To my teachers and colleagues who were supportive throughout this period.

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## LIST OF ABBREVIATIONS

1. **CDC:** Center for Disease Control
2. **CDC 2019-nCoV RT-PCR:** CDC 2019 Novel Coronavirus (2019-nCoV) Real-Time Reverse Transcriptase (RT)–PCR Diagnostic Panel
3. **COVID-19:** Corona Virus Disease 2019
4. **LGA:** Local Government Area
5. **MERS-CoV:** Middle East Respiratory Syndrome Coronavirus
6. **NCDC:** National Center for Disease Control
7. **NPHCDA:** National Primary Health Care Development Agency
8. **NAFDAC:** National Agency for Food and Drug Administration and Control
9. **NPI:** National Programme on Immunization
10. **SARS-CoV-2:** Severe Acute Respiratory Syndrome Coronavirus 2
11. **UN** : United Nations
12. **WHO:** World Health Organization

## **OPERATIONAL DEFINITION OF TERMS**

1. **EPIDEMIOLOGY:** is the method used to find the causes of health outcomes and diseases in populations.
2. **INFODEMIC:** An excessive amount of information about a problem that is typically unreliable, spreads rapidly, and makes a solution more difficult to achieve.
3. **LOCKDOWN:** A community-wide containment strategy implemented to reduce person-to-person interaction to a minimum.
4. **PANDEMIC:** A pandemic is defined as an epidemic occurring worldwide, or over a very wide area, crossing international boundaries and usually affecting a large number of people
5. **TRADER:** An adult who engages in an informal type of business, particularly at the marketplace.
6. **VACCINE:** A product that stimulates a person's immune system to produce immunity to a specific disease, protecting the person from that disease.
7. **VACCINE HESITANCY:** delay in acceptance or refusal of vaccination despite availability of vaccination services

## ABSTRACT

**Background:** The COVID-19 pandemic, caused by the SARS-CoV-2 virus, originated in Wuhan, China, in December 2019 and was declared to be a global pandemic by the WHO in March 2020. Vaccination is a crucial measure for controlling the spread of the virus. Several vaccines have been developed and approved for use including the novel mRNA type vaccines. Uptake of the vaccine is affected by factors such as hesitancy, supply-demand gaps and the economic impact of the lockdown measures as well as knowledge of and attitude towards the vaccine. This study aims at assessing level of uptake of the COVID-19 vaccination and factors affecting it among traders in Benin City.

**Method:** The study was a descriptive cross-sectional study carried out among traders in Egor, Ovia North-East and Oredo Local Government Areas of Benin City, the capital of Edo State, Nigeria. A sample size of 426 was obtained, and a multistage sampling technique was used to select respondents. Ethical clearance was obtained from the Research Ethics Committee in University of Benin Teaching Hospital (UBTH) before commencement of the study with ethical clearance number ADM/E 22/A/VOL.VII/14831293. An interviewer-administered questionnaire was used to collect the data for the study after pretesting. Data was analysed using the Statistical Package for Social Sciences (SPSS) version 25.

**Results:** The mean age of respondents was  $45.7 \pm 11.2$ . A higher proportion, 89.0% were female, Christians (93.0%) and married (81.0%). Out of 426 respondents, 42.7% had primary level of education. The median household income was 120,000 naira. From the responses, 35.7% and 15.5% had good knowledge of and good attitude towards the COVID-19 vaccine respectively. About a quarter of the respondents, 26.3% were willing to take the vaccine and 15.0% had taken it. The factors found to affect uptake of the vaccine were age ( $p=0.012$ ), household monthly

income ( $p < 0.001$ ), knowledge of ( $p < 0.001$ ), attitude towards ( $p = 0.013$ ) and willingness ( $p = 0.025$ ) to take the COVID-19 vaccination.

**Conclusion:** The study showed that knowledge of and attitude towards the COVID-19 vaccine were low. Also, willingness to take and uptake of vaccine were also low among the respondents. The federal and state governments should create awareness on the vaccine importance and availability using multimedia and make vaccines available at the market. Individuals should rely on credible sources for information on the vaccine and consider the negative impact of taking the vaccine on their health, community, nation and the world.

**Keywords:** COVID-19, pandemic, vaccine, vaccine hesitancy, mRNA, traders, vaccine uptake.

## CHAPTER ONE

### INTRODUCTION

#### 1.1 BACKGROUND

The world is currently facing a serious pandemic caused by a novel coronavirus that was first reported on December 21, 2019.<sup>1</sup> The disease was spread from patients who were in contact with the Huanan Seafood Market (in Wuhan, China), which is widely known to be the origin of this pandemic.<sup>2</sup>

COVID-19 is caused by infection with a virus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). SARS-CoV-2 appears to have originated in bats and was spread to humans by zoonotic transfer. Its exact evolutionary history, the identity and provenance of its most recent ancestors, and the place, time, and mechanism of transmission of the first human infection, remain unknown.<sup>3</sup>

The coronaviruses were originally grouped into the family Coronaviridae on the basis of the crown or halo-like appearance given by the glycoprotein-studded envelope on electron microscopy. Coronaviruses are enveloped, 120- to 160-nm particles. They contain an unsegmented genome of single-stranded positive-sense RNA. They are difficult to culture.<sup>3</sup>

SARS-CoV-2 can spread through both direct means (droplet and human-to-human transmission) and by indirect contact (contaminated objects and airborne contagion).<sup>4</sup> Respiratory droplets are the main means of transmission.<sup>5,6</sup> In a study done on the vertical transmission of SARS-CoV-2, a series of nine pregnant women with confirmed COVID-19 showed no mother to child transmission. In addition, SARS-CoV-2 was not detected in breast milk, indicating that the virus cannot be transmitted with breastfeeding.<sup>7</sup>

A study done showed that bats are a possible natural reservoir while Malayan Pangolins and turtles are possible intermediate hosts.<sup>8</sup>

It was estimated that the mean incubation period is 6.4 days with a range of 2.1–11.1 days (2.5th–97.5th percentile). The incubation period measured was 8 days for workplace, 8 days for dormitory and 4 days for family groups.<sup>9</sup> In a study by Lauer et al. it was estimated that the median incubation period was 5.1 days and that 97.5% of infected individuals would develop symptoms within 11.5 days (CI, 8.2–15.6 days) of infection.<sup>10</sup> Hence, a 14-day period of active monitoring is recommended by health authorities.

Patients with SARS-CoV-2 infection may present with symptoms ranging from mild to severe with a large portion of the population being asymptomatic carriers. The most common reported symptoms include fever (83%), cough (82%) and shortness of breath (31%). In patients with pneumonia, chest X-ray usually shows multiple mottling and ground-glass opacity.<sup>11</sup> Some gastrointestinal symptoms such as vomiting, diarrhea, and abdominal pain are described in 2–10% of the patients with COVID-19.<sup>11</sup> COVID-19 patients usually show decrease lymphocyte and eosinophils counts, lower median hemoglobin values as well as increases in WBC, neutrophil counts, and serum levels of CRP, LDH, AST, and ALT.<sup>11</sup>

COVID-19 was first identified amid an outbreak of respiratory illness cases in Wuhan City, Hubei Province, China.<sup>12</sup> It was initially reported to the World Health Organization (WHO) on December 31, 2019. On January 30, 2020, the WHO declared the COVID-19 outbreak a global health emergency.<sup>13</sup> On March 11, 2020, the WHO declared COVID-19 a global pandemic, its first such designation since declaring H1N1 influenza a pandemic in 2009.<sup>14</sup>

This is the third serious Coronavirus outbreak in less than 20 years, following SARS in 2002-2003 and MERS in 2012.<sup>15</sup>

As of 22nd April 2022, there have been 505,817,953 confirmed cases of COVID-19, globally, including 6,213,876 deaths, reported to WHO, the number of active cases and recoveries couldn't be ascertained because of poor records from some countries.<sup>16,17</sup>

In Africa, there were a total of 8,711,054 confirmed cases, 171,538 confirmed deaths and over 5,105,205 recoveries. In Nigeria, there was a total of 255,679 confirmed cases, 1,987 active confirmed cases, 3,143 confirmed deaths and over 230,000 recoveries.<sup>16,17</sup>

The first case of COVID-19 in Nigeria was reported on the 27th of February, 2020.<sup>18</sup> Many measures were put in place to curtail the spread one of which was enforcing lockdowns and movement restrictions. Areas of public gatherings such as churches, mosques, schools and even marketplaces were closed down.

Despite the surge and rapid transmission rate, there's no known cure.<sup>15</sup> Certain preventive measures have been put in place by disease control bodies which are focused on prevention and control measures with the aim of minimizing spread and reducing the burden on the healthcare system. These control and preventive measures includes the use of facemasks, social distancing, restriction of large gatherings, border closure, hygiene protocols, lockdowns and vaccination.<sup>19</sup>

Vaccination is an effective preventive measure which reduces morbidity and mortality caused by infective agents. It constitutes the mainstay of prevention of infectious diseases and is of great importance in primary healthcare.<sup>20</sup>

COVID-19 vaccine is an mRNA vaccine. The mRNA vaccines against COVID-19 are the first mRNA vaccines to be authorized, representing the beginning of a new era for preventive medicine.<sup>21</sup>

In COVID-19 mRNA vaccines, the mRNA molecule is encapsulated in lipid nanoparticles, which facilitate mRNA uptake and endocellular penetration which protect against degradation.<sup>22</sup> The vaccine mRNA is delivered intramuscularly into the deltoid muscle, the encapsulated mRNA enters the muscle cells, transits into the cytosol, and the ribosomes perform cellular translation and produces the spike protein, which stimulates the immune response when it enters the circulation. The spike protein aids endocellular entry of SARS-CoV-2. It is also responsible for the induction of neutralizing antibodies.<sup>23</sup>

Vaccines represent the most powerful weapon available to slow the growing pandemic of elucidated COVID-19. The vaccine trials began on the March, 2020 and the vaccines got to Nigeria in March 2021.<sup>24</sup> Since then globally over 1,963,086,645 (25.0%) has received the first dose and over 940,131,842 (12.0%) has received their second dose.<sup>25</sup> As at 23<sup>rd</sup> April, 2022 , about 65.1% of the world population has received at least one dose of a COVID-19 vaccine; 11.52 billion doses have been administered globally, and 11.03 million are now administered each day and only 15.2% of people in low-income countries have received at least one dose.<sup>26</sup>

In Nigeria as at 7th April 2022, over 6,779,000 (4.38%) has received the first dose and over 9,751,700 (6.3%) have received the second dose of the vaccine.<sup>25,26</sup>

The high level of poverty in Nigerian cannot be over emphasized. This obviously played out as the government embarked on measures to curb the COVID-19 pandemic. As observed earlier, fighting COVID-19 in emergency cases require measures that halt and cripple the economy.

During the first and second two weeks lockdown, so many Nigerians were unable to cope financially. This was because 85% of Nigerians are self-employed and most of which are traders(market women), labourers and craftsmen many markets, points of sales , shops and building sites were closed during the pandemic.<sup>27</sup>

The financial difficulty imposed on the masses and alleged mismanagement of COVID-19 palliatives and funds alongside the infodemics fueled the negative attitude of the masses to the virus and also the vaccine. Vaccine uptake is hampered by factors such as vaccine hesitancy fueled by conspiracy theories and religious beliefs, supply not reaching demand and inability to vaccinate children hence, addressing these factors would improve the vaccination profile or ratio and reduce the COVID-19 prevalence and halting the pandemic in its tracks.

The NPHCDA is the government agency directly responsible for distributing the COVID-19 vaccines around the country alongside Gavi, the Vaccine Alliance, World Health Organisation (WHO) and the Coalition for Epidemic Preparedness (CEPI) who have led COVAX — a worldwide programme created to ensure equitable vaccine access for low- and middle-income countries.<sup>28</sup>

## **1.2 STATEMENT OF PROBLEM**

As of 22nd April 2022, there have been 505,817,953 confirmed cases of COVID-19, globally, including 6,213,876 deaths, reported to WHO, the number of active cases and recoveries couldn't be ascertained because of poor records from some countries.<sup>16,17</sup>

The COVID-19 virus is transmitted via respiratory droplets hence it is easily transmitted in crowded and densely populated areas such as markets, prisons and slums.<sup>29</sup> This puts people in such areas at a higher risk of contracting the virus. Hence traders, market women, store keepers and individuals who frequent the markets are among those who would benefit more from the vaccine.<sup>30</sup> The increment of COVID –19 cases has been subjected to different factors in the country and its prevalence is high in populated and industrialized areas.<sup>30</sup>

Vaccination in the country is confronted by vaccine hesitancy which is as old as vaccination itself. Vaccine hesitancy refers to delay in acceptance or refusal of vaccination despite availability of vaccination services, it is complex and context specific, varying across time, place and vaccines. It is influenced by factors such as complacency, convenience and confidence.<sup>31</sup> Vaccine refusal in time past has been associated with outbreaks of many diseases in different countries, both developed and developing countries. Outbreaks of pertussis were reported in the United Kingdom and the United States in the past due to vaccine refusal.<sup>27</sup>

Since there is presently no widely recommended effective treatment for COVID-19, vaccination is the biggest hope for the control of the COVID-19 pandemic. Vaccination has been effective in the prevention of infectious diseases thereby reducing associated morbidity, mortality and also the severity of the disease. It is the mainstay of prevention and control of infectious diseases. However, the success of vaccination against COVID-19 will be largely dependent on the willingness of the

general populace to accept and receive the vaccine and the subsequent development of herd immunity.<sup>32</sup>

The polio vaccine refusal in Northern Nigeria in 2003/2004 did not only quintuple polio incidence in Nigeria but also contributed to outbreaks across three continents. The rejection was driven by rumors and distrust which are rudiments of vaccine hesitancy.<sup>33</sup>

Complacency is another reason for vaccine hesitancy and it arises when perceived risks for vaccine-preventable diseases are low; therefore, vaccination is not considered a necessary preventive action. Thus, other issues or responsibilities of life are of higher priority at the time than vaccination. As regards confidence, trust in vaccines, delivery system, and policymakers is needed to build the trust and confidence of an individual to accept vaccination.

The explanations for vaccination hesitancy among traders and market women can be traced to deep rooted religious, sociocultural and even political beliefs stemming from infodemics.

Hence addressing these beliefs will go a long way in improving vaccine uptake in these group of individuals.

### **1.3 JUSTIFICATION**

Food stuff which form the bulk of products traders sell are a basic necessity for survival as such traders are exposed to a significant risk of contracting the virus due to continuous patronage from the masses.

Vaccine hesitancy has the potential to impact vaccine coverage and without any doubt might be a significant contributing factor to the current trend of childhood immunization in Nigeria.<sup>34</sup>

Consequently, due to the adverse implications of the disease on people's health. the economy as well as the urgent need for total eradication of the virus, it is important to evaluate factors that interfered with and thus undermined COVID-19 preventive efforts put in place to combat the disease. These challenging factors must be identified so as it will help to unveil loop holes of prevention in the country and more promising means of combating the disease in the future. <sup>32</sup>

The aim of this study is to identify and assess the knowledge and attitude of traders towards COVID-19 vaccination and also to identify the factors influencing the uptake of the COVID-19 vaccination. This will add to the already existing body of knowledge and promote awareness about the benefits of the vaccine.

During the pandemic food vendors and traders were seen as an essential service and during the lockdown were continuously going to work leading to increased exposure. Increased infection among this group would lead to food shortages and negatively affect the population at large hence vaccination of this group of individuals is essential to the survival of the population.

Hence assessing their knowledge and willingness to take the vaccine will help in providing methods and strategies to improve vaccine acceptance in this group of individuals. However, there is a paucity of research work and materials on this subject.

#### **1.4 RESEARCH QUESTIONS**

1. What is the level of knowledge about the COVID-19 vaccination among traders?
2. What is the attitude of traders towards the COVID-19 vaccination?
3. What is the level of uptake of COVID-19 vaccination among traders?
4. How willing are traders to take the COVID-19 vaccination?
5. What factors influence the uptake of the COVID-19 vaccination among traders?

## **1.5 OBJECTIVES**

### **1.5.1 General Objectives**

The main objective of this study is to assess the knowledge, attitude and level of uptake of the COVID-19 vaccination among traders in Uselu Market, Oba Market and Oregbeni Market, Benin City.

### **1.5.2 Specific Objectives**

1. To assess the knowledge about the COVID-19 vaccination among traders.
2. To ascertain the attitude of traders towards the COVID-19 vaccination.
3. To assess the willingness of traders to participate in COVID-19 vaccination.
4. To determine the level of uptake of COVID-19 vaccination among traders.
5. To identify factors influencing the uptake of the COVID -19 vaccination among traders.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 BACKGROUND

COVID-19 vaccines were approved for use in the general population in late 2020 and early 2021 across different countries. COVID-19 vaccination hesitancy rates in the general population have now been explored across the world and are fairly well established.<sup>34-36</sup> In a recent systematic study, the highest rates for COVID-19 vaccine acceptance in the general population were reported in Ecuador, Malaysia, Indonesia, and China (> 90% for all countries). In contrast, the lowest rates were reported for Kuwait, Jordan, Italy, Russia, Poland, United States, and France (< 60% for all countries).<sup>37</sup> In these studies, from the general population, it has been shown that COVID-19 vaccination hesitancy rates differ worldwide by perceived susceptibility to and severity of COVID-19 and several sociodemographic characteristics such as sex, age, education, income, and occupation.<sup>35,36</sup>

NPHCDA and NAFDAC are organizations in charge of distribution of the COVID-19 vaccine in Nigeria.

National Primary Health Care Development Agency (NPHCDA) was established in 1992, and merged with the National Programme on Immunization (NPI) in 2007, is the domestic development agency for health.

National Primary Health care Development Agency was established following the recommendation of a high level WHO review team through Decree 29 of 1992, it is the government agency directly responsible for distributing the COVID-19 vaccines around the country.<sup>38</sup> One of the main functions

of NPHCDA is the control of preventable diseases through interventions for controlling, preventing, and scaling up national immunization services including COVID-19 vaccine.

The National Agency for Food and Drug Administration and Control (NAFDAC) was established by Decree No. 15 of 1993 as amended by Decree No. 19 of 1999 and now the National Agency for Food and Drug Administration and Control Act Cap N1 Laws of the Federation of Nigeria (LFN) 2004 to regulate and control the manufacture, importation, exportation, distribution, advertisement, sale and use of Food, Drugs, Cosmetics, Medical Devices, Packaged Water, Chemicals and Detergents (collectively known as regulated products). The agency was officially established in October 1992.

As of May 2022, there are several types of mRNA COVID-19 vaccine. On 31 December 2020, the Pfizer COVID-19 vaccine (BNT162b2) was issued for emergency use listing by WHO. This was followed by the AstraZeneca/Oxford COVID-19 vaccine, manufactured by the Serum Institute of India on 15 February 2021, and most recently, on 12 March 2021, the Ad26.COV2.S, developed by Janssen (Johnson & Johnson) and Moderna on 30 April.<sup>39</sup>

Grocery and supermarket workers as they are commonly called in foreign countries are indispensable for community survival as they aid in sales and purchase of food items, in developing countries, open market spaces are commonly used rather than supermarkets and traders are the main workers there are called traders. Their jobs require physical exertion and constant customer contact. They experience higher rates of nonfatal injuries compared to the U.S. average<sup>40</sup> and, as essential workers, have had increased rates of acute respiratory illness or influenza-like illnesses documented in the past.<sup>41</sup> They are considered essential workers because their jobs place them at

risk for exposure, yet they are low-wage workers who often lack the safety measures required to prevent the occupational transmission of SARS CoV-2, the virus causing the COVID-19 pandemic. Early in the current pandemic, an investigation of COVID-19 rates in a Massachusetts grocery store found that of the 104 workers screened for COVID-19, 20% had positive viral assays and fewer than half of the infected workers were symptomatic.

## **2.2 KNOWLEDGE ABOUT COVID-19 VACCINES AMONG MARKET WOMEN.**

On the 2nd of March 2021, Nigeria received nearly 4 million doses of the COVID-19 vaccine, shipped via the COVAX Facility, a partnership between CEPI, Gavi, UNICEF and WHO.<sup>42</sup>

Two (2) major brands of the COVID-19 vaccine are currently obtainable in the country they are AstraZeneca and Moderna.

Since the vaccines arrived the country a lot of publicity was done on social media and other platforms to increase awareness about them and their importance.

In a cross-sectional study done among traders in Anambra State, Nigeria, results showed that almost all the traders are aware of the existence of COVID-19 (99.62%) however, 80.56% were unaware of the existence of any COVID-19 vaccine and 87.11% were unaware of drugs for its treatment.<sup>43</sup>

In a cross sectional study done in Lapai, Niger State among traders, majority of traders (90%) had adequate knowledge of COVID-19 and the presence of the vaccine.<sup>44</sup>

There's a paucity of research work done on COVID-19 vaccine knowledge amongst this group of individuals.

### **2.3 ATTITUDE OF MARKET WOMEN TOWARDS THE COVID-19 VACCINE**

Socioeconomic factors are part of the most investigated independent variables in health promotion and health education intervention research because they predict a number of health behavior indices as some directly and indirectly impacts on health over time than some other biological factors. These factors are: income, education, employment, brotherhood, burial style, religious affiliation, community safety, community lifestyle, social interaction, marketing type, social support, health choice, health seeking, housing type, feeding pattern, family type, natural and built environment, policies and programmes among others. For instance the income of people has direct correlation with their knowledge, perception, attitude and health seeking behavior and also the type of access to housing and nutrition also, education determine the understanding of information been provided such as COVID-19 protocols, only the educated can better understand the disease narratives and easily adhere to them.<sup>45</sup>

In a cross-sectional study done in Lapai, Niger State among traders, findings revealed that there was negative attitude and perception of the traders in embracing COVID-19 vaccine. They were not conforming with COVID-19 guideline protocols and were unwelcoming towards the vaccine, 118 representing 59% responded that they will not welcome COVID-19 vaccine in the local government as they believed it may have side effect after receiving it., while 82 representing 41% claimed that the vaccine will be embraced.

Majority of the traders 141 representing 70.5% said they will not encourage their families to receive COVID-19 vaccine, only few 59 representing 29.5% will allow their family to receive the vaccine. About 66.5% believed that the COVID-19 vaccine will have side effect after receiving it, only 46 representing 23% shun the side effect of the vaccine on the health if received it, while few respondents claimed no idea of any likely side effects.<sup>44</sup>

## **2.4 THE LEVEL OF UPTAKE OF COVID-19 VACCINE AMONG MARKET WOMEN**

In a study done in the United States of America, findings showed that influenza vaccination coverage was lower in sales and service workers than most occupations.<sup>46</sup>

## **2.5 WILLINGNESS OF MARKET WOMEN TO TAKE COVID-19 VACCINE**

A cross-sectional study among 776 adult Nigerians (age  $\geq 18$  years) was conducted in the 36 States of Nigeria and the Capital City with online questionnaires.<sup>47</sup> This study reveals that only a simple majority (58.2%) were willing to take a COVID-19 vaccine when available. About one-fifth of the respondents in this study were indecisive, another one-fifth of the respondents were unwilling to receive the vaccine which appears to stem from skepticism about the safety of the potential vaccine. Majority were unsure if the potential vaccine is 'a mark of the beast' or if the motive is 'to reduce the world population'.

Findings may be influenced by selection bias because respondents needed access to a smartphone or computer. This may have excluded the poor, elderly who are most vulnerable to COVID-19 this may limit external validity and may have distorted estimation of those willing to take the vaccine.<sup>47</sup>

In a cross-sectional study done in Lapai, Niger State among traders, 140 respondents representing 70% gave assurance that if the president of Nigeria receive the vaccine without having any adverse effects, same will be received from the government, while 60 representing 30% of the population were not ready to be vaccinated. Minority of respondents 52 representing 26% of whole population were ready to be vaccinated while, 148 representing 74% of the total population refused to take the vaccine to encourage others.<sup>44</sup>

In a cross-sectional study done in three senatorial districts in Akwa-Ibom majority of participants showed willingness to accept the COVID-19 vaccine if it were available to them.<sup>48</sup>

In a cross sectional study done in China, findings showed that clerical, sales and service workers including traders had a lower willingness to accept the COVID-19 vaccine than the others.<sup>49</sup>

## **2.6 FACTORS INFLUENCING THE UPTAKE OF THE COVID-19 VACCINE**

Nigeria is multi-ethnic and multireligious with diverse cultural beliefs and practices across various regions these characteristics however allow vaccine hesitancy to thrive. Some influences such as cultural, social, demographic, and psychosocial factors contribute to the occurrence of vaccine hesitancy.

These influences proliferate greatly in our culture and social structure because individuals possess a communal nature and are strongly influenced by what they think others around them are doing or are expect them to do. This communal nature encourages the need for acceptance by other members of the community which influences how individuals behave and respond in different circumstances.<sup>50</sup>

Hesitancy can thrive in the country because various religions see causation as coincidences. Deaths either childhood or adults are seen as coincidences or ascribed to God even if apparent causation like vaccine-preventable disease can be identified as a probable cause. The thrust for vaccination uptake will undoubtedly be affected because death has an alternative explanation by religion.<sup>34</sup>

Vaccine hesitancy can be ascribed to a deep-seated fear or distrust for the safety of the vaccine, the health system, or the capacity of the health provider to act correctly. This complex interplay of psychosocial and structural influences makes a suitable nursery for vaccine hesitancy to thrive in our environment. Husband's or head of household's approval or disapproval of the vaccine, his/her religion or beliefs, and socioeconomic status either predispose to or prevent vaccine hesitancy.<sup>51</sup>

Demographic variability across the six zones or region of the country also contributes to vaccine hesitancy. Experiences vary from region to region despite the poor overall outlook of vaccination

uptake across the country. This demographic difference, primarily educational, socioeconomic, and religious levels, impacts immunization uptake. In this instance, it can lead to vaccine hesitancy, either subtly or overtly.<sup>52,53</sup>

The influence of religion and the complex interplay with psychosocial factors in this region, for example, increases the occurrence of vaccine hesitancy in the country and might explain the observed trends in immunization coverage in the country.

## CHAPTER THREE

### MATERIALS AND METHODS

#### 3.1 STUDY AREA

The study was an analytical cross-sectional study carried out in the Egor, Ovia North-East and Oredo Local Government Area of Benin City, the capital of Edo State, Nigeria. Edo State is one of the 36 states in Nigeria. It is located in the South-South geopolitical zone of Nigeria and was formed in 1991 from the Northern portion of defunct Bendel State and has a land mass of about nineteen thousand, seven hundred and forty-three square kilometres (19,743sqkm) bounded by Kogi State to the north-east, Anambra State to the east, Delta State to the south-east and Ondo State to the west and the north-west. The population of Edo state as at 2021 is 4,980,440 (projected).<sup>51</sup>

Benin City has a heterogeneous population estimated at 1.8 million people made up of different ethnic groups, among whom the predominant one is Benin; the predominant religion of the residents of the city is Christianity<sup>52</sup>. The major languages in the city are Edo, English and Pidgin English. The inhabitants of the city come from all walks of life, and include artisans, traders, bankers, politicians, professionals, civil servants and other public servants.

The city centre (Ring Road) has many remarkable landmarks, including the Oba's Palace, the State House of Assembly, the Central Bank of Nigeria, the State Museum and many historical sculptures. Benin City hosts a local airport, a stadium, a public library and a host of other modern infrastructure<sup>51</sup>.

### **3.2 STUDY DESIGN**

An analytical cross-sectional study design was used for this study.

### **3.3 STUDY POPULATION**

The study will be carried out among traders in three major local governments of the Benin metropolis Egor LGA (Uselu Market), Oredo LGA (Oba Market) and Ikpoba – Oka (Oregbeni Market).

### **3.4 SELECTION CRITERIA**

#### **3.4.1 INCLUSION CRITERIA**

- I. Traders women in Uselu market, Oba market and Oregbeni Market who were willing and gave consent.

#### **3.4.2 EXCLUSION CRITERIA**

- I. Those who were ill.
- II. Those who were unwilling to participate in the study.

### **3.5 STUDY DURATION**

The study was carried out for a period spanning from July 2021 to May 2023.

### **3.6 SAMPLE SIZE DETERMINATION**

The sample size (n) is calculated using the Cochran formula used for descriptive studies.<sup>53</sup>

$$n = \frac{z^2 pq}{d^2}$$

$$d^2$$

Where:

n = Minimum sample size

$z =$  Standard normal deviation set at 1.96 (at 95% confidence interval)

$p =$  Estimated proportion of an attribute that is present in a population (prevalence)

$d =$  Desired level of precision

$q = 1 - p$

$p = 20.8\%$ , a figure obtained from a study carried out to assess the knowledge, attitude and uptake of COVID-19 vaccine among traders in Edaiken market, in Edo state, Nigeria.<sup>55</sup>

$d =$  Degree of precision set at 0.05

$$\begin{aligned}\text{Therefore, } p &= \frac{20.8}{100} \\ &= 0.208\end{aligned}$$

$$\begin{aligned}q &= 1 - 0.208 \\ &= 0.792\end{aligned}$$

$$n = \frac{z^2 pq}{d^2}$$

$$\begin{aligned}n &= \frac{1.96 \times 1.96 \times 0.208 \times 0.792}{0.05 \times 0.05}\end{aligned}$$

$$n = 253.13$$

$$n \approx 253$$

To make room for non-response, 10% non-response rate was added to the minimum sample size, utilizing the formula for non-response rate.

$$n_f = \frac{n}{1 - n_r}$$

$n =$  Minimum sample size = 253

$n_r$  = Non-response rate = 10% = 0.10

$n_f$  = Final Minimum sample size

$$\begin{aligned} &= \frac{253}{1 - 0.10} \\ &= \frac{253}{0.90} \\ &= 281 \end{aligned}$$

Design effect of 1.5 was used  $281 \times 1.5 = 421.5$  which is approximately 422.

Thus, final minimum sample size for this study is 422.

However, for the purpose of this study, a sample size of 426 was used.

### **3.7 SAMPLING TECHNIQUE**

Respondents were selected using a Multistage Sampling Technique involving three (3) stages.

#### **STAGE 1: Selection of Local Government Areas**

Benin has 3 local government areas; Egor, Oredo and Ikpoba-Oka but is now expanding include Ovia North East and Uhumnwonde. Of these, 3 LGAs were selected by simple random sampling by die toss. These LGAs were used for this study. The LGAs selected included; Egor, Oredo and Ikpoba-Oka.

#### **STAGE 2: Selection of Markets**

A list of markets was obtained and Uselu Market (Egor LGA), Oba Market (Oredo LGA) and Oregbeni Market (Ikpoba – Oka) were selected by simple random sampling.

### **STAGE 3: Selection of Respondents**

A sampling frame was generated from the population and the respondents were selected using a simple random sampling technique.

## **3.8. DATA MANAGEMENT**

### **3.8.1 Tools and methods of data collection**

Data on knowledge, attitude and perception of COVID-19 vaccine were collected using an interviewer-administered questionnaire. The questionnaire was modified to ensure that the market women understand the questions properly.

The questionnaire comprised of 4 sections: section A contained questions assessing the biodata and socio-demographics characteristics, section B contained questions on the knowledge of vaccine uptake, section C contained questions on the attitude to COVID-19 vaccine while section D contained questions on the perception of COVID-19 vaccine.

### **PRE-TESTING**

A pretest of the questionnaire was carried out in Edaiken market, Uselu in Edo State to determine the comprehensibility, validity and sensitivity of the data tool. 10% of the minimum sample size of the study was used for pretesting. Observed errors were corrected before the tool is utilized for the study.

### **3.8.2 Method of Data Analysis**

The filled questionnaires were thoroughly checked for any inconsistencies. Data coding and cleaning were done. Data was entered and analyzed using Statistical Package for the International Business Machines Corporation Social Science (IBM SPSS) version 25.0 software with statistical

significance set at  $p < 0.05$  and 95% confidence interval. Categorical data were presented as frequencies and proportions. Continuous data was presented as mean and standard deviations if normally distributed and as median and modes if skewed. Univariate analysis was done to assess the distribution of the variables. Bivariate analysis was done to determine association between respondent's socio-demographic characteristics and their knowledge, attitude, and willingness of COVID-19 vaccination using chi-squared test. A p-value of less than 0.050 was considered statistically significant. Multivariate analysis was done using binary logistic regression. Results of data analysis were presented using prose, tables, charts and graphs.

## **SCORING SYSTEM**

Socio-demographic characteristics;

- i. Age of respondents: this was assessed and grouped using a 10 years interval with age group ranging from 21-30, 31-40, 41-50, 51-60 and 61-70.
- ii. Religion was grouped into Christian, Islam, African Traditional Religion and Others
- iii. Marital status was grouped as 'single', 'married', 'separated', 'divorced', 'co-habiting' or 'widowed'.
- iv. Level of Education was grouped into Primary, Secondary, Tertiary

### **Knowledge Score;**

The respondent's knowledge on COVID-19 and COVID-19 vaccination was assessed using a total of 12 questions addressing all the knowledge domains (cause, transmission, symptoms, vaccines, adverse effect and types available) with a total score of 50. Each question answered correctly were assigned a score of 1 and a score of 0 for incorrect answers and unanswered questions. The scores were converted to percentages and grouped as follows:

Good knowledge: score  $\geq 50\%$

Poor knowledge: score  $< 50\%$

The questions used in scoring were internally consistent with a Cronbach's alpha value of 0.737.

### **Attitude and willingness scores;**

Attitude towards COVID-19 vaccination were also analyzed. A total of 14 questions for attitude and 4 questions for willingness. Questions were designed with a 3-point Likert response options. Where 1 = "disagree", 2 = "undecided" and 3 = "agree". The maximum score for Attitude obtainable was 42 and the minimum will be 14. The maximum score obtainable for willingness was 12. Scores will be converted to percentages and grouped as follows

Good attitude: score  $\geq 50\%$

Poor attitude: score  $< 50\%$

### **Level of Uptake & Factors affecting level of uptake:**

COVID-19 vaccine uptake was defined as:

Ever Received

Never Received

Ever received is defined as the number of participants who have received at least one dose of COVID-19 vaccine. 'Have you taken the COVID-19 vaccine' was used to assess uptake and 'Yes' and 'No' were the responses.

### **3.9. ETHICAL CONSIDERATION**

Ethical clearance was obtained from the Research Ethics Committee in UBTH before commencement of the study with ethical clearance number ADM/E 22/A/VOL.VII/14831293. Written informed consent was obtained from respondents and participants' confidentiality and privacy was maintained. Permission was obtained from rural leaders in the local government area prior to collection of data.

### **3.10. BENEFITS OF THE STUDY**

This study will bridge the gap in our society on the knowledge, perception and attitude of traders to COVID-19 vaccine.

### **3.11. LIMITATIONS OF THE STUDY**

This study may be subject to information bias and intentional withholding of facts by respondents based on perception of the concept of COVID-19 and COVID-19 vaccination. To mitigate this limitation attempts at educating them were made in addition to assurance of full confidentiality. Respondents were made to understand the impact and significance of the research and how it pertains to them.

## **CHAPTER FOUR**

### **RESULTS**

A total of 426 respondents participated in the study. The results are presented in the following sections in line with the specific objectives.

SECTION A: Socio-demographic characteristics of respondents

SECTION B: Knowledge of COVID-19 and COVID-19 vaccines

SECTION C: Attitude of respondents towards the COVID-19 vaccine

SECTION D: Willingness to participate in COVID-19 vaccination

SECTION E: Level of uptake of COVID-19 vaccination among respondents

SECTION F: Factors influencing the uptake of the COVID -19 vaccination among respondents

**SECTION A:**

**SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS**

**Table 1: Socio-demographic characteristics of respondents (n = 426)**

<b>Variable</b>	<b>Frequency (%)</b>
<b>Age</b>	
21 – 30	50 (11.7)
31 – 40	99 (23.2)
41 – 50	118 (27.7)
51 – 60	110 (25.8)
61 – 70	49 (11.5)
<b>Mean age = 45.7 ± 11.2</b>	
<b>Sex</b>	
Male	47 (11.0)
Female	379 (89.0)
<b>Religion</b>	
Christian	396 (93.0)
Islam	28 (6.6)
ATR	2 (0.5)
<b>Marital status</b>	
Ever married	381 (89.5)
Never married	45 (10.5)
<b>Marriage Type</b>	
Monogamous	296 (69.5)
Polygamous	49 (11.5)
<b>Highest Level of Education</b>	
No formal education	8 (1.9)
Primary	182 (42.7)
Secondary	165 (38.7)
Tertiary	71 (16.7)
<b>Household size</b>	
1 – 6	273 (64.1)
>6	153 (35.9)
<b>Mean Household size = 5.8 ± 1.9</b>	
<b>Household monthly income</b>	
30000 – 150000	302 (70.9)
>150000	124 (29.1)
<b>Median income (Range)</b>	120000 (45000 - 960000)
<b>Ethnic group</b>	
Bini	167 (39.2)
Esan	65 (15.3)
Igbo	62 (14.6)
Yoruba	37 (8.7)
Auchi	36 (8.5)
Hausa	22 (5.2)
Isoko	19 (4.5)
Urhobo	18 (4.2)

One hundred and eighteen (27.7%) of the respondents were within the age group 41 – 50 years. The mean age was  $45.7 \pm 11.2$  years. Majority were female (379, 89.0%), Christian (396, 93.0%) and married (345, 81.0%). Most of the respondents who were married were married in a monogamous setting (296, 69.5%) and most of the respondents had primary education as their highest level of educational qualification (182, 42.7%). Most also came from a household with less than 6 persons (273 64.1%). None of the respondents earned less than 30,000 naira (minimum wage) on average every month. Most of the respondents (302, 70.9%) earn between 30,000 and 150,000 naira. The average monthly income per month was 120,000 naira with a range of 45,000 to 960,000 naira. Most of the respondents were from the Bini ethnic group (167, 39.2%).

**SECTION B:**

**KNOWLEDGE OF RESPONDENTS OF COVID-19 AND COVID-19 VACCINES**

**Table 2: Respondent’s knowledge of causative agent, symptoms and transmission of COVID-19 (n = 426)**

<b>Variable</b>	<b>Frequency (%)</b>
<b>Awareness of COVID-19</b>	
Yes	426 (100.0)
No	0 (0.0)
<b>Source of Information*</b>	
Television	348 (81.7)
Radio	224 (52.6)
Friends	118 (27.7)
Social media	64 (15.0)
Health workers	19 (4.5)
Billboards/Posters	12 (2.8)
<b>Causative agent for COVID-19</b>	
Virus	343 (80.5)
Fungi	46 (10.8)
Bacteria	23 (5.4)
5G Installation	8 (1.9)
Do Not know	6 (1.4)
<b>COVID-19 symptoms*</b>	
Cough	334 (78.4)
Weakness	211 (49.5)
Fever	116 (27.2)
Difficulty with breathing	39 (9.2)
Body pains	20 (4.7)
Diarrhea	18 (4.2)
Bleeding from orifices	6 (1.4)
Loss of sight	5 (1.2)
Loss of taste/smell	4 (0.9)
Hearing loss	1 (0.2)
<b>COVID-19 Transmission*</b>	
Airborne	273 (64.1)
Blood transfusion	144 (33.8)
Inhalation of respiratory droplets	112 (26.3)
Touching contaminated surfaces	40 (9.4)
Sexually transmitted	31 (7.3)
Contact with broken skin	28 (6.6)
Eating contaminated food	27 (6.3)
Insect bite	6 (1.4)

\* = multiple response question

All of the respondents (426, 100.0%) had heard of COVID-19 and the major sources of information was the television (348, 81.7%) and radio (224, 52.6%). Majority (343, 80.5%) also knew that COVID-19 was caused by a virus. The commonly recognized symptoms among the respondents were Cough (78.4%), Weakness (49.5%) and Fever (27.2%). Most of the respondents (273, 64.1%) thought that COVID-19 was transmitted through the airborne route.

**Table 3: Respondent’s knowledge of benefit, importance, side effects and availability in Nigeria COVID-19 Vaccination (n = 426)**

<b>Variable</b>	<b>Frequency (%)</b>
<b>Awareness of COVID-19 Vaccine</b>	
Yes	346 (81.2)
No	80 (18.8)
<b>Source of Information*</b>	
Television	286 (67.1)
Radio	220 (51.6)
Friends	85 (20.0)
Social media	73 (17.1)
Health workers	16 (3.8)
Billboards/Posters	6 (1.4)
<b>Benefit of COVID-19 Vaccine</b>	
Stop COVID-19	196 (46.0)
Prevent COVID-19	126 (29.6)
Reduce symptoms of COVID-19	7 (1.6)
Cure COVID-19	3 (0.7)
Do not know	94 (22.1)
<b>Importance of COVID-19 Vaccine</b>	
Ensures immunity from COVID-19	147 (34.5)
Protection from contracting COVID-19	144 (33.8)
Prevents death from COVID-19	23 (5.4)
Do not know	112 (26.3)
<b>Side effects of COVID-19 vaccination*</b>	
Nausea	269 (63.1)
Fever	165 (38.7)
Headaches	146 (34.3)
Muscle aches	8 (1.9)
Vomiting	7 (1.6)
Localized pain	3 (0.7)
<b>Availability of vaccines in Nigeria</b>	
Yes	236 (55.4)
No	36 (8.5)
Do not know	154 (36.2)
<b>Vaccines available in Nigeria</b>	
Pfizer	154 (36.3)
Moderna	88 (20.7)
Oxford AstraZeneca	7 (1.6)
Johnson & Johnson	0 (0.0)

\* = multiple response question

Majority of the respondents had heard of the COVID-19 vaccine (346, 81.2%) and the commonest source of information was the television (286, 67.1%). Most of the respondents (126, 29.6%) thought that the vaccine was ‘a drug that can stop coronavirus’. Only 7 (1.6%) thought the vaccine was ‘a vaccine that can reduce the symptoms of COVID-19’ and 94 (22.1%) did not know. One hundred and forty-seven (34.5%) of the respondents thought that the importance of the COVID-19 vaccine was that it ensures immunity to COVID-19. As much as 112 (26.3%) did not know the importance of the vaccine. The commonest recognized side effects of the vaccine were Nausea (63.1%), Fever (38.7%) and Headaches (34.3%). Most of the respondents (236, 55.4%) knew that the vaccine was available in Nigeria but 154 (36.2%) did not know if it was. One hundred and fifty-four (36.2%) knew that the Pfizer vaccine was available in Nigeria. Only 7 (1.6%) knew that the Oxford AstraZeneca was the vaccine that was available in Nigeria

**Table 4: Respondent’s knowledge of and relationship with others who have taken COVID-19 Vaccine**

<b>Variable</b>	<b>Frequency</b>
<b>Know anyone who is vaccinated (n = 426)</b>	
Yes	207 (48.6)
No	219 (51.4)
<b>Relationship with vaccinated person (n = 207)</b>	
Friend	155 (74.2)
Neighbor	40 (19.1)
Family	14 (6.7)
<b>Experience any side effects (n = 207)</b>	
Yes	19 (9.2)
No	188 (90.8)
<b>Side effects experienced* (n = 207)</b>	
Fever	13 (6.3)
Nausea	5 (2.4)
Muscle aches	3 (1.4)

\* = multiple response question

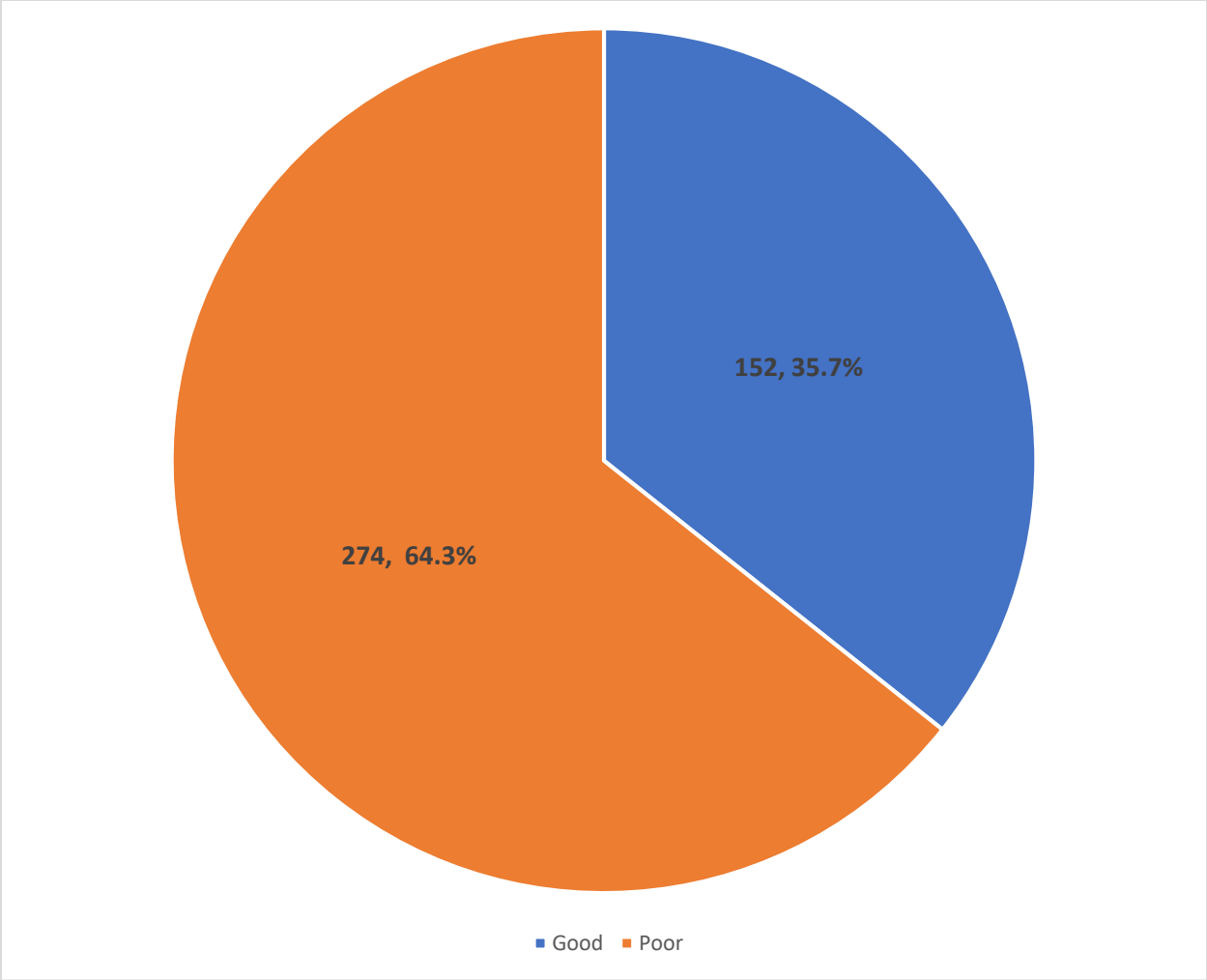
Most of the respondents (219, 51.4%) did not know anyone that had taken the COVID-19 vaccine. Majority (155, 74.2%) who knew someone that was vaccinated described their relationship with them as a friend. Eighteen (9.2%) of those known to the respondents who were vaccinated had a side effect after receiving the vaccine. Thirteen (6.3%) of those who had taken the vaccine had fever as a side effect of the vaccine.

**Table 5: Respondent's knowledge of COVID-19 and COVID-19 vaccination (n = 426)**

<b>Variable</b>	<b>Correct responses Freq (%)</b>	<b>Incorrect responses Freq (%)</b>
<b>Causative agent for COVID-19</b>	343 (80.5)	83 (19.5)
<b>COVID-19 symptoms*</b>		
Cough	334 (78.4)	92 (21.6)
Weakness	211 (49.5)	215 (50.5)
Fever	116 (27.2)	310 (72.8)
Difficulty with breathing	39 (9.2)	387 (90.8)
Body pains	406 (95.3)	20 (4.7)
Diarrhea	408 (95.8)	18 (4.2)
Bleeding from orifices	420 (98.9)	6 (1.4)
Loss of sight	421 (98.8)	5 (1.2)
Loss of taste/smell	4 (0.9)	422 (99.1)
Hearing loss	425 (99.8)	1 (0.2)
<b>COVID-19 Transmission*</b>		
Airborne	153 (35.6)	273 (64.1)
Blood transfusion	282 (66.2)	144 (33.8)
Inhalation of respiratory droplets	112 (26.3)	314 (73.7)
Touching contaminated surfaces	40 (9.4)	386 (90.6)
Sexually transmitted	395 (92.7)	31 (7.3)
Contact with broken skin	398 (93.4)	28 (6.6)
Eating contaminated food	399 (93.7)	27 (6.3)
Insect bite	420 (98.6)	6 (1.4)
<b>Awareness of COVID-19 Vaccine</b>	346 (81.2)	80 (18.8)
<b>Benefit of COVID-19 Vaccine</b>	7 (1.6)	419 (98.4)
<b>Importance of COVID-19 Vaccine</b>	144 (33.8)	282 (66.2)
<b>Side effects of COVID-19 vaccination*</b>		
Nausea	269 (63.1)	157 (36.9)
Fever	165 (38.7)	261 (61.3)
Headaches	146 (34.3)	280 (65.7)
Muscle aches	8 (1.9)	418 (98.1)
Vomiting	7 (1.6)	419 (98.4)
Localized pain	3 (1.9)	423 (99.3)
<b>Availability of vaccine in Nigeria</b>	236 (55.4)	190 (44.6)
<b>Vaccine available in Nigeria*</b>		
Moderna	338 (79.3)	88 (20.7)
Pfizer	154 (36.2)	272 (63.8)
Oxford AstraZeneca	7 (1.6)	419 (98.4)
Johnson and Johnson	0 (0.0)	426 (100.0)

\* = multiple response question

Majority of the respondents (343, 80.5%) knew that COVID-19 was caused by a virus. Most also knew that the symptoms of COVID-19 included Cough (334, 71.8%), Weakness (211, 49.5%) and Fever (116, 27.2%). Only a few knew that Difficulty with breathing (39, 9.2%) and Loss of smell/taste (4, 0.9%) were also symptoms of COVID-19. About a third (153, 35.6%) and two-third (282, 66.2%) of the respondents believed that COVID-19 could be transmitted by the airborne route and blood transfusion respectively. About a quarter (112, 26.3%) and even fewer (40, 9.4%) could identify the correct means of transmission of COVID-19 as inhalation of respiratory droplets and touching the eyes, nose and mouth after touching contaminated surfaces respectively. Majority of the respondents knew that COVID-19 was not transmitted through sexual contact (345, 92.7%), contact with broken skin (398, 93.4%) and insect bite (420, 98.6%). Almost all the respondents (420, 98.6%) knew about the COVID-19 vaccine. However, only a third of them (144, 33.8%) knew that the vaccine was important because it offered protection from contracting the virus and only 7 (1.6%) were aware that the benefit of the vaccine was that it could reduce symptoms of COVID-19 even if one contracts the infection. Most of the respondents (338, 79.3%) knew that the vaccine was available in Nigeria. About a third of the respondents (154, 36.2%) and only 7 (1.6%) knew that the Pfizer and Oxford AstraZeneca vaccine were the COVID-19 vaccine available in Nigeria at the time.



**Figure 1: Showing level of knowledge of COVID-19 vaccinations among respondents**

Overall, 152 (35.7%) of respondents had good knowledge of COVID-19 and COVID-19 vaccination and 274 (64.3%) of the respondents had poor knowledge.

**Table 6: Factors associated with knowledge of COVID-19 vaccination among respondents**

Variable	Knowledge of COVID-19 vaccination		$\chi^2$	p-value
	Good knowledge (n = 152) Freq (%)	Poor knowledge (n = 274) Freq (%)		
<b>Age</b>				
21 – 30	20 (40.0)	30 (60.0)	1.396	0.847
31 – 40	33 (33.3)	66 (66.7)		
41 – 50	45 (38.1)	73 (61.9)		
51 – 60	36 (32.7)	74 (67.3)		
61 – 70	18 (36.7)	31 (63.3)		
<b>Sex</b>				
Male	20 (42.6)	27 (57.4)	1.087	0.334
Female	132 (34.8)	247 (65.2)		
<b>Religion</b>				
Christian	144 (36.4)	252 (63.6)	1.339*	0.373
Islam	8 (28.6)	20 (71.4)		
ATR	0 (0.0)	2 (100)		
<b>Marital status</b>				
Ever married	136 (35.7)	245 (64.3)	<0.001	>0.999
Never married	16 (35.6)	29 (64.4)		
<b>Marriage type</b>				
Monogamous	106 (35.8)	190 (64.2)	0.897	0.424
Polygamous	21 (42.9)	28 (57.1)		
<b>Highest Level of Education</b>				
No formal education	1 (12.5)	7 (87.5)	3.032	0.386
Primary	66 (36.3)	116 (63.7)		
Secondary	63 (38.2)	102 (61.8)		
Tertiary	22 (31.0)	49 (69.0)		
<b>Household size</b>				
1 – 6	90 (33.0)	183 (67.0)	2.439	0.140
>6	62 (40.5)	91 (59.5)		
<b>Household monthly income</b>				
30000 – 150000	102 (33.8)	200 (66.2)	1.642	0.221
>150000	50 (40.3)	74 (59.7)		

\* = Fisher's exact,

\*\* = statistically significant

Respondents within the age group 21 – 30 had the highest proportion (40.0%) of those with good knowledge. More Males (42.6%) had good knowledge when compared to the Female (34.8%).

Single respondents (39.0%) and respondents who had Secondary level of education (38.2%) had the higher proportion of those with good knowledge. Respondents who had a household size of > 6 persons (40.5%) and those with an average household monthly income of > 150, 000 naira (40.3%) also had a higher proportion of those who had good knowledge of COVID-19 and COVID-19 vaccines. The relationship between age ( $p = 0.847$ ), sex ( $p = 0.334$ ), religion ( $p = 0.373$ ), marital status ( $p = >0.999$ ), marriage type ( $p = 0.424$ ), level of education ( $p = 0.386$ ), household size ( $p = 0.140$ ), household monthly income ( $p = 0.221$ ) of the respondents and the respondent's knowledge of COVID-19 and COVID-19 vaccines were all found to be statistically insignificant.

**Table 7: Determinants of Knowledge of COVID-19 vaccination among respondents**

Factors	B (Regression co-efficient)	Odds ratio	95% CI for OR		p-value
			Lower	Upper	
<b>Sex</b>					
Female	-0.377	0.686	0.351	1.338	0.269
Male**		1			
<b>Household monthly income</b>					
30000 – 150000	0.411	1.508	0.940	2.418	0.089
>150000**		1			

R<sup>2</sup> = 1.2 – 1.6; \* = statistically significant; \*\* = Reference category; CI = Confidence interval; OR = Odds Ratio

From the results, none of the factors were statistically significant determinants of knowledge of COVID-19 vaccination among the respondents. Female respondents were found to be less likely to have good knowledge and respondents who had a household income of between 30,000 and 150,000 naira monthly were more likely to have good knowledge of COVID-19 vaccination but neither was statistically significant (OR = 0.686, CI = 0.351 – 1.338, p = 0.269; and OR = 1.508, CI = 0.940 – 2.418, p = 0.089).

**SECTION C:**

**ATTITUDE OF RESPONDENTS TOWARDS THE COVID-19 VACCINE**

**Table 8: Respondent's attitude towards the COVID-19 vaccination (n = 426)**

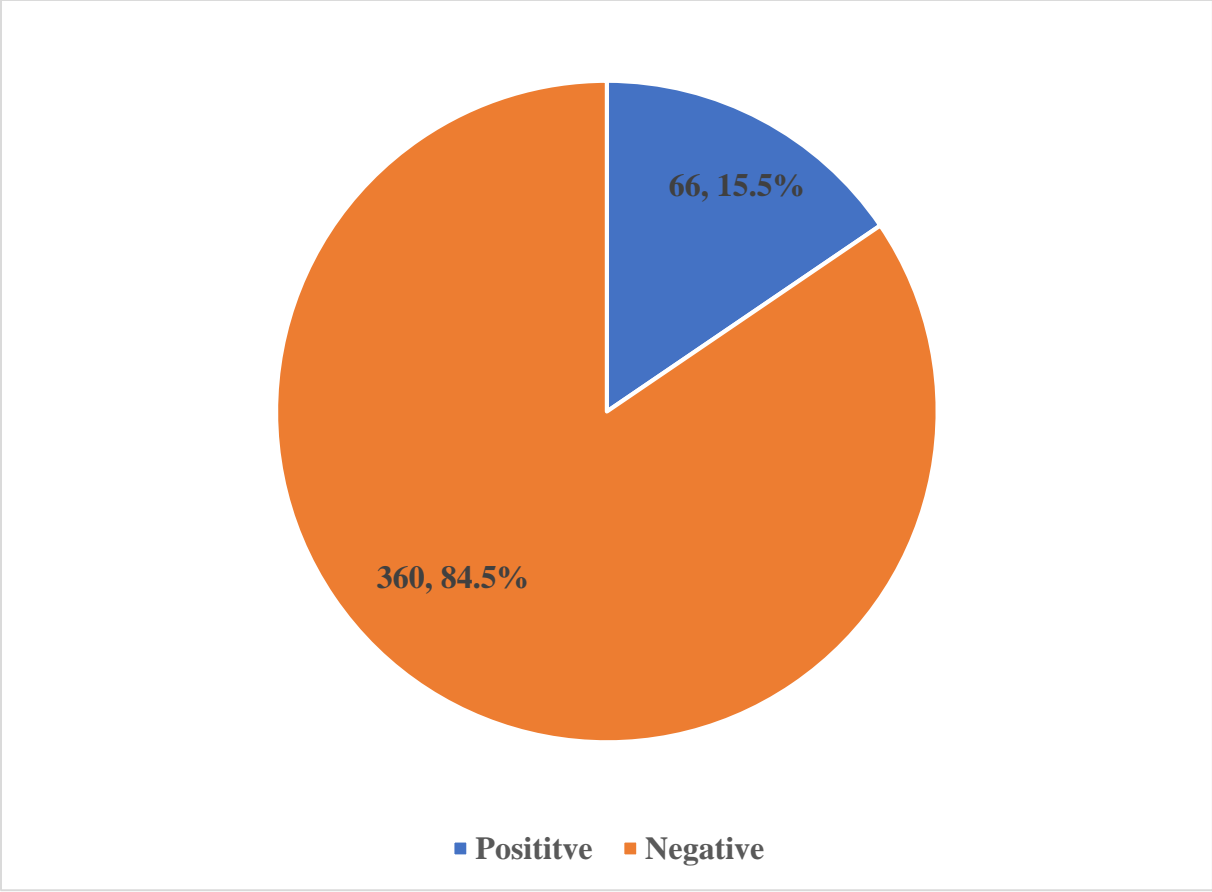
<b>Variable</b>	<b>Frequency (%)</b>
<b>Safe to take vaccine</b>	
Agree	100 (23.5)
Undecided	224 (52.6)
Disagree	102 (23.9)
<b>Vaccine can prevent infection</b>	
Agree	63 (14.8)
Undecided	239 (56.1)
Disagree	124 (29.1)
<b>Vaccine increases occurrence of infection</b>	
Agree	37 (8.7)
Undecided	245 (57.5)
Disagree	144 (33.8)
<b>Less worry of contacting infection with vaccine</b>	
Agree	83 (19.5)
Undecided	250 (58.7)
Disagree	93 (21.8)
<b>Will recommend vaccine to family and friends</b>	
Agree	72 (16.9)
Undecided	235 (55.2)
Disagree	119 (27.9)
<b>Unknown safety profile of vaccine discourages me from taking it</b>	
Agree	80 (18.8)
Undecided	257 (60.3)
Disagree	89 (20.9)
<b>COVID-19 vaccines are generally safe</b>	
Agree	54 (12.7)
Undecided	286 (67.1)
Disagree	86 (20.2)
<b>Vaccination decreases my chances of getting COVID-19 or its complications</b>	
Agree	62 (14.6)
Undecided	297 (69.7)
Disagree	67 (15.7)
<b>Vaccines are likely to work for everyone</b>	
Agree	41 (9.6)
Undecided	272 (63.9)
Disagree	113 (26.5)
<b>Taking the vaccine is important</b>	
Agree	82 (19.2)
Undecided	229 (53.8)
Disagree	115 (27.0)

Most of the respondents were undecided about the safety of the vaccine (52.6%), whether the vaccine could prevent infection with COVID-19 (56.1%), whether the vaccine increases the occurrence of infection with COVID-19 (57.5%), or whether taking the vaccine will make them less worried of contracting the coronavirus. Most of the respondents were also undecided if they will recommend the vaccine to their family and friends (55.2%), whether the unknown safety profile of the vaccine discouraged them from the vaccine (60.3%) and if the vaccine was generally safe (67.1%). Furthermore, most of the respondents were undecided when asked if vaccination decreases their chances of getting COVID-19 or its complications (69.7%), if the vaccines are likely to work for everyone (63.8%) or if taking the vaccine is important (53.8%).

**Table 9: Respondent’s attitudinal responses towards COVID-19 Vaccination (n = 426)**

<b>Variable</b>	<b>Appropriate responses Freq (%)</b>	<b>Inappropriate responses Freq (%)</b>
Safe to take vaccine	100 (23.5)	326 (76.5)
Vaccine can prevent infection	124 (29.1)	302 (70.9)
Vaccine increases occurrence of infection	144 (33.8)	282 (66.2)
Less worry of contacting infection with vaccine	83 (19.5)	343 (80.5)
Will recommend vaccine to family and friends	72 (16.9)	354 (83.1)
Unknown safety profile of vaccine discourages me from taking it	89 (20.9)	337 (79.1)
COVID-19 vaccines are generally safe	54 (12.7)	372 (87.3)
Vaccination decreases my chances of getting COVID-19 or its complications	62 (14.6)	364 (85.4)
Vaccines are likely to work for everyone	41 (9.6)	385 (90.4)
Taking the vaccine is important	82 (19.2)	344 (80.8)

Most of the respondents gave an inappropriate response for the questions used to assess attitude towards the COVID-19 including whether the vaccine was safe to take (326, 76.5%), if the vaccine could prevent infection (302, 70.9%), whether the vaccine is generally safe (372, 87.3%), if the vaccine will likely work for everyone (385, 90.4%) and if taking the vaccine is important (344, 80.8%). Most of the respondents that taking the vaccine will reduce their chances of getting COVID-19 infection (364, 85.4%).



**Figure 2: Showing attitude towards COVID-19 vaccinations among respondents**

Most of the respondents – 360 (84.5%) had poor attitude towards the COVID-19 vaccine. Sixty-six (15.5%) of the respondents had good attitude towards the COVID-19 vaccine.

**Table 10: Factors affecting attitude towards COVID-19 vaccination among respondents**

Variable	Attitude towards COVID-19 Vaccine		$\chi^2$	p-value
	Positive (n = 66) Freq (%)	Negative (n = 360) Freq (%)		
<b>Age</b>				
21 – 30	11 (22.0)	39 (78.0)	2.118	0.720
31 – 40	14 (14.1)	85 (85.9)		
41 – 50	16 (13.6)	102 (86.4)		
51 – 60	17 (15.5)	93 (84.5)		
61 – 70	8 (16.3)	41 (83.7)		
<b>Sex</b>				
Male	0 (0.0)	47 (100.0)	9.685	0.002**
Female	66 (17.4)	313 (82.6)		
<b>Religion</b>				
Christian	63 (15.9)	333 (84.1)	0.907*	0.712
Islam	3 (10.7)	25 (89.3)		
ATR	0 (0.0)	2 (100.0)		
<b>Marital status</b>				
Ever married	58 (15.2)	323 (84.8)	0.201	0.664
Never married	8 (17.8)	37 (82.2)		
<b>Marriage type</b>				
Monogamous	43 (14.5)	253 (85.5)	0.484	0.518
Polygamous	9 (18.4)	40 (81.6)		
<b>Highest Level of Education</b>				
No formal education	2 (25.0)	6 (75.0)	5.511	0.127
Primary	21 (11.5)	161 (88.5)		
Secondary	27 (16.4)	138 (83.6)		
Tertiary	16 (22.5)	55 (77.5)		
<b>Household size</b>				
1 – 6	48 (17.6)	225 (82.4)	2.535	0.126
>6	18 (11.8)	135 (88.2)		
<b>Household monthly income</b>				
30000 – 150000	51 (16.9)	251 (83.1)	1.541	0.241
>150000	15 (12.1)	109 (87.9)		
<b>Knowledge of COVID-19 vaccination</b>				
Good	20 (13.2)	132 (86.8)	0.984	0.333
Poor	46 (16.8)	228 (83.2)		

\* = Fisher's exact, \*\* = statistically significant

Respondents who were aged 21 – 30 years (22.0%), Christian (15.9%), Single (19.5%), were from a household with 1 – 6 persons (17.6%) had a higher proportion of those with good attitude towards

the COVID-19 vaccine. All the respondents who were male had poor attitude (47, 100.0%) towards the vaccine. Respondents who had primary level of education (88.5%) and those earning > 150,000 naira (87.9%) had a higher proportion of those with poor attitude towards the vaccine. There was a statistically significant relationship between sex and attitude towards the vaccine ( $p = 0.002$ ). The relationship between age ( $p = 0.720$ ), religion ( $p = 0.712$ ), marital status ( $p = 0.664$ ), marriage type ( $p = 0.518$ ), level of education ( $p = 0.127$ ), household size ( $p = 0.126$ ), household monthly income ( $p = 0.241$ ) of the respondents and the respondent's attitude towards COVID-19 and COVID-19 vaccines were all found to be statistically insignificant. Respondents who had poor knowledge of COVID-19 and COVID-19 vaccine (16.8%) had a slightly higher of them with a good attitude towards the COVID-19 vaccine. The relationship between knowledge of COVID-19 and COVID-19 vaccine and respondents' attitude towards the COVID-19 vaccine was not statistically significant ( $p = 0.333$ ).

**Table 11: Determinants of Attitude towards COVID-19 vaccination among respondents**

Factors	B (Regression co-efficient)	Odds ratio	95% CI for OR		p-value
			Lower	Upper	
<b>Household size</b>					
1 – 6	0.160	1.174	0.982	1.403	0.079
>6		1			
<b>Knowledge of COVID-19 vaccination</b>					
Good	-0.607	1.545	0.276	1.075	0.030*
Poor		1			

R<sup>2</sup> = 6.4 – 11.1; \* = statistically significant; \*\* = Reference category; CI = Confidence interval; OR = Odds Ratio

From the results, respondents' knowledge of COVID-19 vaccination was a statistically significant determinant of attitude towards COVID-19 vaccination. Respondents who had good knowledge of COVID-19 vaccination were more likely to have a positive attitude towards COVID-19 vaccination. (OR = 1.545, CI = 0.276 – 1.075, p = 0.030).

**SECTION D:**

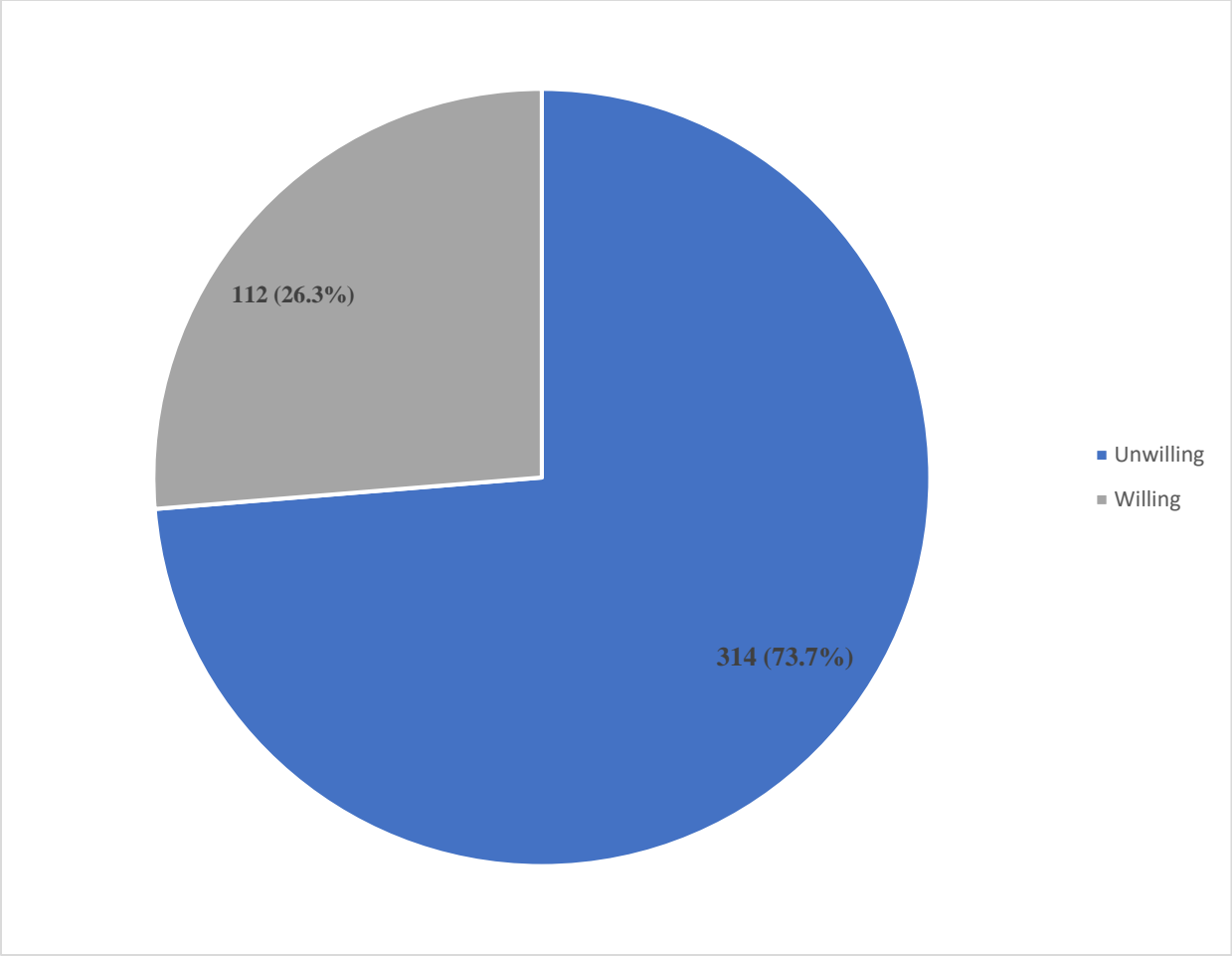
**WILLINGNESS OF RESPONDENTS TO PARTICIPATE IN COVID-19**

**VACCINATION**

**Table 12: Willingness to participate in COVID-19 Vaccination (n = 426)**

<b>Variable</b>	<b>Frequency (%)</b>
<b>Will take vaccine if I feel at risk</b>	
Agree	65 (15.3)
Undecided	274 (64.3)
Disagree	87 (20.4)
<b>Will use vaccines only if free</b>	
Agree	56 (13.1)
Undecided	282 (66.2)
Disagree	88 (20.7)
<b>Will take vaccine if government required everyone to</b>	
Agree	52 (12.2)
Undecided	261 (61.3)
Disagree	113 (26.5)
<b>Will take the vaccine if suggested by family or friends</b>	
Agree	63 (14.8)
Undecided	275 (64.6)
Disagree	88 (20.7)

Most of the respondents were undecided about whether they will take the vaccine if they feel at risk (64.3%), they will take the vaccine if only it was free (66.2%), will take the vaccine if required by the government (61.3%) or if they will take the vaccine if suggested by their family and friends (64.6%). Sixty-five (15.3%) of the respondent agreed to take the vaccine if they felt at risk, 56 (13.1%) will take it if it were free, 52 (12.2%) will take the vaccine if required by the government and 63 (14.8%) would take if recommended by the government.



**Figure 3: Showing willingness to participate in COVID-19 vaccinations among respondents**

One hundred and twelve (26.3%) of the respondents were willing to take the vaccine. Three hundred and fourteen (73.7%) were not willing to take the COVID-19 vaccine.

**Table 13: Factors affecting willingness to take COVID-19 vaccine among respondents**

Variable	Willingness to take COVID-19 Vaccine		$\chi^2$	p-value
	Willing (n = 112) Freq (%)	Unwilling (n = 314) Freq (%)		
<b>Age</b>				
21 – 30	15 (30.0)	35 (70.0)	1.980	0.743
31 – 40	27 (27.3)	72 (72.7)		
41 – 50	26 (22.0)	92 (78.0)		
51 – 60	29 (26.4)	81 (73.6)		
61 – 70	15 (30.6)	34 (69.4)		
<b>Sex</b>				
Male	1 (2.1)	46 (97.9)	15.917	<0.001**
Female	111 (29.3)	268 (70.7)		
<b>Religion</b>				
Christian	104 (26.3)	292 (73.7)	0.479*	0.905
Islam	8 (28.6)	20 (71.4)		
ATR	0 (0.0)	2 (100.0)		
<b>Marital status</b>				
Ever married	94 (24.7)	287 (75.3)	4.879	0.032
Never married	18 (40.0)	27 (60.0)		
<b>Marriage type</b>				
Monogamous	67 (22.6)	229 (77.4)	0.358	0.584
Polygamous	13 (26.5)	36 (73.5)		
<b>Highest Level of Education</b>				
No formal education	2 (25.0)	6 (75.0)	9.445	0.024**
Primary	36 (19.8)	146 (80.2)		
Secondary	47 (28.5)	118 (71.5)		
Tertiary	27 (38.0)	44 (62.0)		
<b>Household size</b>				
1 – 6	80 (29.3)	193 (70.7)	3.561	0.067
>6	32 (20.9)	121 (79.1)		
<b>Household monthly income</b>				
30000 – 150000	82 (27.2)	220 (72.8)	0.397	0.548
>150000	30 (24.2)	94 (75.8)		
<b>Knowledge of COVID-19 vaccination</b>				
Good	24 (15.8)	128 (84.2)	13.449	<0.001**
Poor	88 (32.1)	186 (67.6)		
<b>Attitude towards COVID-19 vaccination</b>				
Positive	53 (80.3)	13 (19.7)	117.572	<0.001**
Negative	59 (16.4)	301 (83.6)		

\* = Fisher's exact, \*\* = statistically significant

Respondents who were aged 61 – 70 years (30.6%), Female (29.3%), Muslim (28.6%), Divorced (100.0%), were in a Polygamous marriage (26.5%), attained Tertiary education (38.0%), were

from a household with 1 – 6 persons (17.6%) and those who earned between 30,000 and 150,000 naira (27.2%) had a higher proportion of those who were willing to take the COVID-19 vaccine. There was a statistically significant relationship between sex ( $p < 0.001$ ), marital status ( $p = 0.032$ ) and highest level of education ( $p = 0.024$ ) and respondent's willingness to take the COVID-19 vaccine. The relationship between age ( $p = 0.743$ ), religion ( $p = 0.905$ ), marriage type ( $p = 0.584$ ), household size ( $p = 0.067$ ) and household monthly income ( $p = 0.548$ ) of the respondents and the respondent's willingness to take the COVID-19 vaccine were all found to be statistically insignificant. Respondents who had Poor knowledge of COVID-19 and COVID-19 vaccination had a higher proportion (88, 32.1%) of those who were willing to take the vaccine and there was a statistically significant relationship between respondent's knowledge and willingness to take the vaccine ( $p < 0.001$ ). Respondents with a Good attitude towards the COVID-19 vaccine had a higher proportion (53, 80.3%) of those who were willing to take the COVID-19 vaccine and this was found to be statistically significant ( $p < 0.001$ ).

**Table 14: Determinants of willingness to take COVID-19 vaccine among respondents**

Factors	B (Regression co-efficient)	Odds ratio	95% CI for OR		p-value
			Lower	Upper	
<b>Knowledge of COVID-19 vaccination</b>					
Good	1.195	3.303	1.579	6.911	0.002*
Poor		1			
<b>Attitude towards COVID-19 vaccination</b>					
Positive	-3.049	1.047	0.022	1.103	<0.001*
Negative		1			

R<sup>2</sup> = 28.1 – 42.5; \* = statistically significant; \*\* = Reference category; CI = Confidence interval; OR = Odds Ratio

From the results, the respondent’s knowledge of COVID-19 vaccination and their attitude towards it were statistically significant determinants of willingness to take the COVID-19 vaccine. Respondents who had good knowledge of COVID-19 vaccination were more willing to take the COVID-19 vaccine (OR = 3.303, CI = 1.579 – 6.911, p = 0.002). Respondents with a positive attitude were more willing to take the COVID-19 vaccine (OR = 1.047, CI = 0.022 – 1.103, p < 0.001).

**SECTION E:**

**LEVEL OF UPTAKE OF COVID-19 VACCINATION AMONG RESPONDENTS**

**Table 15: Uptake, vaccination experience and reasons for not taking the COVID-19 vaccine among respondents**

<b>Variable</b>	<b>Frequency</b>	<b>Percent (%)</b>
<b>Taken the COVID-19 Vaccine (n = 426)</b>		
Yes	64	15.0
No	362	85.0
<b>Brand of vaccine taken (n = 64)</b>		
Pfizer (1 dose)	43	67.2
Moderna (1 dose)	21	32.8
<b>COVID-19 Vaccination card seen (n = 64)</b>		
Yes	45	70.3
No	19	29.7
<b>Place of Vaccination (n = 64)</b>		
Market	51	79.7
Vaccination center	7	10.9
School	5	7.8
Home	1	1.6
<b>Experienced side effects (n = 64)</b>		
Yes	4	6.3
No	60	93.8
<b>Side effect experienced (n = 4)</b>		
Muscle aches	4	6.3
Headaches	2	3.1
Localized pain	2	3.1
<b>Reason for Not taking vaccine (n = 362)</b>		
Local herbs will protect me	174	48.1
Doubt effectiveness of the vaccine	110	30.4
Inadequate information on the vaccine	109	30.1
Against my cultural beliefs	100	27.6
Scared of side effects	87	24.0
Waiting for many others to	61	16.9
Already taking too many vaccines	60	16.6
Vaccine is the mark of the beast	52	14.4
Against my religious beliefs	47	13.0
Need support from family members	44	12.2
No need, infection is harmless	40	11.0
Have other medical conditions	33	9.1
Do not know where to get the vaccine	17	4.7
I take multivitamins so I am immune	15	4.1
COVID-19 is not real	12	3.3
Vaccines not for the elderly	12	3.3
Vaccines only for health workers	11	3.0
Vaccines only for children	5	1.4

Sixty-four (15.0%) of the respondents have taken the vaccine. Forty-seven (67.2%) of those who had taken the vaccine took 1 dose of the Pfizer vaccine. Majority of them took the vaccine at the market (51, 79.7%) and had no side effects (60, 93.8%) after taking the vaccine. The commonest reasons for not taking the vaccine among the respondents were belief that local herbs will provide protection against the virus (48.1%), they doubt the effectiveness of the vaccine (30.4%) and they felt that they had too little information on the vaccines (30.1%).

**SECTION F:**  
**FACTORS INFLUENCING THE UPTAKE OF THE COVID -19 VACCINATION**  
**AMONG RESPONDENTS**

**Table 16: Factors affecting COVID-19 vaccine uptake among respondents**

Variable	Taken COVID-19 Vaccine		$\chi^2$	p-value
	Yes (n = 64) Freq (%)	No (n = 352) Freq (%)		
<b>Age</b>				
21 – 30	10 (20.0)	40 (80.0)	2.960	0.568
31 – 40	14 (14.1)	85 (85.9)		
41 – 50	19 (16.1)	99 (83.9)		
51 – 60	17 (15.5)	93 (84.5)		
61 – 70	4 (8.2)	45 (91.8)		
<b>Sex</b>				
Male	13 (27.7)	34 (72.3)	6.607	0.016**
Female	51 (13.5)	328 (86.5)		
<b>Religion</b>				
Christian	58 (14.6)	338 (85.4)	1.321*	0.573
Islam	6 (21.4)	22 (78.6)		
ATR	0 (0.0)	2 (100.0)		
<b>Marital status</b>				
Ever married	59 (15.5)	322 (84.5)	0.603	0.516
Never married	5 (11.1)	40 (88.9)		
<b>Marriage type</b>				
Monogamous	49 (16.6)	247 (83.4)	0.159	0.835
Polygamous	7 (14.3)	42 (85.7)		
<b>Highest Level of Education</b>				
No formal education	0 (0.0)	8 (100.0)	3.434	0.331
Primary	30 (16.5)	152 (83.5)		
Secondary	27 (16.4)	138 (83.6)		
Tertiary	7 (9.9)	64 (90.1)		
<b>Household size</b>				
1 – 6	41 (15.0)	232 (85.0)	< 0.001	>0.999
>6	23 (15.0)	130 (85.0)		
<b>Household monthly income</b>				
30000 - 150000	31 (10.3)	271 (89.7)	18.403	<0.001**
>150000	33 (26.6)	91 (73.4)		
<b>Knowledge of COVID-19 vaccination</b>				
Good	51 (33.6)	101 (66.4)	63.554	<0.001**
Poor	13 (4.7)	261 (95.3)		
<b>Attitude towards COVID-19 vaccination</b>				
Positive	10 (15.2)	56 (84.8)	0.001	>0.999
Negative	54 (15.0)	306 (85.0)		
<b>Willingness to take COVID-19 vaccine</b>				
Willing	3 (4.1)	71 (95.9)	8.441	0.004**
Unwilling	61 (17.3)	291 (82.7)		

\* = Fisher's exact, \*\* = statistically significant

Respondents who were aged 21 – 30 years (20.0%), Male (27.7%), Muslim (21.4%), Married (16.2%) and earned > 150,000 naira (26.6%) had a higher proportion of those who had taken the COVID-19 vaccine. All the respondents who had no formal education (8, 100.0%) had not taken the vaccine. With respect to the p-value, the sex of the respondents (0.016) and average monthly household income ( $p < 0.001$ ) were found to have a statistically significant relationship with uptake of the COVID-19 vaccine. The relationship between age ( $p = 0.568$ ), religion ( $p = 0.573$ ), marital status ( $p = 0.516$ ), marriage type ( $p = 0.835$ ), level of education ( $p = 0.331$ ) and household size ( $p > 0.999$ ) of the respondents and the respondent's uptake of the COVID-19 vaccine were all found to be statistically insignificant. Respondents who had good knowledge of COVID-19 and COVID-19 vaccines (33.6%), had a good attitude towards COVID-19 (15.2%) and who were unwilling to take the vaccine (17.3%) had a higher proportion of those who had taken the COVID-19 vaccine. With respect to the p-value, the knowledge of the respondents ( $p < 0.001$ ) and willingness to take the vaccine ( $p = 0.004$ ) were found to have a statistically significant relationship with uptake of the COVID-19 vaccine. The relationship between attitude and the respondent's willingness to take the COVID-19 vaccine were found to be statistically insignificant ( $p > 0.999$ ).

**Table 17: Determinants of Uptake of COVID-19 vaccine among Respondent's**

Factors	B (Regression co-efficient)	Odds ratio	95% CI for OR		p-value
			Lower	Upper	
<b>Age</b>	0.043	1.044	1.099	1.080	0.012*
<b>Household monthly income</b>					
30000 – 150000	1.508	4.518	2.240	9.112	<0.001*
>150000**		1			
<b>Knowledge of COVID-19 vaccination</b>					
Good	-2.378	1.093	0.403	1.199	<0.001*
Poor*		1			
<b>Attitude towards COVID-19 vaccination</b>					
Positive	-1.495	1.224	1.069	1.726	0.013*
Negative*		1			
<b>Willingness to take COVID-19 vaccination</b>					
Yes	-1.371	4.990	1.253	13.694	0.025*
No*		1			

$R^2 = 21.1 - 35.9$ ; \* = statistically significant; \*\* = Reference category

CI = Confidence interval; OR = Odds Ratio

From the results, it was found that uptake of the vaccine increased with increasing age and this was found to be statistically significant (OR = 1.044, CI = 1.099 – 1.080, p = 0.003). Respondents who had an average monthly income of between 30,000 – 150,000 naira were more likely to have taken the vaccine than those who earned > 150,000 naira and this was found to be statistically significant (OR = 4.518, CI = 2.240 – 9.112, p < 0.001). Respondents who had good knowledge of COVID-19 vaccination and those with a positive attitude towards COVID-19 vaccination were more likely to have taken the COVID-19 vaccine. Both Respondent's knowledge and their attitude towards the vaccine were both statistically significant predictors of their uptake of the COVID-19 vaccine (OR = 1.093, CI = 0.403 – 1.199, p < 0.001 and OR = 1.224, CI = 1.069 – 1.726, p = 0.013

respectively). Respondents' willingness to take the vaccine was also a statistically significant determinant of uptake of the vaccine. Those who were willing to take the vaccine were more likely to have taken the vaccine (OR = 4.990, CI = 1.253 – 13.694, p = 0.025).

## **CHAPTER FIVE**

### **DISCUSSION**

The mean age of respondents in this study was  $45.7 \pm 11.2$ , which is much higher than that reported from a similar study among traders in Anambra state.<sup>54</sup> Majority of the respondents were female, Christian and married. Most of the respondents who were married were in a monogamous setting, had primary education as their highest level of educational qualification and earn between 30,000 and 150,000 naira monthly. The large proportion of the respondents who did not have a tertiary or even secondary level education could be a limitation to their being knowledgeable concerning the virus and its vaccine and the pandemic in general.

From the result it shows that over all, only about one-third of the respondents had good knowledge of COVID-19 vaccination. One-eight of them knew that COVID-19 was caused by a virus. Many thought that it was spread through the air and respiratory droplets. About a third of the respondents also thought that the virus could be spread through blood transfusion. Most also that the common symptoms of COVID-19 were cough, body weakness and fever. The major sources of information to these traders are television, radio, and friends. This therefore, shows that the traders are aware of the existence of COVID-19 and have the television as their main source of information concerning the virus. This shows that television should be the major source of enlightenment campaign aimed that targeting this group. These findings are keeping with a study done among traders in Anambra State, Nigeria which showed that most of the respondents had heard of COVID-19 and had their main source of information of the virus as the television.<sup>54</sup>

According to the results, majority had also heard of the COVID-19 vaccine. Most thought the vaccine was a drug which either functioned to stop COVID-19 infection or to prevent it. A few of

the respondents knew that the vaccine's function was to reduce the symptoms of COVID-19 infection. Just above half of the respondents knew that the vaccine was available in Nigeria. That is, even though most of the respondents knew about the existence of the vaccine, they did not know what it did or if it was available in the country. None of the socio-demographic characteristics were found to significantly determine the knowledge of COVID-19 vaccination among the respondents. The overall result of assessment of knowledge of COVID-19 vaccination in this study is similar to results obtained from another study among traders at Edaiken Market, Uselu, Benin-City which showed poor knowledge of the vaccine among the respondents.<sup>55</sup> The main source of information of the vaccine in the study was also the television and radio and this should also be considered when planning awareness campaigns to reach this demographic. Using means of media that the population of interest have access to will ensure that the correct knowledge of COVID-19 infection, prevention practices and vaccination will get to them and will likely improve practice of vaccination. This will overall reduce the spread of disease in this demographic and drive the general population towards herd immunity and effectively stop COVID-19 infection. Also, the finding that knowledge was not affected by socio-demographic characteristics of the respondents may represent a wide and indiscriminate reach of the awareness campaigns both from the Nigerian government and international organizations. A drive to reach everyone regardless of their demographic status is needed to ensure large scale compliance with preventive measures, favourable health outcomes and bring an end to the pandemic.

With respect to the respondent's attitude towards the COVID-19 vaccines and vaccination, only about one-sixth of them had a positive attitude. Less than a quarter of respondents thought that the vaccines were safe to take. Even fewer agreed that taking the vaccine will decrease their chances of getting the COVID-19 infection or its complications. Less than a tenth of the respondents

thought the vaccines are likely to work for everyone and about a fifth of them thought taking the vaccine was important. Still very few of them, would recommend the vaccine to family or friends. The statistically significant determinant of attitude of the respondents to COVID-19 vaccine was their knowledge of COVID-19 vaccination. This is similar to results obtained from a study to assess the perception of traders in Lapai local government area of Niger state, Nigeria to the vaccine which shows a similar poor perception.<sup>56</sup> The poor attitude to the vaccine and vaccination among the respondents may be linked to their poor knowledge of the vaccines and may be a pointer to need for public enlightenment campaigns focused on increasing awareness of the vaccine among this demographic. This will most likely work to sway opinion of the vaccine since most of them were undecided about the vaccines and vaccination.

Less than a fifth of the respondents were willing to take the vaccine if they felt at risk, will take it if it were free, will take the vaccine if required by the government or if recommended by the government. This represents a small percentage of the respondents willing to take the vaccine even in all this conditions. Most of them remained undecided about being willing to take the vaccine. Overall, only about a quarter of the respondents were willing to take the COVID-19 vaccine. Respondent's knowledge and attitude towards the vaccine affected their willingness to take the vaccine. Another study among traders in Lapai local government area of Niger state, Nigeria also showed a similar trend in willingness to take the COVID-19 vaccines both for themselves and their family members.<sup>56</sup> This may be explained by the poor knowledge of the vaccine and resulting poor attitude towards the vaccine already noted by the study. The study also showed an association between respondent's knowledge of COVID-19 their attitude towards the vaccine and their willingness to take the vaccine. This is also likely to change with more public enlightenment.

Concerning level of uptake of the vaccine, only about a sixth of the respondents had taken the vaccine and majority of those who had had taken it during vaccination efforts at the market. The common reasons for not taking the vaccine among the respondents were belief that local herbs will provide protection against the virus, doubting the effectiveness of the vaccine and they having too little information on the vaccines. About a quarter felt that taking the vaccine was against their cultural beliefs or were scared of side effects of the vaccine. This is similar to a study done in the United States of America, with findings showing that influenza vaccination uptake was lower in sales and service workers than most other occupations.<sup>57</sup> Notably, the vaccination efforts in the market had yielded result as the majority of the respondents had gotten vaccinated had availed themselves of the opportunity. This may be because the respondents are understandably unlikely to welcome leaving their workplaces to go and take the vaccine since most have to work daily to fend for their families. Another study among traders had found that inability to locate a vaccination center was a significant deterrent for taking the vaccine.<sup>55</sup> This may be a useful consideration by the authorities for driving vaccine compliance both now and for future vaccination campaigns.

The factors that were found to affect the uptake of the vaccine among the respondents were their age, average household monthly income, knowledge of COVID-19 and attitude towards COVID-19 vaccination and willingness to take the vaccine. Males, those with household monthly income >150,000 naira and those with good knowledge were found to have better uptake of the vaccine. This is comparable with a study done among Cameroonian adults assessing vaccine hesitancy. The study showed a high level of vaccine hesitancy among the respondents and a low uptake of the vaccine. Likelihood to have taken the vaccine was influenced by factors such as knowledge of the vaccine as well. <sup>58</sup> These findings underscore the need to focus on raising awareness of the

pandemic to improve the general public's perception of risk and create necessary cues to action that will drive uptake of the vaccine and lead to halt in the spread of the pandemic.

## **CONCLUSION**

The study showed that most of the respondents had a poor knowledge of COVID-19 and COVID-19 vaccination, poor attitude towards the vaccines and were unwilling to take the vaccine. The level of uptake of the vaccine among the respondents was also low. The factors that were found to affect the uptake of the vaccine among the respondents were sex, average household monthly income, knowledge of COVID-19 and COVID-19 vaccination and their willingness to take the vaccine.

## **RECOMMENDATIONS**

### **To the Federal/State Ministry of Health**

1. To increase efforts at creating awareness of the COVID-19 vaccine focusing especially on its importance and availability.
2. To utilize channels such as television and the radio to reach this demographic.
3. To consider efforts to make vaccination centers available at the market, close to their place of work as this would likely prove most effective in reaching the respondents.

### **To individuals**

1. Individuals should pay attention to credible sources of information concerning the pandemic and the COVID-19 vaccine and report sources of misinformation.
2. Points of confusion and clarification should also be directed to trustworthy sources to avoid misinformation and spread of rumors.
3. They should also consider the impact of not being vaccinated on their health, the community, nation and world at large to decide if they will or will not take the vaccine.

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**APPENDIX I**  
**DEPARTMENT OF COMMUNITY HEALTH, SCHOOL OF MEDICINE, UNIVERSITY OF**  
**BENIN**  
**ASSESSMENT OF COVID-19 VACCINATION UPTAKE AMONG TRADERS IN**  
**USELU MARKET, OREGBENI MARKET AND OBA MARKET.**

**MAT NO:** \_\_\_\_\_ **S/N:** \_\_\_\_\_

We are 500L medical students of the University of Benin, Benin City. This questionnaire is designed to assess the uptake of COVID-19 vaccine in your community. All information given will be treated as confidential. Thank you.

**SECTION A: SOCIODEMOGRAPHIC CHARACTERISTICS**

1. Age in years (as at last birthday): \_\_\_\_\_
2. Religion: Christianity ( ) Islam ( ) African Traditional Religion ( ) Others (specify)\_\_\_\_\_
3. Occupation: \_\_\_\_\_
4. Place of work: \_\_\_\_\_
5. Ethnic group: \_\_\_\_\_
6. Marital Status: Single ( ) Married ( ) Widowed ( ) Divorced ( ) Separated ( ) Cohabiting ( )
7. Marriage Type : Monogamous ( ) Polygamous ( ) Others (specify)\_\_\_\_\_
8. Highest Level of Education attained: No formal education ( ) Primary ( ) Secondary ( ) Tertiary ( )
9. Household Size: \_\_\_\_\_
10. Household income (monthly): \_\_\_\_\_

**SECTION B**

**KNOWLEDGE OF COVID-19 AND THE VACCINE AMONG RESPONDENTS**

11. Have you heard of COVID-19? Yes [ ] No [ ]
12. If yes, what is your source of information? Television [ ] Radio [ ] Social Media [ ] Friends [ ] Health workers [ ] Billboards/posters [ ] Others specify \_\_\_\_\_ **multiple responses allowed**
13. What causes COVID-19? Bacteria [ ] Fungi [ ] Virus [ ] 5G installation [ ] Others specify \_\_\_\_\_
14. Symptoms of COVID-19 include? Fever [ ] Cough [ ] Weakness [ ] Body pain[ ] Bleeding from orifices[ ] Diarrhoea [ ] Difficulty with breathing [ ] Loss of sight [ ] Loss of taste or smell [ ] Hearing loss [ ] Others specify \_\_\_\_\_ **multiple responses allowed**
15. How is COVID-19 transmitted? Blood transfusion [ ] Airborne [ ] Eating contaminated food [ ] Inhalation of respiratory droplets [ ] Contact with bare skin [ ] Sexually

- transmitted [ ] Touching your eyes, nose and mouth after touching contaminated surfaces  
 [ ] Insect bites [ ] others specify \_\_\_\_\_ **multiple responses allowed**
16. Have you heard about COVID-19 vaccine: Yes [ ] No [ ] **If NO, skip to 22**
17. If yes, what is your source of information Television [ ] Radio [ ] Social Media [ ] Friends  
 [ ] Health workers [ ] Billboards/posters [ ] Others specify  
 \_\_\_\_\_ **multiple responses allowed**
18. What is COVID-19 vaccine? A drug that can stop coronavirus [ ] a drug that can prevent  
 coronavirus [ ] A vaccine that can reduce the symptoms of COVID-19 [ ] A drug that  
 cures corona virus [ ] I don't know [ ]
19. What is the importance of COVID-19 vaccine? Offers protection from COVID-19 [ ]  
 prevents death if one contacts COVID-19 [ ] ensures immunity to COVID-19 [ ] I  
 don't know [ ]
20. Side effects after vaccination include: Fever [ ] obesity [ ] headaches [ ] vomiting [ ]  
 muscle aches [ ] pain [ ] Others specify \_\_\_\_\_ **multiple responses allowed**
21. Is any vaccine available in Nigeria: Yes [ ] No [ ] I don't know [ ]
22. Which COVID-19 vaccine is available in Nigeria? Moderna [ ] Pfizer [ ] Oxford  
 AstraZeneca [ ] Johnson and Johnson [ ] Others specify \_\_\_\_\_

### SECTION C

#### ATTITUDE TOWARDS THE COVID-19 VACCINE.

**A= AGREE UD= UNDECIDED D= DISAGREE**

SN		Agree	Undecided	Disagree
23	It is safe to take the COVID-19 vaccine			
24	The COVID-19 vaccine can prevent COVID-19 infection			
25	The COVID-19 vaccine increases the occurrence of COVID-19 infection.			
26	If I feel at risk of getting COVID-19, I will take the vaccine			
27	Vaccination is a good idea because it makes me feel less worried about contracting COVID-19			
28	I will recommend COVID-19 vaccine to my friends and family			
29	The unknown safety profile discourages me from taking the COVID-19 vaccine			
30	COVID-19 vaccines are generally safe.			
31	I will use the COVID-19 vaccine only if it is free			
32	If we were all required by the government to take a COVID-19 vaccine, I would take it.			
33	Vaccination decreases my chance of getting COVID-19 or its complications			
34	The COVID-19 is effective and likely to work for everyone			

35	If my family or friends suggested I get a COVID-19 vaccine, I would take it.			
36	Taking COVID-19 vaccine is important.			

## SECTION C

### ASSESSMENT OF THE LEVEL OF UPTAKE OF COVID-19 VACCINATION

37. Have you taken the COVID-19 vaccine? Yes  No ; **If NO, skip to Q48**

38. If yes, what brand?

a) AstraZeneca  Number of doses: 1  2  Booster

b) Moderna  Number of doses: 1  2  Booster

c) Pfizer  Number of doses: 1  2  Booster

d) Sinovac  Number of doses: 1  2  Booster

e) Johnson.Johnson  Number of doses: 1  2  Booster

40. COVID-19 Vaccination card seen. Yes  No

41. Where were you vaccinated? Home  Workplace  School  Hospital  Church   
Mosque  Market  others, specify.....

42. **If no**, why? (MRQ)

- a. I do not have adequate information on the vaccine
- b. I will only take the vaccine if the vaccine is taken by many in the public.
- c. My religious belief does not encourage me to take COVID-19 vaccine.
- d. The COVID-19 vaccine is a mark of the beast.
- e. Receiving the COVID-19 vaccination is against my cultural beliefs.
- f. Getting support from my family members will encourage me to take the COVID-19 vaccine.
- g. I already take local herbs which protect me against the virus.
- h. I have other medical condition that would not allow me to take the vaccine.
- i. I do not know where to get the vaccine.
- j. I already take multivitamins which makes me immune to the virus.
- k. COVID-19 is not real therefore I do not need the vaccine
- l. The vaccines are only for children.
- m. The COVID-19 vaccines are only meant for health workers
- n. The COVID-19 vaccines are only meant for the elderly
- o. The vaccines we are taking are already too much.

- p. The vaccine is not needed because the infection is harmless. [ ]
- q. I am scared of the side effects of the vaccine [ ]
- r. I doubt the effectiveness of the vaccine [ ]

## APPENDIX II

### INFORMED CONSENT FORM

**TITLE OF STUDY: ASSESSMENT OF COVID-19 VACCINATION UPTAKE AMONG TRADERS IN USELU MARKET, OREGBENI MARKET AND OBA MARKET.**

INSTITUTION: UNIVERSITY OF BENIN.

PRINCIPAL INVESTIGATOR: UMOLU EFUA OFURE

SUPERVISOR:**DR. ANDREW IFEANYICHUKWU OBI** MBBS; MPH; FMCPh; CERT. EPID  
(NORTH CAROLINA)

SPONSORSHIP: This study will be self-sponsored.

**PURPOSE OF THE RESEARCH:** The main purpose of this study will be to assess the uptake of the COVID-19 vaccination among traders in Benin City, Edo State in order to improve vaccine uptake.

**PROCEDURES INVOLVED IN THE STUDY:** In this study respondents will be asked questions to assess their knowledge, attitude, willingness, level of uptake as well as factors affecting uptake of COVID-19 vaccine among traders in markets in Benin City, Edo State.

**CONFIDENTIALITY:** All information obtained in the course of the survey will be treated with utmost confidentiality. The name of the participant will not be written on the questionnaire. All information obtained from the questionnaire will be coded in a file in the personal computer of the principal investigator and pass-warded.

**COMPENSATION:** There shall be no financial compensation for participation in this study.

**VOLUNTARY PARTICIPATION:** Participation in this study is entirely voluntary and you may wish to withdraw from it whenever you choose. If you desire to withdraw out of this study at any time, no punitive measures will be meted out against you on account of your withdrawal. Your refusal to

participate or withdraw from the study will not involve any negative consequences or loss of benefits to which you are otherwise entitled to.

**RISKS:** There is no risk associated with your participation in this survey. The study does not entail any activity that would result in harm to you.

**BENEFITS:** Results obtained from this study will help in assessing the level of COVID-19 vaccine uptake among traders and the determinants of the vaccine uptake. This will help in identifying possible strategies to improve COVID-19 vaccine uptake among health care workers and therefore, the general populace.

**FINANCIAL SPONSORSHIP:** This study will be sponsored by the principal investigator.

The under-listed may be contacted in case you have any clarifications to make.

UMOLU EFUA OFURE

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P. M. B. 1111,

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**Email: [efuaumolu@gmail.com](mailto:efuaumolu@gmail.com)**

**Cell: +2348035027235**

## **CERTIFICATE OF CONSENT**

1. I confirm that I have read and understand the subject information for the above study and have had the opportunity to ask questions which have been fully answered[  ]
2. I understand that my participation is voluntary and I am free to withdraw at any time[  ]
3. I agree to take part in the above study[  ]

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Signature of Participant

---

Date

## **APPENDIX IIB**

### **INFORMED CONSENT FORM [PIDGIN]**

**TITLE OF STUDY: ASSESSMENT OF COVID-19 VACCINATION UPTAKE AMONG TRADERS IN USELU MARKET, OREGBENI MARKET AND OBA MARKET.**

INSTITUTION: UNIVERSITY OF BENIN.

PRINCIPAL INVESTIGATOR: UMOLU EFUA OFURE

SUPERVISOR:**DR. ANDREW IFEANYICHUKWU OBI** MBBS; MPH; FMCPH; CERT. EPID  
(NORTH CAROLINA)

SPONSORSHIP: This study will be self-sponsored.

PURPOSE OF THE RESEARCH: De reason for this study na check if traders for Bini dey take the COVID-19 vaccine.

PROCEDURES INVOLVED IN THE STUDY: De way we go take do this study be say we go dey ask you questions about the vaccine, wetin traders know about am, whether dem go take am if dem never take am, how many don take am and wetin dey make them no take am.

CONFIDENTIALITY: Anything wey you tell us dey safe with us, we nor go dey broadcast am, we no go even collect your name. Anything wey you tell us we go lock am for computer.

COMPENSATION: We no dey pay traders wey join us for this study.

**VOLUNTARY PARTICIPATION:** Participation for this study nor dey compulsory, na if you wan do am you do am. If you no wan do am, nobody go fine you, na your choice and if e be say you wan comt you fit comot anytime.

**RISKS:** No anything for this study fit affect or harm you , no risk dey involved.

**BENEFITS:** Dis work go help us know how traders for Bini dey collect the COVID-19 vaccine. E go also help us get correct information wey we go use take encourage more traders to collect the vaccine.

**FINANCIAL SPONSORSHIP:** Na my money I go take do this study.

If you get question or anything wey no clear to you, you fit contact:

**UMOLU EFUA OFURE**

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University of Benin Teaching Hospital,

P. M. B. 1111,

Benin City. Nigeria.

**Email: [efuaumolu@gmail.com](mailto:efuaumolu@gmail.com)**

**Cell: +2348035027235**

## **CERTIFICATE OF CONSENT**

1. I don read am and I understand wetin dey this form, and I don still ask all the questions wey I wan ask for the matter wey no too clear to me about the research and I dey ok with d information wey dem give me [ ]
2. I understand say no be by force to participate and I fit comot [ ]
3. I gree say I go take part for the research [ ]

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Signature of Participant

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Date