ASSESSMENT OF ACCEPTANCE OF COVID-19 VACCINE AND ITS ASSOCIATED FACTORS AMONG RESIDENTS IN BENIN CITY

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A PROJECT SUBMITTED TO THE DEPARTMENT OF COMMUNITY HEALTH, SCHOOL OF MEDICINE, UNIVERSITY OF BENIN, BENIN CITY, EDO STATE, NIGERIA.

IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE BACHELOR OF MEDICINE AND BACHELOR OF SURGERY (MBBS) DEGREE

JUNE, 2023.

DECLARATION

We hereby declare that this project work titled "**Assessment of acceptance of COVID-19 vaccine and its associated factors among residents in Benin City**" was conducted by us and it is original. This work has never been submitted anywhere else for publication.

……..	……..	……
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CERTIFICATION

This is to certify that this research was carried out by Kikosem Igwubor**,** Jessica Eseosa Iyoha and Savior Chimaobi James in partial fulfillment of the requirement for the award of Bachelor of Medicine, Bachelor of Surgery (MBBS) in the Department of Community Health, School of Medicine, College of Medical Sciences, University of Benin, Benin City, Edo State. The research process was duly supervised and corrections were made.

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DEDICATION

We dedicate this project to God Almighty for His faithfulness and kindness towards us which has sustained us through this project. We also dedicate this project to our loving parents whose moral and financial support has enabled us to carry out this project. This work is also dedicated to our supervisor, Prof. V.O. Omuemu who has guided us through this work and for her tender care. Also to everyone who contributed to making this a reality, God bless you.

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Saviour Chimaobi James

I am most grateful to my parents Mr and Mrs Igwubor for their constant love and care throughout my medical school journey. I am also grateful to my siblings and friends who made this journey worthwhile. May the Lord reward you all. Finally, to my project partners; Jessica Iyoha and James Savior Chimaobi thank you for all the support.

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Jessica Eseosa Iyoha

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COVID-19	Coronavirus disease 2019
EUL	Emergency Use Listing
SAGE	Strategic Advisory Group of Experts
SARS- CoV2	Severe Acute Respiratory Syndrome
USA	United States of America
WG	Working Group
WHO	World Health Organization

DEFINITION OF TERMS

Herd Immunity: The indirect protection from an infectious disease that happens when a population is immune either through vaccination or immunity developed through previous infection.

Immunity: A state of altered responsiveness to a specific substance acquired through immunization or natural infection.

Immunization: The artificial induction of active immunity by introducing into a vulnerable host the specific antigen of a pathogenic organism. protection of susceptible individuals from communicable disease by the administration of the living modified agent, a suspension of killed organisms, or an inactivated toxin

Perception: The ability to understand or notice something easily

Vaccine: A product that stimulates a person's immune system to produce immunity to a specific disease, protecting the person from that disease

Vaccination: The act of introducing a vaccine into the body to produce immunity to a specific disease.

Vaccine hesitancy: Delay in acceptance or refusal of vaccines despite the availability of vaccine services.

ABSTRACT

Background: The global coronavirus 2019 (COVID-19) is a new strain of coronavirus SARS-CoV-2 which has been a cause of severe acute respiratory syndrome (SARS) on a global scale. Despite the burden of the disease, there has not been any known treatment against SARS-COV-2. Vaccination is considered a crucial measure for controlling the spread of the virus and this subsequently led to the development of several vaccines. Despite the efforts made to achieve successful COVID-19 vaccine use, a major hindrance was related to vaccine hesitancy of the approved vaccine.

Objectives: To determine the acceptance of the COVID-19 vaccine and its associated factors among residents in Benin City in order to make recommendations to key stakeholders to ensure improved uptake of the COVID-19 vaccine.

Methodology: A descriptive cross-sectional study design was carried out among residents in Egor, Ovia North-East, and Oredo Local Government Areas of Benin City, Edo State, Nigeria. It was conducted from March 2021 to May 2023. Six hundred and ten residents were selected using a multi-stage sampling technique. Data was collected from the respondents using an interviewer-administered questionnaire. The data obtained were analyzed with IBM SPSS version 25. The level of significance of all statistical associations was set at $p < 0.05$.

Results: From the 610 respondents interviewed, males 328 (53.8%) and females 282 (46.2%) with an average age of 33.8± 13.4years. The majority of them were Christians 533 (87.43%) and 367 (60.2%) were single. Three hundred and ninety-nine (65.4%) respondents had a tertiary level of education. The mean household income was ₦52,244 ± 87091 and about two-third of them earned < ₦100,000. From the responses, 358 (58.7%) and 233 (38.2%) had good knowledge of the COVID-19 and COVID-19 vaccines respectively while 252 (41.3%)

and 377 (61.8%) of the respondents had poor knowledge of the COVID-19 and COVID-19 vaccine respectively. Four hundred and twenty-three respondents (69.3%) had a poor perception of risk while 187 (30.7%) had a good perception of the risk of COVID-19 (63.4%) had a good perception of COVID-19 vaccine and 223 (36.6%) had a poor perception of COVID-19 vaccine. A total of 415 (68%) respondents were willing to take up the COVID-19 vaccine if offered. Two hundred and forty-nine respondents (40.8%) have received the COVID-19 vaccine. The factors found to affect the uptake of the vaccine were age, skill level, level of education, knowledge of COVID-19, and willingness to take the COVID-19 vaccination.

Conclusion: The study showed that the majority of the respondents had good knowledge and poor knowledge of COVID-19 and COVID-19 respectively. Over three- quarter of respondents had a poor perception risk of COVID-19. About two-third were willing to take up the vaccine if offered. The government should provide accurate, up-to-date information about the safety and efficacy of COVID-19 vaccines. They should work with appropriate stakeholders to create awareness campaigns that address vaccine hesitancy.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

The current global coronavirus 2019 (COVID-19) pandemic has caused great alarm since the outbreak in 2019. The causative pathogen is severe acute respiratory syndrome coronavirus - 2 (SARS-CoV-2). It belongs to a family of RNA viruses of the coronaviridae that causes various symptoms such as pneumonia, fever, difficulty in breathing and lung infection. It was initially detected in a cluster of patients with pneumonia of unknown cause and was linked to a local South China seafood market in Wuhan, Hubei province, China in December 2019.[1]

The novel coronavirus spread rapidly around the world within a month of its onset. On 11 March 2020, the World Health Organization (WHO) declared COVID-19 a worldwide pandemic. By 6th of June 2021, the COVID-19 had infected over 173 million people and has led to more than 3.7 million deaths worldwide.[2] By 6th of June 2021, the total number of confirmed COVID-19 cases on the African continent amounted to over 4.9 million and total death counts of 132,517 and more than 4.4 million people have recovered from the virus.[3]

The first case of COVID-19 in Nigeria was first detected on the 27 February 2020. As at 2 May 2021, a total of 165 167 confirmed cases with 155 361 recovered and 2063 deaths have been reported.[3] This virus has proven to be a great threat to the health and economic systems of various nations in the world and there is a need to fast track the development of vaccine.[4]

Given the spread of the new coronavirus and its impacts on human health, the research community has responded rapidly to the new virus and many preliminary researches have been conducted to proffer solutions to this problem.[4]

Despite the burden of the disease, there has not been any proven treatment against the SARS-CoV-2 and this has led to scientists and governments of different nations to look for the most possible escape route from this deadly disease. They are aware and recognize the importance

of development of vaccine against COVID-19 in the restoration of normalcy against devastating effect of the pandemic. COVID 19 vaccine has proved to be a near solution to solving the problem. Expectations were built up towards COVID-19 vaccine to help reduce mortality and rising number of cases.[4]

Vaccination is a simple, safe and effective way of protecting people against harmful diseases, before they come in contact with them. It uses the body's natural defenses to build resistance to specific infections and makes your immune system stronger.[5]

Vaccines contain killed or weakened forms of micro-organisms, but do not cause the disease or predisposes to risk. They can be administered through various routes. Today vaccines protect at least over 20 diseases such as diphtheria, tetanus, pertussis, influenza etc. Together, these vaccines save the lives of about 3 million people every year.[6]

The COVID-19 pandemic has caused a challenge to healthcare systems, the economy, and education. It put billions of people in quarantine during national lockdowns, magnifying pre-existing psychological and health issues and affecting various aspects of life. Simultaneously, the health crisis has been counteracted by the scientific community's unprecedented efforts encompassing basic research on SARS-CoV-2, epidemiological modeling, characterizing the clinical image of COVID-19, studies on repurposed drugs to treat the disease, and the development of vaccine candidates. The unseen speed at which COVID-19 vaccines were made available is due to years of research and technological advances, the use of innovative platforms enabling rapid development of candidates, running multiple trials in parallel, significant funding, and help from regulatory institutions and their experts working at a higher pace. In the European Union, the first vaccine, BNT162b2 by BioNTech/Pfizer, was authorized on 21 December 2020, followed by mRNA-1273 by Moderna and AZD1222 by Oxford/AstraZeneca approved on 7 and 29 January 2021, respectively. The third phase clinical trials of these vaccines have proven their efficacy in decreasing the number of

symptomatic COVID-19 infections and disease severity. Initial data originating from massive vaccinations reassure that these vaccines are an effective tool on the way to fight the pandemic.[7]

The WHO Emergency Use Listing (EUL) procedure is a risk-based procedure for assessing and listing unlicensed vaccines, therapeutics and in vitro diagnostics with the ultimate aim of expediting the availability of this product to people affected by public health emergency. This helps determine the acceptability of using specific product based on an essential set of available quality, safety, efficacy and performance data.[8]

WHO issued an EUL for the Pfizer COVID-19 vaccine (BNT162B2) on 31 December 2020. On 15 February 2021, WHO issued EULs for two versions of the AstraZeneca/Oxford COVID-19 vaccine, manufactured by the Serum Institute of India and SKBio. On 12 March 2021, WHO issued an EUL for the COVID-19 vaccine Ad26 COV2 S, developed by Janssen (Johnson & Johnson). WHO is on track to EUL other vaccine products through June.[9]

Despite the efforts made to achieve successful COVID-19 use, a major hindrance can be related to vaccine hesitancy towards the approved COVID-19 vaccination.[10] Vaccine hesitancy (delay in acceptance or refusal of vaccination despite availability of vaccine services) remains a prevalent issue across the globe.[11] Factors associated with vaccine hesitancy include complacency, confidence and convenience. Confidence is trust in the effectiveness and safety of the vaccine, the system that delivers them including reliability and competence of health services and health professionals and the motivation of the policy-makers who decides on the needed vaccines. Vaccine complacency exist where perceived risk of vaccine preventable diseases is low and vaccine is not deemed the necessary preventive action. Vaccine convenience is the measure of the extent to which physical availability, affordability and willingness to pay, geographical accessibility, language and health literacy, and appeal of immunization services uptake.[11] The COVID-19 anti vaccine

movement appears to be fueled by conspiracy theories, false beliefs, in the vaccine approved process.[11]

Vaccine acceptance depends on the public trust and confidence in the safety and efficacy of the vaccine, immunization and health system. Vaccine acceptance involves multiple levels of trust: trust in the product (the vaccine), the provider (the specific healthcare professionals or administrative staff that are involved in providing and administering vaccination), and trust in the policy-maker (the health system, government, and public health researchers involved in approving and recommending the vaccine).[11]

The perception of trustworthiness are subjective and different individuals ascribe to different levels of trustworthiness depending on those individual's experiences and biases.

1.2 STATEMENT OF PROBLEM

Since the outbreak of COVID-19 caused by Severe Acute Respiratory Syndrome coronavirus 2 (SARS CoV-2) was initially detected in Wuhan, China in December 2019, by 6th of June 2021, the COVID-19 had infected over 173 million people and has led to more than 3.7 million deaths worldwide.[1,2]

The COVID-19 pandemic has brought to the forefront the longstanding debate regarding vaccine hesitancy, Efforts made towards vaccination programs against SARS-CoV-2 are being challenged by vaccine hesitancy which means the reluctance or unwillingness to be vaccinated or have one's children vaccinated against a disease, even if proven safe and effective. Vaccine hesitancy poses dangers to both the individual and his or her community, since exposure to a contagious disease places the person at risk and individuals are for more likely to spread the disease to others if they do not get vaccinated.[9]

Developing a safe, effective, and affordable vaccine is already difficult, but vaccine hesitancy confers a different and unique hurdle to researchers, scientists, government and community leaders.[10] A study done in the United States of America (USA) in May 2020 on the impact of misinformation and subsequent distrust in vaccines as demonstrated in the poll suggested that 50% will get vaccinated, 30% were undecided and 20% refused to take the vaccine.[5]

Another poll from Gallup in USA reported that 65% of respondents would take the vaccine and 35% are not willing to take the vaccine. Another survey published in August 2020 found a 67% acceptance of a COVID-19 vaccine. However, there were outstanding demographic factors in the acceptance of the vaccine. Black Americans reported lower COVID-19 vaccine acceptance (40%) than all other racial groups in the USA.[5]

A cross-sectional, web-based study was carried out among 1228 Nigerians (aged 16 years and above, with access to the internet) between July 2020 and August 2020 to assess willingness

to accept COVID-19 vaccine, 50.2% of respondent were willing to accept COVID-19 vaccine and 50.8% of the respondent are unwilling to accept COVID-19 vaccine.[12]

From the study, some of the factors associated with declined in the acceptance of COVID-19 vaccination are the suddenness of vaccine production, fear of adverse effects, Religious believes, public distrust in the Government.

In Africa there have been many experiences and rumors which have challenged the success and effectiveness of the COVID-19 vaccination programs. A notable example is the polio vaccine boycotted in 2003 to 2004, prompted by distrust and wrong perception of religious leaders in northern Nigeria resulted to a five–fold increase in the polio incidence in Nigeria.[13]

The rejection of vaccination program in these instances lead to more exposure of individuals to infections illness and disease progression among ill individuals. These suggest that vaccine hesitancy poses a threat to individual, personal and global health as it delays the attainment of herd immunity for specific diseases (i.e. COVID-19).[13]

The COVID-19 has ignited fears of an impending economic crisis and subsequent recession. Non-pharmacological interventions like social distancing, self-isolation and travel restrictions have led to a reduction in the workforce across all economic sectors and has led to the loss of jobs of many people. The educational sector has suffered due to closure of schools. Also, the need for commodities and finished product has decreased. In contrast, the need for medical supply has greatly increased.

The agricultural sector is also facing high demand due to panic buying and stockpiling of food products. In response to the outbreak, the social economic effect of COVID-19 can be summarized on individual aspects of the word economy.[14]

1.3 JUSTIFICATION OF THE STUDY

The novel COVID-19 SARS-CoV- 2 is a disease of public health importance with no definitive treatment. The outbreak has resulted in many cases of morbidity and mortality across the globe.[15]

The daily rise in COVID-19 related cases and fatalities thus indicate the inadequacy of the present COVID-19 mitigation measures. This therefore reveals the need for the development of vaccines for the aversion of further spread of COVID-19 locally and globally, Vaccines have demonstrated an excellent historical capacity for the elimination of many infectious illnesses such as tetanus, diphtheria, polio, rabies, pertussis, measles, and yellow fever.[16]

Vaccination is a productive way to curtail the burden of COVID-19 and the success depends huge acceptance of the vaccine. However, addressing concerns among individuals who hesitate to take the vaccine is essential to avoid failure of the immunization program. Nevertheless, even with available COVID-19 vaccines, some parts of the public do not get vaccinated mainly due to a phenomenon known as vaccine hesitancy. Therefore, it is very pertinent to understand the intentions, motivators and barriers that influence the public to vaccinate against COVID-19. This would help to prepare interventions based on accessibility to the general public while trying to target those that show a tendency not to get vaccinated.

Therefore, this study seeks to assess the level of knowledge and the risk perception of COVID-19 among residents in Benin City, also to determine the perception of COVID-19 Vaccine among resident in Benin city. The study also seeks to assess the level acceptance and factors associated with the acceptances of COVID-19 vaccine and its associated factors among residents in Benin City.

1.4 RESEARCH QUESTIONS

1. What is the knowledge and perception of risk of COVID-19 among residents in Benin City
2. What is the perception of COVID-19 vaccine among residents in the Benin City
3. What is the level of acceptance of COVID-19 vaccine among residents in Benin City.
4. What are the factors associated with COVID-19 vaccine acceptance among resident in Benin City.

1.5 OBJECTIVES

GENERAL OBJECTIVE

To assess the acceptances of COVID-19 vaccine and its associated factors among residents in Benin City.

SPECIFIC OBJECTIVES

1. To determine the knowledge and perception of risk of COVID-19 among residents in Benin City
2. To determine the perception of COVID-19 vaccine among residents in Benin City
3. To ascertain the level of acceptance of COVID-19 vaccine among residents in Benin City.
4. To identify the factors associated with acceptance of COVID-19 vaccine among resident in Benin City.

CHAPTER TWO

LITERATURE REVIEW

Vaccines have long been considered as one of the greatest achievements in attaining community and global health. Due to the highly effective nature of vaccination programs on the African continent, a reduction in mortality and morbidity due to vaccine-preventable diseases as a result of high and sustainable uptake has been recorded especially among children. Due to this result, lower costs are being incurred by households in the treatment of diseases.[15]

2.1 Knowledge and perception of risk of COVID-19.

2.1.1 Knowledge of COVID-19

An adaptive cross-sectional study was conducted among the general population of Pakistan from 1st to 12th June 2020 to assess their knowledge, attitude and perceptions regarding COVID-19. Due to the mode of transmission of SARS-CoV-2, an online medium to collect responses was employed. The questionnaire was produced in English language but was also translated to Urdu by the research team in order to interview participants orally who were not-fluent in English. A total of 1200 respondents participated in this study with a wide range of age groups and education. The target population was selected using non-probability convenience sampling. It included participants aged 15 years and above who were permanent residents of Pakistan and were willing to take part in the study. Chi-square test was used to determine the association between knowledge and perception of COVID-19 with socio-demographic characteristics. Most of the population was aged between 20 and 29 years. Majority of the respondents had adequate knowledge (93.3%) The majority (70.5%) of the respondents answered correctly that COVID-19 is transmitted through air droplets and contact. Also, almost the entire population (97.8%) were aware of preventive measures. Significant differences in knowledge were observed among genders, age groups, education

and between students and employees in the healthcare and non-healthcare department. A multivariate analysis revealed a higher education status and female gender as significant predictors of adequate knowledge and perception.[17]

A cross-sectional descriptive study was conducted in Kenya from April 30th to May 7th 2020 to assess the knowledge and perceived risk of infection among youths in Kenya. A combination of online survey and phone interviews was used to get responses from the respondents. The survey instrument was piloted with young people who were not part of the respondents. The survey aimed to collect information on the level of knowledge on signs and symptoms of COVID-19, adoption of preventive practices, and the effects of COVID-19 among the population. The collected data was exported to Stata version 15 for analysis. A total of 2156 youths completed the responses to the study questions. Knowledge on symptoms of COVID-19 was generally high. Close to 90% of respondents can correctly identify at least three symptoms of COVID-19. In terms of knowledge of preventive measures, most measures mentioned by the respondents were: washing hands with soap and running water (98.1%), use of hand sanitizers (95.6%), use of masks (93.1%) and maintaining social distance (88.0%). Of the 14 infection preventive measures listed, female respondents were able to identify 71% of them, while male respondents were able to identify 73%. There was no significant difference in the preventive measures mentioned.[18]

A study was done to assess the knowledge of COVID-19 pandemic in Nigeria and Egypt. The survey instrument was published online on the 9th of April 2020. The study was designed as a cross-sectional community-based questionnaire survey in both countries. The online survey was extracted on the 11th of May 2020. Due to the spread of the COVID-19 pandemic and the lockdown policy enforced in both countries, a physical paper-based questionnaire was not possible. Participants' demography, knowledge, attitude and perceptions towards the COVID-19 outbreak was obtained from the respondents. Collected data was subjected to

descriptive statistics and logistic regression analysis. A total of 1437 respondents were included in this preliminary report Both countries were chosen because they were the first two countries to record positive COVID-19 cases. The targeted respondents from both countries include adults >17 years of all educational levels. Most respondents had satisfactory knowledge of the disease and the internet was the main source of information (61.6%). The majority of the respondents (96%) practiced self-isolation and social distancing but only 36% follow all health recommendations.[19]

An analytic cross-sectional survey was done in Kano, Nigeria in March 2020 with questionnaires administered to the general population. The study was aimed at assessing the knowledge of COVID-19 and the attitude among residents in Northern Nigeria. Participants were recruited by convenience sampling following informed consent. Independent predictors of good knowledge of COVID-19 were ascertained using a binary logistic regression model. The questionnaire was administered among urban 32.8%, peri-urban dwellers 32.4%, and to online participants 34.8%. The questionnaire was administered in three formats: the first was a self-administered questionnaire that was distributed in the urban area of Kano (32.8%), the second was by a trained research assistant interviewer administration in a semi-urban locality (32.4%) and the last was administered as an online form (34.8%) when social distancing was introduced and self-administration could not proceed as planned. Coded data were inputted into MS Excel and scored. There were 886 study participants with a mean age of 28.58years. Most participants were students (40%) and civil servants (20%). Out of the respondents, 270 (30.47%) had good knowledge of COVID-19. Over 48% did not agree COVID-19 originated from animals while 60% perceived the pandemic to be due to God's punishment. Also, 36% thought it was a man-made virus. Most respondents (63.5%) had marked fear and 56% admitted to modifying their habits recently in fear of contracting the virus. As regards attitude to religious norms, 77.77% agreed on cancellation of the lesser pilgrimage as a measure to

curb the spread of the disease while 23.64% admitted that greater pilgrimage (Hajj) should proceed despite the persistence of the ongoing pandemic.[20]

2.1.2. Perception of risk of COVID-19

A cross-sectional survey of adults in the USA was conducted in April 2020 to assess perceptions of the COVID-19 pandemic. This survey attempted to gauge public perception of the pandemic among non-health workers. It was conducted among adults aged 18 and overusing the Google Consumer Survey methodology. The Google Consumer Surveys show questions across a network of premium online news, reference and entertainment sites, where they get embedded directly into content through a mobile app. The Google Consumer Survey was administered in such a way as to garner a validated, representative sample regarding gender, location, and basic demographics of US adults. There were 113 participants in the survey. Of the 113 subjects, 101 were found to be non-healthcare workers and were used for the remaining survey questions The vast majority of respondents (91.1%) have been practicing social distancing. 53.9% of the 101 respondents were concerned about contracting the virus. The majority of respondents (73.1%) answered that COVID-19 is more severe compared to influenza. This trend was relatively equal across gender, age groups, and regions. The majority of respondents (74.1%) answered that they would get the COVID-19 vaccine if it is available. However, amongst the age groups, participants age between 45-54 years preferred not to receive the vaccine.[21]

A cross-sectional study was conducted in Iran during March and April 2020. The study aimed to investigate how people perceived the COVID-19 outbreak and to find out how this might contribute to possible behavioral responses to the prevention and control of the disease. Participants were recruited via online applications using several social media platforms asking people to take part in the study. An electronic self-designed questionnaire based on the Extended Parallel Process Model was used to measure the perception of risk (efficacy,

defensive responses, perceived threat) related to the COVID-19. Statistical analyses were performed using the Statistical Package for Social Science (SPSS), Version 18, for Windows. Descriptive statistics, chi-square, t-test, and analysis of variance (ANOVA), were used to explore the data. A total of 3727 individuals participated in the study. The mean age of the respondents was 37.0 years. The perceived risk for all participants based on sociodemographic characteristics was ascertained. The results by age revealed that as age increased, there is a significant progressive increase in perceived self-efficacy, avoidance response, and perceived susceptibility scores A total of 56.4% of participants were engaging in danger control processes and 43.6% in fear control processes. The respondents who were involved in danger control processes were more likely to engage in preventive behavior while those who engaged in fear control processes were more likely to delay recommended responses for preventing themselves from the COVID-19. This indicated that more than half of all participants had high perceived efficacy.[22]

An internet-based survey was conducted from April 22 to May 4, 2020, in Ethiopia. The study was used to examine risk perceptions and attitudinal responses to COVID-19 among the educated section of the society in Ethiopia. A questionnaire addressing the perception of health threat (combination of perceived vulnerability and perceived seriousness) and perceived efficacy (combination of perceived self-efficacy and perceived collective efficacy) was used. The data was analyzed using SPSS 21.0. Descriptive statistics were computed after the standardization of the scores. The scores for overall efficacy and threat were split by median value and response classifications were generated through threat by efficacy interactions. A total of 929 respondents submitted their responses for the study. Eight hundred and twenty-eight (89.1%) of the respondents were male and 753 (81.1%) were Christian. The perceived threat to COVID-19 was generally low (median = 58.3%). The median score for overall efficacy perceived response efficacy and perceived self-efficacy

were 79.8%, 87.5%, and 80.0% respectively. However, the median value (66.7%) for perceived collective efficacy was relatively low. Perceived threat varied with age, education, occupation, and place of residence. Perceived efficacy significantly differed by gender, residence, and use of some sources of information.[23]

A cross-sectional study was done to assess the perception of the COVID-19 pandemic in Nigeria and Egypt. The survey instrument was published online on the 9th of April 2020. The study was designed as a community-based questionnaire survey in both countries. The online survey was extracted on the 11th of May 2020. Due to the spread of the COVID-19 pandemic and the lockdown policy enforced in both countries, a physical paper-based questionnaire was not possible. Participants' demography, knowledge, attitude, and perceptions towards the COVID-19 outbreak were obtained using a convenience sampling technique. Collected data were subjected to descriptive statistics and logistic regression analysis. A total of 1437 respondents were included in this preliminary report. Both countries were chosen because they were the first two countries to record positive COVID-19 cases. The targeted respondents from both countries include adults >17 years of all educational levels. Most of the participants (62.1%) had a positive perception of global efforts to control the pandemic. Although most of the participants agreed with the compulsory lockdown to prevent the further spread of the disease, only 38.6% believed that the government had done enough to protect their citizens. Only 22% of the respondents were satisfied with the way the pandemic was handled by their country. Most respondents (81%) affirmed that improved personal hygiene, avoiding social contacts and following their countries' health recommendations are necessary to reduce disease burden and reduce transmission.[19]

2.2 Perception of COVID-19 vaccine.

A cross-sectional survey-based study was conducted in Poland between February and March 2021 to assess the perception and attitude towards COVID-19 vaccines. A convenient sample approach was adopted, with a sample size of 1020 participants. An online, self-administered questionnaire was used to survey adult participants on their perception of the COVID-19 vaccine.

The findings revealed that the primary reasons behind the willingness to receive a COVID-19 vaccine included protecting oneself and relatives from the disease (64.2%). Social benefits, such as unrestricted traveling and better access to work opportunities (2.3%). Preferences in the type of COVID-19 Vaccines; Pfizer Vaccine (84.1%), Moderna Vaccine (82.3%), Oxford/AstraZeneca Vaccine (52.4%). Fears related to the adverse effect of COVID-19 Vaccination, 22.1% of individuals had no fear regarding the adverse effect of vaccination. Fear of severe adverse events 48.4%, the onset of anaphylaxis or other serious allergic reaction 33.2%, unknown long-term effects of the vaccine 41.1%, the vaccine will not protect them from the COVID-19 or that immunity will be short-lasting 2.2%.[7]

A cross-sectional survey-based study was carried out among 3,100 adult participants in Jordan. The survey was conducted in November 2020 to assess the perception and acceptability of COVID-19 vaccines. A convenient sample approach was adopted. An online, self-administered questionnaire was used to survey adult participants on their perception of the COVID-19 vaccine. Logistic regression analysis was used to find the predictors of COVID-19 vaccines' acceptability.

Findings revealed, individuals who believed that it was important to get a vaccine to protect them from COVID-19 (66.5%), the COVID-19 vaccines will be safe and effective (58.7%). vaccines made in Europe or America were safer than those made in other countries(30.8%),

side effects would prevent them from taking the vaccine (49.6%), The government will make the vaccine available free for all citizens in Jordan (36.2%).[24]

A cross-sectional survey-based study was carried out among 196 adult African American participants from the United States of American (USA) in July 2020 to assess the perception and attitude of COVID-19 vaccines. The study aimed at acceptances of the COVID-19 vaccine and factors impacting their decisions. A convenient sample approach was adopted. An online, self-administered questionnaire was used to survey adult participants on their perception of the COVID-19 vaccine.

The findings reviewed that, 30% responded they would accept a vaccine COVID19 vaccine, 54% responded they would not, while 16% were undecided. the major reasons provided by participants for potentially declining COVID-19 vaccination were a combination of distrust in the vaccine efficacy irrespective of what the research shows and distrust of the pharmaceutical companies that produce vaccines (78%), fear of vaccination side effects (65%), and perceived immunity against COVID-19 re-infection (29%).[25]

A cross-sectional survey-based study was carried out among 385 healthcare workers from Egypt in 2020 to assess the perception and attitude of COVID-19 vaccines. This study aimed to assess the perception, determinants of attitude, and the factors that could increase the acceptance of the vaccine. A convenient sample approach was adopted. An observational web-based anonymous survey was used. The questionnaire was designed using Google Forms and distributed electronically, data were collected from December 2020 to January 2021 using an online, self-administered questionnaire was used.

The findings revealed, individual's responses regarding COVID-19 vaccination were undecided about COVID-19 vaccine 51%, declined vaccination 28%, willing to accept covid-19 vaccine 21%. Reasons for vaccine acceptance mainly were risks of COVID-19 (93%),

safety (57.5%), and effectiveness (56.25%) of the vaccine. Simultaneously, the reasons for vaccine hesitancy were the absence of enough clinical trials (92.4%) and fear of side effects of the vaccine (91.4%).[26]

A cross-sectional, web-based study was carried out among 517 Nigerians (aged 16 years and above, with access to the internet) in 2020 to assess perception regarding a hypothetical COVID-19 vaccine, the internet link was randomly distributed with the majority of its participants from the southwest zone of Nigeria.

The result showed that 74.5% were willing to receive the COVID-19 vaccine while 25.5% of our respondents were not willing to take the vaccine. Reservations toward vaccination (24%), while respondents with no reservations toward vaccination (76%). The major reason for the non-acceptance of the COVID-19 vaccine among our respondents is the unreliability of clinical trials (37.1%), followed by the belief that their immune system is enough to combat the virus (27.3%).[27]

A community-based descriptive cross-sectional study was done in Ibadan, Nigeria in 2020 among 440 participants to assess the perception of community members and willingness to pay for the prospective COVID-19 vaccine in Ibadan, Nigeria. A descriptive cross-sectional study design was used. A multistage sampling technique was adopted, the study was done among community members aged 15 years and above, data were collected using an interviewer-administered questionnaire in September 2020.

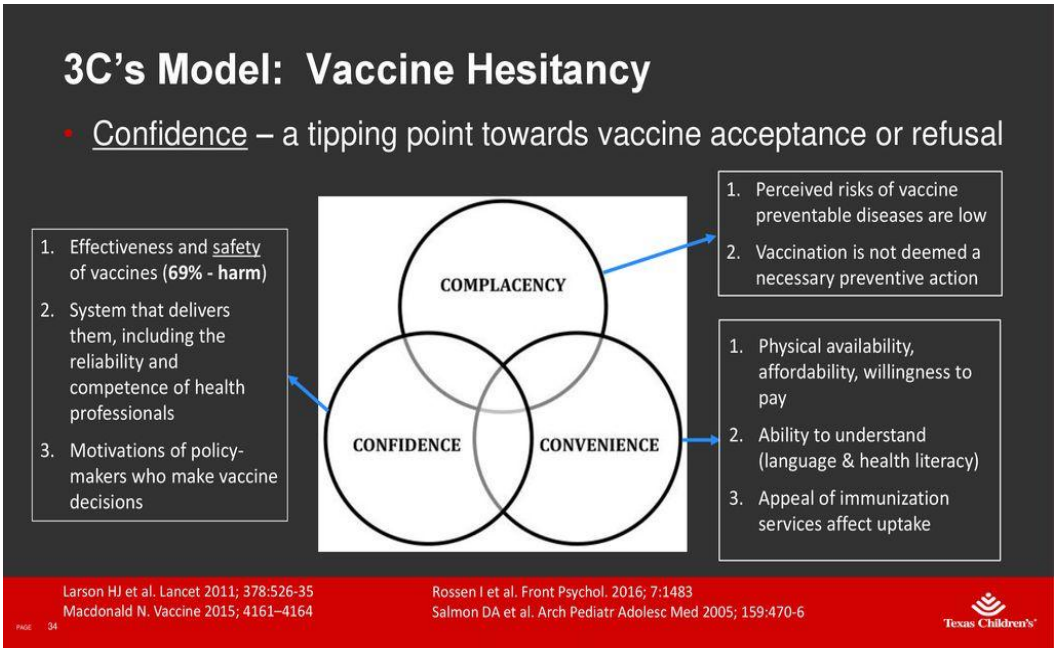
The findings revealed that 281 (96.20%) of the respondent strongly agreed that COVID-19 is a major public health problem requiring vaccine, while 279 (95.50%) strongly agreed that the COVID-19 vaccine would prevent COVID-19. Also, 182 (62.30%) strongly disagreed that the COVID-19 vaccine is against their cultural belief, and 180 (61.60%) strongly agreed to take the COVID-19 vaccine when produced. Overall, 232

(79.50%) respondents had a positive perception regarding the COVID-19 vaccine compared to 60 (20.50%) with a negative perception.[28]

2.3 Level of acceptance of COVID-19 vaccine.

Vaccine hesitancy is the behavior that emanates from decision making process and reflects a number of factors that influence the decision to accept some or all vaccines which is in keeping with the recommended schedule. Models were considered and reviewed for applications by the global community. Their factors were considered and assessed for the effective use in informing the development of indicators associated with vaccine hesitancy, survey questions and necessary interventions for use internationally and locally.[29] The 3C's model (confidence, complacency and convenience) was intuitive and easy to understand. In addition, a more detailed working group matrix was introduced that captured the complexity of the contextual, individual, group and vaccination specific influences.[29]

The SAGE (Strategic Advisory Group of Experts) Working Group on Vaccine Hesitancy concluded that vaccine hesitancy refers to delay in acceptance or refusal of vaccination despite the availability of vaccination services.[29] Vaccine hesitancy is complex and context-specific, varying across time, place, and vaccines. It is influenced by factors such as complacency, convenience, and confidence.[29]



Acceptance of vaccines by individuals is an outcome of behaviors resulting from a complex decision-making process that can largely be influenced by several factors. In developing the definition, the SAGE and WG (working group) in 2012 did a review of several conceptual models for categorizing vaccine hesitancy determinants. In the review, model complexity, global applicability, factors, and potential usefulness in developing vaccine hesitancy indicators and survey questions were all considered.[29] There are a number of factors associated with confidence; these include (i) trust in the effectiveness and safety of vaccines. (ii) The system that delivers them with respect to reliability and competence of health services and health personnel (iii) The motivations of policymakers who decide on the needed vaccines.

Complacency exists where perceived risks of vaccine-preventable diseases are low and vaccination is not deemed a necessary preventive action. Complacency about a particular vaccine is influenced by many factors and they include other life/health responsibilities which may be very important at that particular time. Immunization program success may contradictorily result in complacency and eventually, hesitancy as individuals begin to weigh

risks of vaccines against the risks of the diseases which are now uncommon. Self-perceived or the ability of an individual to take action to be vaccinated also influences the degree to which complacency results in hesitancy.

Convenience is determined by a number of factors which include the extent to which physical availability, affordability and willingness to pay, geographic accessibility, ability to understand (language and health literacy) and, appeal of immunization services affect uptake. The quality of the service and the degree to which vaccination services are delivered at a time and place and in a cultural context that is convenient and comfortable also affect the decision to be vaccinated and could lead to vaccine hesitancy.[29]

A global survey was conducted in 19 countries in 2020 including Nigeria, to assess the potential acceptance of a COVID-19 vaccine. A simple random sample technique was used in selecting 13,426 participants across the 19 countries, most with a high COVID-19 burden.

The findings revealed that 71.5% responded that they would take a vaccine if it were proven safe and effective, and 61.4% said that they would get vaccinated if their employer recommended it. However, high heterogeneity in responses was observed between countries. Furthermore, reporting one's willingness to get vaccinated might not be necessarily a good predictor of acceptance, as vaccine decisions are multifactorial and change over time. Differences in acceptance rates ranged from 90% (in China) to less than 55% (in Russia). The acceptance rate in Nigeria was 65.22%. Countries, where acceptance exceeded 80%, tended to be Asian nations with strong trust in central governments (China, South Korea, and Singapore). A relatively high tendency toward acceptance in middle-income countries, such as Brazil, India, and South Africa, was also observed.[30]

A cross-sectional survey was conducted among social media users in Nigeria in August 2020 using an online questionnaire. The questionnaire includes sections on the demographic characteristics of the respondents and their perceptions regarding a hypothetical COVID-19 vaccine. This study aimed to understand the perception of social media users regarding a hypothetical COVID-19 vaccine in Nigeria. A total of 517 respondents completed the questionnaire electronically.

The findings showed that most of the respondents 385 (74.5%) intend to take the COVID-19 vaccine when it becomes available. Among the 132 respondents that would not take the vaccine, the major reason for non-acceptance was unreliability of the clinical trials (37.1%), followed by the belief that their immune system is sufficient to combat the virus (27.3%). A significant association between the age of the respondents and the COVID-19 vaccine acceptance was observed. The geographical location of the respondents also played a role in their perception and acceptance.[27]

2.4 Factors associated with acceptances of COVID-19 vaccine.

A Cross sectional study done in Kuwait on the factors associated with COVID-19 vaccine acceptance was conducted by enrolling adults residing in the region. The sample size was 2,368 with respondents aged >21 years (comprising 1,597 females and 771 males). The study was done using a web-based survey that was disseminated using social media platforms, including twitter, Instagram, and WhatsApp. The enrolment of the respondents commenced on August 26, 2020 and stopped on September 1, 2020. The snowball sampling technique, a non probability sampling method which yields a convenience sample, was used to recruit the participants. The study revealed that the majority of the respondent were between 25 and 34 with 90.6% being of kuwati nationality. It was said to be noted that the willingness to accept the vaccine was highest among subjects within the range 21- 24 years (74.3%) and was

lowest among those aged 55-64 years (35.3%). Deductions from the study showed that 71.2% who were willing to take the vaccine indicated that vaccines in general protect against infectious diseases and 30.5 % were uncertain and 10.5% did not believe the vaccine offered protection.

This was further seen that respondents who disagreed with development of natural immunity were more likely to accept uptake of the vaccine against COVID-19 compared to those who believed the contrary. These results highlight the need for improving public knowledge and trust in the effectiveness of the vaccines in order to tackle core questions pertaining to the vaccine. As it revealed that individuals who refused to take the COVID -19 vaccine were more likely to express such concerns of hesitancy in comparison to respondents who reported willingness to receive vaccine while available.

A cross-sectional study was done in Ghana among Health workers from January 16th to 15th February, 2021. A self- administered online survey using both convenient and snowballing sampling techniques was used with sample size of 234 participants. The aim of the study was to determine the acceptability of COVID-19 vaccine among Health workers in Ghana. Google form was used in designing the online self- administered questionnaire and was disseminated through WhatsApp to the health care platforms. Subsequently, a snowball sampling technique was used to reach out to health workers and were further encouraged to share the online survey link to other health workers.

The results revealed that two-fifth of respondents (39.3%) indicated acceptance of COVID-19 vaccine if available, while more than half (60.7s%) indicated non acceptance to take the vaccine if available. Findings also revealed that majority of health workers 64.5% were unwilling to take the vaccine due to concerns about the vaccine safety. Factors associated

with the unwillingness were attributed to misinformation on the quality of the vaccines on social media, misinformation and conspiracy theories have also been identified.[32]

A cross-sectional survey conducted in December 2020 among the general population in Nigeria was carried out to assess the determinants and willingness to receive COVID-19 vaccine in Nigeria. Data were collected using an electronic questionnaire with a total of 368 individuals that participated. The questionnaire was designed on kobo toolbox and administered through WhatsApp, telegram, Facebook, Instagram platforms.

The results revealed that 40.5% were willing to take the vaccine while the remaining 59.5% were unwilling to take the vaccine out of which 44.7% was due to lack of trust in the government while 33.1% was due to perceived risks. The study also revealed that majority who were willing to accept the vaccine were in the age group 20- 29 years (51.0%), 58.9% were female, 74.7% were Yoruba, 85.6% had tertiary level of education and 68.6% lived in the urban areas.[33]

CHAPTER THREE

MATERIALS AND METHODS

3.1 STUDY AREA

The study was carried out in Benin City, the capital of Edo State in the South-South geopolitical zone of Nigeria. Edo State is an inland state in central southern Nigeria formed in 1991 from the northern portion of Bendel State. Its capital is Benin City and is its largest urban city. It is bounded in the northeast and east by Kogi State, Anambra to the east, in the south by Delta State, and in the west and northwest by Ondo State; the Niger River flows along the state's eastern boundary. Edo State lies at elevations between 500 feet (150m) in the south and more than 1800 feet (550m) in the north.[34] The core Edo area, about 10,400 square kilometers, is located on a rolling coastal plain crossed by rivers, in an area of the tropical rain forest. About 40% of the region is forest reserves. There is seasonal variation, with a wet season from July to September and a dry one from December to February.[35] The state produces crude oil and is notable for agricultural products; rubber, cocoa, cashew nuts, and is blessed with precious stones like Quartz, Amethyst, Mica, Dolomite, granite stone, and Limestone used in the production of cement in Okpella. Edo State is home to several ethnicities, among them the Edo, Esan, Okpe, Afemai, Ora, Akoko-Edo, Igbanke, Emai, and Ijaw.[36]

The population of Edo State during the last census in 2006 was 3,233,366 with a male to female ratio of 50.5% to 49.5% and the annual population change is 2.7%. The population projection as of 2021 was 4,847,769.[37]

The burden of COVID-19 in the state as of 22nd of August 2021, a total number of 5113 confirmed cases, 4792 recovery, 189 death, 132 active cases, and a total number of 76284

cases.[38] There are 357 health facilities in Benin City across the three Local Government Areas. Oredo has 3 Tertiary, 40 secondary, and 105 primary facilities. Ikpoba-okha has 12 secondary, 117 primary and no tertiary facilities. Egor has 3 tertiary, 12 secondary and 65 primary facilities.[39]

Benin City, the capital, is located within Latitude 6º14'N and 6º21'N of the equator and Longitude 5º35'E and 5º44'E and covers 1,125 square kilometers approximately. It is located some 30 kilometres (18.6 miles) from the coast and to the west of the Niger River. Benin City is bounded in the east by Orhionmwon LGA, to the West by Ovia North East LGA, to the north by Uhunmwonde Local Government Area and to the south by Delta State. Metropolitan Benin cuts across three or four Local Government Area (LGAs) namely Oredo, Egor, Ikpoba –Okha and Ovia North East. The predominant occupation in Benin City include civil service, artisans, and agricultural practice.[40] The dominant tribe is Benin, however, there is a large population of non-indigenes.[41]

Egor LGA has its headquarters in the town of Uselu. The area hosts members of several tribal groups such as Esan, Benin, and Owan. Ikpoba Okha LGA has its headquarters in the town of Idogbo. It is made up of many towns and villages. The Bini language is predominantly spoken in the area. Important landmarks in the area include the Benson Idahosa University.[42] Oredo LGA is made up of several districts and the headquarters is in the town of Benin City. The Benin and English Languages are commonly spoken in the LGA. Notable landmarks in Oredo include the Palace of the Oba of Benin, the Edo State Government house, and the National Museum.[42]

3.2 STUDY DESIGN

A descriptive cross-sectional study design was used for this study

3.3 STUDY POPULATION

The study was carried out amongst male and female adults in Benin City.

3.4 SELECTION CRITERIA

3.4.1 Inclusion criteria

1. Adults aged 18years and above.
2. Adults who were available at the time of the study and had lived in the study area for at least one year
3. Adults who gave consent to participate in the study

3.4.2 Exclusion criteria

Adults who were too ill to participate in the research.

3.4 DURATION OF STUDY

The study spanned for 12months, from March 2021 to March 2022.

3.6 SAMPLE SIZE DETERMINATION

The minimum sample size (n) was calculated using the Cochran formula for a cross-sectional study with design effect factored in, taking into consideration the sampling method to be used in the study (multistage sampling technique).[43]

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

Where:

n = Minimum Sample Size.

Z = Standard normal deviate set at 95% confidence interval (1.96)

p = Prevalence rate of a particular characteristic of the target population.

= using 80% as the proportion of residents will to accept COVID-19 vaccine in a previous study.[28]

= 0.8

q = The complementary probability

1-p = 1-0.8 = 0.2

d = Degree of precision set at 0.05

Deff = Design effect

Design effect for a multistage sampling technique is 2, estimated to compensate for deviation from simple random sampling procedure.[43]

Hence:

$$n = \frac{(1.96)^2 \times (0.8)(0.2) \times 2}{(0.05)^2} = 492$$

To make room for non-response, poor or incomplete responses, 10% non-response rate was added to the minimum sample size, utilizing the formula for Non-response rate.[44]

$$\mathbf{nf} = \frac{\mathbf{n}}{\mathbf{1 - nr}}$$

n = Minimum sample size = 492

nr= Non-response rate = 10% = 0.10

nf = Final Minimum sample size

= 492/ 1-0.1

=546

Thus, the final minimum sample size for this study was 546. However, for this study, a sample size of 550 was used.

3.7 SAMPLING TECHNIQUE

Respondents who met the inclusion criteria were selected using a multistage sampling technique and cluster sampling technique comprising of 3 stages.

STAGE 1: SELECTION OF WARD

There are three (3) LGAs in Benin City including Egor, Ikpoba-Okha, and Oredo LGAs. A list of all the wards in the three LGAs was obtained from the official Independent National Electoral Commission (INEC) website and this served as the sampling frame. From this sampling frame, one ward per LGA was selected by simple random sampling by balloting.

STAGE 2: SELECTION OF COMMUNITIES

From the selected wards, one (1) community per ward was selected using a simple random sampling method by balloting.

STAGE 3: SELECTION OF RESPONDENT

The respondents from the selected community were chosen by cluster sampling technique. This was done by selecting a street in which everybody who met the inclusion criteria was chosen.

3.8 DATA MANAGEMENT

3.8.1 TOOLS FOR DATA COLLECTION

Tools utilized for this study were interviewer-administered questionnaires containing open-ended and closed-end questions.

Questionnaires

Data for this study were collected using a standardized structured interviewer-administered questionnaire. The questions were grouped into five sections which sought to gather the following information.

Section A: Socio-demographic profile

This section was designed to gather information regarding the respondents' socio-demographic characteristics and sought answers concerning respondents' gender, ethnic group, religion, age {as at last birthday}, marital status, level of education, occupation, and employment status

Section B: Level of knowledge and perception of risk of COVID-19

Knowledge of COVID-19

Knowledge of COVID-19 was assessed using the following domains; knowledge of COVID-19, knowledge of the cause and spread of COVID-19, knowledge of symptoms of COVID-19,

and knowledge of the consequences of COVID-19, knowledge of prevention of COVID-19 including COVID-19 vaccination.

Perception of risk of COVID-19

Perception of risk of COVID-19 was assessed using 11 questions with responses in a 3-point Likert-scale under the following domains; perceived susceptibility and perceived severity.

Section C: Perception of COVID-19 vaccine.

Perception of COVID-19 vaccine was assessed using 15 question with responses in a 3-point Likert-scale question under the following domains; perceived benefit, perceived barrier and cues to action.

Section D: Level of acceptance of COVID-19 vaccine.

Level of acceptance was assessed using 13 questions bordering on the acceptance and uptake of COVID-19 Vaccine among respondents.

3.8.2 METHOD OF DATA COLLECTION

The questionnaire for this study was interviewer-administered. There was also training of research assistants (3 to 5) who were enlightened about the topic and how to effectively carry out the interview. The research assistants were medical students in 400 Level and 500 Level classes.

3.8.3 PRE-TESTING

The questionnaire was pretested in Benson Idahosa University (B.I.U) Edo State, as it has a similar study population. Ten percent of the sample size in the proportion (55 questionnaires) was used for pretesting. The aim was to test the questionnaire for the correctness and appropriate understanding by the respondents to aid the appropriate collection of data.

Appropriate corrections were made where applicable to the questionnaire before the commencement of this survey.

3.8.4 DATA ANALYSIS

The filled questionnaires were thoroughly checked for any inconsistencies. Data coding and cleaning was done. Data was entered and analysed with IBM Statistical Package for Social Sciences (SPSS) version 25.0 software.

Socio-demographic Characteristics

This section was designed to gather information regarding the respondents' socio-demographic characteristics and sought answers concerning respondents' gender, ethnic group, religion, age {as at last birthday}, marital status, level of education, occupation, and employment status.

The occupation of respondents was coded into skill levels according to International Labour Organization (ILO) classification and modified to include skill level 0.[41]

Skill level 0: Housewives, students, unemployed

Skill level 1: Cleaners, laborers

Skill level 2: Secretary, police officers, hairdressers and butchers

Skill level 3: Shop managers, medical radiographers, legal secretaries, medical laboratory technicians

Skill level 4: Medical practitioners, civil engineers, secondary school teachers.

Knowledge of COVID-19.

The knowledge of COVID-19 among residents in Benin City was assessed using a total of 16 questions under 6 domains; (knowledge of COVID-19, knowledge of the cause, route of transmission of COVID-19, knowledge of symptoms of COVID-19, knowledge of preventive measures and treatment, and knowledge of COVID-19 vaccine. A score of 1 was given for a correct response and 0 for a wrong response. The total score for each respondent will be converted to percentage and grouped as follows:

Good Knowledge: scored ≥ 70.0%.

Fair knowledge: scored 50-69.9%

Poor Knowledge: scored < 50%

Perception of risk of COVID-19

Perception of risk of COVID-19 was assessed using 11 questions with responses in a 3-point Likert-scale "Agree" "Undecided" "Disagree". This section dealt with the views/opinions of respondents towards the perceived risk of COVID-19 under two domains; perceived susceptibility and perceived severity. Respondents were expected to select one of three preferred options. where a score of three (3) was given to the most positive answer and a score of one (1) was given to the least positive answer. The maximum score obtainable was 33 and the minimum score was 11. Responses were computed into percentage. Respondents scoring 50% and above had good perception while respondents scoring below 50% had poor perception.

Perception of COVID-19 Vaccine

Perception of risk of COVID-19 Vaccine was assessed using 15 questions with responses in a 3-point Likert-scale "Agree" "Undecided" "Disagree". This section dealt with the views/opinions of respondents towards the perception of COVID-19 Vaccine under three domains; perceived benefits perceived barriers and cues to action. Respondents were expected to select one of three preferred options. Respondents were expected to select one of three preferred options. where a score of three (3) was given to the most positive answer and a score of one (1) was given to the least positive answer. The maximum score obtainable was 75 and the minimum score was 15. Responses were computed into percentages. Respondents scoring 50% and above had good perception while respondents scoring below 50% had poor perception.

Level of acceptance of COVID-19 Vaccine.

The level of acceptance of COVID-19 Vaccine was assessed using questions 58 and other questions bordering on the uptake of COVID-19 Vaccine among respondents. Responses such as "definitely yes" "probably yes" "probably no" and "definitely no" were used to access level of acceptance. Each of the responses was computed into percentages.

Data analysis

Univariate analysis was carried out on socio-demographic data and presented as frequencies and percentages.

The bivariate analysis was carried out for parametric and non-parametric data. A chi-squared statistical test of associations was done for non-parametric data and Fischer's exact test was used to compare the associations. The associations between socio-demographic characteristics of respondents and variables such as knowledge of COVID-19, perception of

risk of COVID-19 and perception of COVID-19 vaccine were done. The level of acceptance of COVID-19 vaccine, and factors associated with acceptance of COVID-19 vaccine were also analyzed using bivariate analysis.

Multivariate analysis was carried out to determine the predictors of acceptance of COVID-19 Vaccine. The level of significance of all statistical associations was set at $p < 0.05$. The results were presented in prose, tables, and charts.

3.9 ETHICAL CONSIDERATION

Ethical approval was sought from the Ethics and Research Committee, University of Benin Teaching Hospital (UBTH), Benin City. Permission was obtained from the Local Government Chairman, Medical Officer of Health or Primary Health Care (PHC) Coordinator, and the Enogie of the selected communities before the study was carried out. Verbal consent was obtained from the respondents but names and addresses were omitted to ensure confidentiality. Participants were also assured that they could opt out of the survey at any time and that withdrawal from the interview posed no harm to them.

3.10 STUDY LIMITATIONS

1. The study relied on the information provided by the respondents and will be limited by errors that may be introduced due to recall bias, language or prejudice.
2. Social desirability bias may arise as respondents may want to give the most favourable answers, which are contrary to their actual opinions, this can lead to over reporting or under reporting.

CHAPTER FOUR

RESULTS

A total of 610 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 of COVID-19 vaccine

SECTION C: Perception of risk of COVID-19 among respondents

SECTION D: Perception of COVID-19 vaccine among respondents

SECTION E: Level and factors associated with acceptance of COVID-19 vaccine among respondents

SECTION A

SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

TABLE 1a: SOCIODEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Variables	Frequency (n = 610)	Percent
Age (years)		
18 – 24	214	35.1
25 – 34	158	25.9
35 – 44	76	12.5
45 – 54	94	15.4
55 – 65	68	11.1
Mean age = 33.8 ± 13.4		
Sex		
Male	328	53.8
Female	282	46.2
Marital status		
Single	367	60.2
Married	233	38.2
Divorced	10	1.6
Family type		
Monogamous	522	85.6
Polygamous	88	14.4
Household size		
1 – 5	325	53.3
6 – 10	285	46.7
Range = 2 - 10		
Religion		
Christianity	533	87.4
Islam	74	12.1
Traditional religion	3	0.5
Level of education		
No formal education	14	2.3
Primary	17	2.8
Secondary	180	29.5
Tertiary	399	65.4
Employment status		
Unemployed	333	54.6
Employed	277	45.4
Skill level		
Skill level 0	333	54.6
Skill level 1	20	3.3
Skill level 2	136	22.3
Skill level 3	47	7.7
Skill level 4	74	12.1
Average monthly income in ₦ (n = 277)		
< ₦30,000	20	7.2
₦30,000 – ₦100,000	156	56.3
> ₦100,000	101	36.5
Range = ₦10,000 – ₦800,000		

TABLE 1b: SOCIODEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Variables	Frequency (n = 610)	Percent
Local Government Area		
Ikpoba-okha	207	33.9
Oredo	203	33.3
Egor	200	32.8
Ethnic group		
Bini	223	36.6
Igbo	104	17.0
Yoruba	102	16.7
Esan	52	8.5
Urhobo	45	7.4
Ijaw	27	4.4
Hausa	21	3.4
Etsako	17	2.8
Efik	14	2.3
Others*	5	0.8
Perception of current health		
Excellent	235	38.5
Good	273	44.8
Fair	82	13.4
Poor	20	3.3

*Others = Fulani, Kalabari, Ogoja, Ogoni, Tiv.

Two hundred and fourteen (35.1%) of the respondents accounting for most were within the age group 18 – 24 years. The mean age was 33.8 ± 13.4years. In terms of sex, the study recorded more males 328 (53.8%) than females 282 (46.2%). The predominant ethnic groups were Bini 223 (36.6%), Igbo 104 (17.0%), and Yoruba 102 (16.7%). Five hundred and thirty-three (87.6%) of the respondents involved were Christians. Three hundred and sixty-seven (60.4%) were single and most had obtained tertiary level of education 399 (65.4%). However, more than half (54.6%) of the respondents were unemployed or students. The mean monthly income of those who were working was 52,244 ± 87091 and most (63.5%) of them earned <100,000 naira monthly. Three hundred and twenty-five (53.3%) of the respondents lived in a household with between 1 and 5 persons. Respondents were selected from the three (3)

local governments of interest in a proportional manner: Ikpoba-okha 207 (33.9%), Oredo 203 (33.3%) and Egor 200 (32.8%). Most of the respondents perceived their current health status as excellent 235 (38.5%) or good 273 (44.8%).

SECTION B

KNOWLEDGE OF COVID-19 AND COVID-19 VACCINES

TABLE 2a: RESPONDENTS' KNOWLEDGE OF COVID-19

Variable	Frequency (n = 610)	Percent
Awareness of COVID-19		
Yes	610	100.0
Source of Information[$]		
Television	464	76.1
Internet	400	65.6
Social media	310	51.3
Radio	304	49.8
Newspaper	276	45.2
Family	258	42.3
Health professional	252	41.3
Friends	249	40.8
Church	37	6.1
What is COVID-19		
Coronavirus disease	592	97.0
Flu	8	1.3
Staphylococcus aureus infection	6	1.0
I don't know	4	0.7
Cause of COVID-19		
Virus	589	96.6
Bacteria	10	1.6
5G Installation	6	1.0
Fungi	4	0.7
Curse from God	1	0.2
Symptoms of COVID-19[$]		
Cough	499	81.8
Fever	473	77.5
Sneezing	438	71.8
Loss of sense of smell	400	65.6
Difficulty in breathing	352	57.7
Loss of taste	352	57.7
Muscle weakness	173	28.4
Neck stiffness	89	14.6
Diarrhea	56	9.2
Blood in urine	23	3.8
I don't know	2	0.3

[$] = multiple response question

All the respondents, 610 (100%) had heard of COVID-19. Television 464 (76.1%) was recorded as the major source of information and the church 37 (6.1%) was the least source of information among respondents. Majority 592 (97.0%) of the respondents knew that COVID-19 was Coronavirus disease. Most 589 (96.6%) of the respondents also knew it was caused

by a virus. Four (0.7%) claimed to not know what COVID-19 was and 1 (0.2%) respondent attributed its cause to a curse from God. The most common symptoms associated with COVID-19 infection known by respondents were cough 499 (81.8%), fever 473 (77.5%) and sneezing 400 (77.5%).

TABLE 2b: RESPONDENTS' KNOWLEDGE OF COVID-19

Variable	Frequency (n = 610)	Percent
Transmission of COVID-19[$]		
Contact with fluid and droplets from an affected person	608	99.7
Close contact with an infected person	416	68.2
Touching an infected surface	412	67.5
Contact with objects used by an infected person	385	63.1
Contact with 5G network	16	2.6
Insect bites	2	0.3
Exposure to rat	2	0.3
Most at risk of infection with COVID-19[$]		
Elderly	490	80.3
People with chronic diseases	310	50.8
Children	194	31.8
Adults	188	30.8
Adolescent	140	23.0
Prevention/mitigation measures for COVID-19[$]		
Social/Physical distance	512	83.9
Covering the nose while sneezing	487	79.8
Use of alcohol-based hand sanitizer	476	78.0
Use of facemasks	475	77.9
Regular handwashing	460	75.4
Covering your mouth	423	69.3
Vaccines	349	57.2
Avoiding crowded places when going outside	304	49.8
Quarantine of persons exposed to an infected person	286	46.9
Isolating a person with symptoms	273	44.8
Bathing with salt water	31	5.1
Who should practice preventive measures		
Everybody	591	96.9
Health workers only	6	1.0
Youth only	4	0.7
Elderly only	6	1.0
Pregnant women only	3	0.5

[$] = multiple response question

Most (99.7%) of the respondents knew that COVID-19 was transmitted via contact with fluid and droplets from an infected person. Four hundred and ninety (80.3%) of the respondents

considered the elderly to be most at a risk of being infected with COVID-19. Social/physical distancing was the most recorded response for prevention/mitigation measures for COVID-19 (83.9%). Worthy of note was that 31 (5.1%) of the respondents included bathing with salt water as a measure of prevention/mitigation. Almost all (96.9%) the respondents thought that prevention should be practiced by everybody.

TABLE 2c: RESPONDENTS' KNOWLEDGE OF COVID-19

Variable	Frequency (n = 610)	Percent
Effective treatment for COVID-19		
Yes	344	56.4
No	266	43.6
If yes, which (n = 344) [$]		
Hydroxychloroquine	162	47.1
Antiviral drugs	70	20.3
Ivermectin	41	11.9
Antibiotics	31	9.0
Herbs	16	4.7
Use of garlic	3	0.9
Ginger	2	0.6
Vaccine	1	0.3
None of the above	18	5.2
Overall knowledge of COVID-19		
Good	358	58.7
Poor	252	41.3

[$] = multiple response question

Three hundred and forty-four (56.4%) of the respondents felt that there was an effective treatment for COVID-19. Commonest suggested method of treating COVID-19 was hydroxychloroquine according to 162 (47.1%) respondents. Only 1 (0.3%) respondent considered the vaccine a means of treatment. Out of the respondents who thought there was an effective treatment, 18 (47.1%) of them did not choose a drug from the listed options. Overall, 358 (58.7%) of the respondents have good knowledge of COVID-19 while 252 (41.3%) have poor knowledge of COVID-19.

TABLE 3: RESPONDENTS' KNOWLEDGE OF COVID-19 VACCINES

Variable	Frequency	Percent
Heard of COVID-19 vaccine (n = 610)		
Yes	604	99.0
No	6	1.0
Source of information[$](n = 604)		
Television	446	73.8
Radio	284	47.0
Newspaper	261	43.2
Internet	397	65.7
Social media	352	58.3
Family	231	38.2
Friends	212	35.1
Health professional	260	43.0
Church	96	15.9
Types of COVID-19 vaccines[$] (n = 604)		
Pfizer	317	52.5
Moderna	280	46.4
AstraZeneca	274	45.4
Johnsons and Johnsons	192	31.8
Sputnik V	42	7.0
None of the above	127	21.0
Importance of COVID-19 vaccine (n = 604)		
To reduce the spread of the disease	326	54.0
To reduce the severity of the disease	205	33.9
To cure the disease	39	6.5
To prevent other respiratory diseases	32	5.3
I don't know	8	1.3
Side effects of COVID-19 vaccine[$] (n = 604)		
Fever	431	71.4
Headache	405	67.1
Muscle pain	325	53.8
Paralysis	77	12.7
Microchip implant	9	1.5
Asthma	3	0.5
Overall knowledge of COVID-19 vaccine (n = 610)		
Good knowledge	233	38.2
Poor knowledge	377	61.8

[$] = multiple response question

Six hundred and four (99.0%) of the respondents had heard of the COVID-19 vaccine and the television was the commonest source of information about the vaccine according to 446

(73.8%) respondents. The Pfizer vaccine was the most recognized by 317 (52.5%) respondents to be available in Nigeria. Up to 20% (127) of the respondents did not know the name of the vaccines in the country. More than half of the respondents felt that the importance of the vaccine was to reduce the spread of the disease. Most of the respondents were of the opinion that fever (71.4%), headache (67.1%) and muscle pain (53.8%) were side effects of taking the COVID-19 vaccine. Overall, 233 (38.2%) of the respondents have good knowledge of COVID-19 vaccine while 377 (61.8%) have poor knowledge of COVID-19 vaccine.

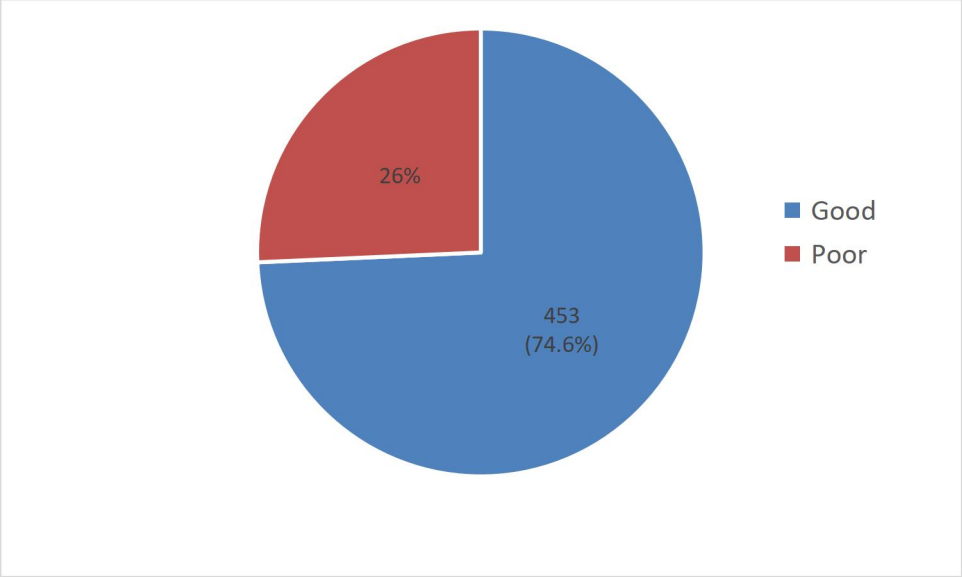


FIGURE 1: OVERALL KNOWLEDGE OF COVID-19 AMONG RESPONDENTS

The result shows that 453 (74.3%) of the respondents had good knowledge of COVID-19 and 157 (25.7%) had a poor knowledge of COVID-19.

TABLE 4a: ASSOCIATION BETWEEN OVERALL KNOWLEDGE OF COVID-19 AND SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Variable	Knowledge of COVID-19		Test statistic	p-value
	Good knowledge (n = 453) Freq(%)	Poor knowledge (n = 157) Freq(%)		
Age group (years)				
18 – 24	190 (88.8)	24 (11.2)	121.483[a]	<0.001*
25 – 34	144 (91.1)	14 (8.9)		
35 – 44	36 (47.4)	40 (52.6)		
45 – 54	46 (48.9)	48 (51.1)		
55 – 65	37 (54.4)	31 (45.6)		
Sex				
Male	247 (75.3)	81 (24.7)	0.403[a]	0.577
Female	206 (73.0)	76 (27.0)		
Marital status				
Single	326 (88.8)	41 (11.2)	103.087[a]	<0.001*
Married	123 (52.8)	110 (47.2)		
Divorced	4 (40.0)	6 (60.0)		
Family type				
Monogamous	409 (78.4)	113 (21.6)	31.671[a]	<0.001*
Polygamous	44 (50.0)	44 (50.0)		
Household size				
1 – 5	225 (69.2)	100 (30.8)	9.214[a]	0.003*
6 – 10	228 (80.0)	57 (20.0)		
Religion				
Christianity	397 (74.5)	136 (25.5)	0.847[b]	1.000
Islam	53 (71.6)	21 (28.4)		
Traditional religion	3 (100.0)	0 (0.0)		
Level of Education				
No formal education	4 (28.6)	10 (71.4)	47.024[b]	<0.001*
Primary	5 (29.4)	12 (70.6)		
Secondary	118 (65.6)	62 (34.4)		
Tertiary	326 (81.7)	73 (18.3)		
Employment status				
Employed	172 (62.1)	105 (37.9)	39.309[a]	<0.001*
Unemployed	281 (84.4)	52 (15.6)		

***= statistically significant**

[a] = Chi-square (χ^2)

[b] = Fisher's Exact test

TABLE 4b: ASSOCIATION BETWEEN KNOWLEDGE OF COVID-19 AND COVID-19 VACCINE AND SOCIO-DEMOGRAPHIC CHARACTERSTICS OF RESPONDENTS

Variable	Knowledge of COVID-19		Test statistic	p-value
	Good knowledge (n = 453) Freq(%)	Poor knowledge (n = 157) Freq(%)		
Skill level				
Skill level 0	282 (84.7)	51 (15.3)	57.985[a]	<0.001*
Skill level 1	5 (25.0)	15 (75.0)		
Skill level 2	85 (62.5)	51 (37.5)		
Skill level 3	33 (70.2)	14 (29.8)		
Skill level 4	48 (64.9)	26 (35.1)		
Average monthly income				
< ₦30,0000	9 (45.0)	11 (55.0)	2.931[a]	0.240
₦30,000 – 100,000	96 (61.5)	60 (38.5)		
> ₦100,000	66 (65.3)	35 (34.7)		
Perception of current health status				
Excellent	205 (87.2)	30 (12.8)	76.625[a]	<0.001*
Good	205 (75.1)	68 (24.9)		
Fair	38 (46.3)	44 (53.7)		
Poor	5 (25.0)	15 (75.0)		

***= statistically significant**
[a] = Chi-square (χ^2)
[b] = Fisher's Exact test

The results showed that the age group 35 - 44 years accounted for the majority 144 (91.1%) of respondents with good knowledge of COVID-19 and COVID-19 vaccine. The relationship between age and knowledge of COVID-19 and COVID-19 vaccine was found to be statistically significant (p = <0.001). Male respondents had a higher proportion 247 (75.3%) of respondents with good knowledge of COVID-19 and COVID-19 vaccine than the Female respondents 206 (73.0%) and this was found not to be statistically significant (p = 0.577). Respondents who were single had the highest proportion 326 (88.8%) of those with good knowledge COVID-19 and COVID-19 vaccine and this was found to be statistically significant (p = <0.001). Respondents from a Monogamous family 409 (78.4%) had a higher proportion of them with good knowledge of COVID-19 and COVID-19 vaccine than those

from Polygamous families 44 (50.0%) and this was found to be statistically significant (p = <0.001). Respondents from a Household with 6 – 10 individuals had a higher proportion 228 (80.0%) of them with good knowledge of COVID-19 and COVID-19 vaccine than those with 1 – 5 individuals 225 (69.2%) and the relationship between respondent's knowledge and household size was found to be statistically significant (p = 0.003).

Respondents who were Christians had the highest proportion 397 (74.5%) of those with good knowledge of COVID-19 and COVID-19 vaccine and the relationship between respondent's knowledge and their religion was found to not be statistically significant (p = 1.000). Good knowledge of COVID-19 and COVID-19 vaccine increased from 4 (28.6%) among those with No formal education to 326 (81.7%) among those with Tertiary education and the relationship between respondent's knowledge and their level of education was found to be statistically significant (p = <0.001). Respondents who were unemployed had a higher proportion of them 281 (84.4%) with good knowledge of COVID-19 and COVID-19 vaccine than those who were employed 172 (62.1%) and this was found to be statistically significant (p = <0.001). Respondents who had Skill level 0 had the highest proportion of respondents 282 (84.7%) with good knowledge of COVID-19 and COVID-19 vaccine and the relationship between respondent's skill level and their knowledge was found to be statistically significant (p = <0.001). Respondents who earned >100,000 naira monthly had the highest proportion of respondents 66 (65.3%) with good knowledge of COVID-19 and COVID-19 vaccine and the relationship between respondent's average monthly income and their knowledge was not statistically significant (p = 0.240). Respondents who considered their current health status to be excellent had the highest proportion of respondents 205 (87.2%) with good knowledge of COVID-19 and COVID-19 vaccine and the relationship between respondent's perception of their current health status and their knowledge was found to be statistically significant (p = <0.001

TABLE 5: DETERMINANTS OF KNOWLEDGE OF COVID-19 AND COVID-19 VACCINE AMONG RESPONDENTS

Factors	B (regression co-efficient)	Odds ratio	95% CI for OR		p-value
			Lower	Upper	
Age	0.010	1.010	0.980	1.041	0.509
Sex					
Male	0.102	1.108	0.702	1.747	0.660
Female**		1			
Marital status					
Single	-1.607	0.200	0.031	1.317	0.094
Married	-0.797	0.451	0.088	2.303	0.338
Divorced**		1			
Family type					
Monogamous	-1.566	0.209	0.109	0.402	<0.001*
Polygamous**		1			
Household size	-0.162	0.851	0.730	0.991	0.037*
Religion					
Christianity	1.461	4.312	1.907	9.748	<0.001*
Islam/ATR**		1			
Level of Education					
No formal education**		1			
Primary	0.673	1.960	1.165	3.296	0.011*
Secondary	1.834	6.258	1.684	23.252	0.006*
Tertiary	2.254	9.524	2.316	39.169	0.002*
Skill level					
Skill level 0**		1			
Skill level 1,2	-0.470	0.625	0.291	1.343	0.229
Skill level 3,4	-0.015	0.985	0.542	1.851	0.962
Household income					
< ₦30,0000	1.522	4.580	1.421	14.767	0.011*
₦30,000 – 100,000	0.214	1.239	0.629	2.438	0.536
> ₦100,000**		1			
Perception of current health status					
Excellent	-1.971	0.139	0.039	0.492	0.002*
Good	-1.292	0.275	0.083	0.905	0.034*
Fair	-0.655	0.519	0.148	1.817	0.305
Poor**		1			

***= statistically significant;**
R^2 = 26.7 – 39.3
**** = Reference category**
CI = Confidence interval
OR = Odds ratio

From the results, it was found that knowledge increased with increasing age but this was not statistically significant (OR = 1.010, p = 0.509). Male respondents were more likely than the female respondents to have good knowledge of COVID-19 and COVID-19 vaccine but this was found to be statistically insignificant (OR = 1.108, p = 0.660). Respondents who were Single or Married were less likely than their divorced counterparts to have good knowledge of COVID-19 and COVID-19 vaccine but these were not statistically significant (OR = 0.200, p = 0.094, OR = 0.451, p = 0.338 respectively). Individuals in monogamous marriages were less likely to have good knowledge and this was found to be statistically significant (OR = 0.209, p = < 0.001). Knowledge of COVID-19 and COVID-19 vaccine was found to be less with increasing number of individuals in the household and this was statistically significant (OR = 0.851, p = 0.037). Christian were more likely than non-Christians to have good knowledge, and this was also statistically significant (OR = 4.312, p = < 0.001). Level of education was found to be a statistically significant determinant of knowledge. Respondents with Tertiary, Secondary and Primary level of education were more likely to have good knowledge of COVID-19 and COVID-19 vaccine than those with no formal (OR = 9.524, p = < 0.002; OR = 6.256, p = 0.006; OR = 1.960, p = 0.011 respectively). Respondents in Skill level 1/2 and Skill level 3/4 were less likely than those with Skill level 0 to have good knowledge of COVID-19 and COVID-19 vaccine (OR = 0.625, p = 0.229 and OR = 0.985, p = 0.962). Respondents who earned less than 30,000 naira and those who earned between 30,000 and 100,000 naira were more likely to have good knowledge of COVID-19 and COVID-19 vaccine than those who earned more than 100,000 naira monthly and this was statistically significant (OR = 4.580, p = 0.011 and OR = 1.239, p = 0.539).

SECTION C

PERCEPTION OF RISK OF COVID-19 AMONG RESPONDENTS

TABLE 6: RESPONDENTS' PERCEPTION OF RISK OF COVID-19

Variable	Agree Freq(%)	Undecided Freq(%)	Disagree Freq(%)
PERCEIVED SUSCEPTIBILITY			
My job puts me at a high risk of getting COVID-19	200 (32.8)	101 (16.6)	309 (50.7)
I am at high risk of catching the COVID-19 virus	197 (32.3)	132 (21.6)	281 (46.1)
I worry a lot about getting COVID-19 infection	177 (29.0)	92 (15.1)	341 (55.9)
My physical health makes it more likely that I will get COVID-19	104 (17.0)	95 (15.6)	411 (67.4)
I think I would get COVID-19 infection within the next year	102 (16.7)	94 (15.4)	414 (67.9)
PERCEIVED SEVERITY			
COVID-19 is a very serious disease	433 (71.0)	104 (17.0)	73 (12.0)
My health will be seriously affected if I contract the COVID-19 virus	309 (50.7)	133 (21.8)	168 (27.5)
I will be greatly affected economically if I contract the COVID-19 virus	297 (48.7)	150 (24.6)	163 (26.7)
If I do contract the virus, I will likely transmit it to others	289 (47.4)	131 (21.5)	190 (31.1)
If I do contract the virus, I will likely have severe illness	251 (41.1)	161 (26.4)	198 (32.5)
The thought of COVID-19 scares me	211 (34.6)	104 (17.0)	295 (48.4)

n = 610

Two hundred and forty-four (46.1%) of the respondents disagree with the idea that they are at high risk of contracting COVID-19. Three hundred and forty-one (55.9%) of the respondents feel they do not need to worry about getting infected with COVID-19. Most of the respondents 414 (67.9%) do not think they would get infected with COVID-19 within the next 1 year. Most (67.4%) do no agree that their physical health makes them more likely of getting infected and more than half (50.7%) do not think that their jobs put them at risk of getting COVID-19. Two hundred and ninety-five (48.4%) of the respondents disagree with the idea that the thought of COVID-19 scares them. Most of the respondents (71.0%) agree that COVID-19 is a very serious disease but only 251 (41.1%) agree that they will have a serious illness if infected. Three hundred and nine of the respondents agree that their health

will be seriously affected if they contract COVID-19 and as much as 190 (31.1%) do not think they transmit the disease to others if infected.

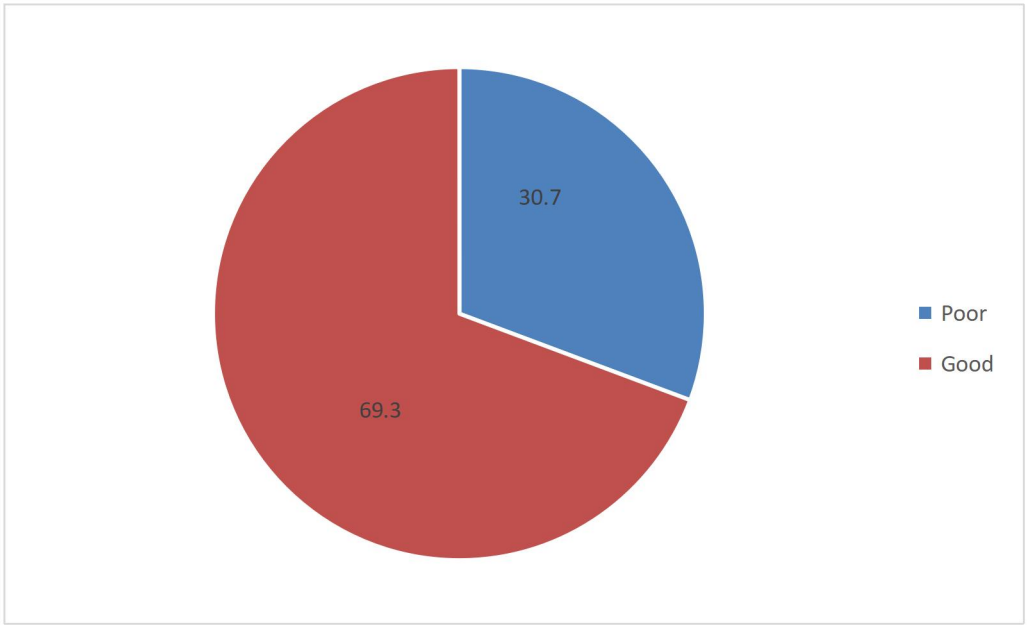


FIGURE 2: PERCEPTION OF RISK OF COVID-19 AMONG RESPONDENTS

One hundred and eighty-seven (30.7%) of the respondents had good perception of COVID-19 while 423 (69.3%) of the respondents had poor perception of risk of COVID-19.

TABLE 7: ASSOCIATION BETWEEN PERCEPTION OF RISK OF COVID-19 AND SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Variable	Perception of Risk		Test statistic	p-value
	Good (n = 187) Freq(%)	Poor (n = 423) Freq(%)		
Age group (years)				
18 – 24	52 (24.3)	162 (75.7)	33.269[a]	<0.001*
25 – 34	31 (19.6)	127 (80.4)		
35 – 44	31 (40.8)	45 (59.2)		
45 – 54	40 (42.6)	54 (57.4)		
55 – 65	33 (48.5)	35 (51.5)		
Sex				
Male	99 (30.2)	229 (69.8)	0.075[a]	0.792
Female	88 (31.2)	194 (68.8)		
Marital status				
Single	85 (23.2)	282 (76.8)	28.198[a]	<0.001*
Married	95 (40.8)	138 (59.2)		
Divorced	7 (70.0)	3 (30.0)		
Family type				
Monogamous	160 (30.7)	362 (69.3)	<0.001[a]	1.000
Polygamous	27 (30.7)	61 (69.3)		
Household size				
1 – 5	114 (35.1)	211 (64.9)	6.396[a]	0.014*
6 – 10	73 (25.6)	212 (74.4)		
Religion				
Christian	154 (28.9)	379 (71.1)	8.055[b]	0.011*
Islam	33 (44.6)	41 (55.4)		
Traditional religion	0 (0.0)	3 (100.0)		
Level of Education				
No formal education	6 (42.9)	8 (57.1)	7.845[a]	0.047*
Primary	10 (58.8)	7 (41.2)		
Secondary	51 (28.3)	129 (71.7)		
Tertiary	120 (30.1)	279 (69.9)		
Employment status				
Employed	109 (39.4)	168 (60.6)	18.044	<0.001*
Unemployed	78 (23.4)	255 (76.6)		

***= statistically significant**

[a] = Chi-square (χ^2)

[b] = Fisher's Exact test

TABLE 7b: ASSOCIATION BETWEEN PERCEPTION OF RISK OF COVID-19 AND SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Variable	Perception of Risk		Test statistic	p-value
	Good (n = 187) Freq(%)	Poor (n = 423) Freq(%)		
Skill level				
Skill level 0	79 (23.7)	254 (76.3)	24.852[a]	<0.001*
Skill level 1	13 (65.0)	7 (35.0)		
Skill level 2	52 (38.2)	84 (61.8)		
Skill level 3	14 (29.8)	33 (70.2)		
Skill level 4	29 (39.2)	45 (60.8)		
Average monthly income				
< ₦30,000	10 (50.0)	10 (50.0)	1.115[a]	0.577
₦30,000 – ₦100,000	59 (37.8)	97 (62.2)		
> ₦100,000	39 (38.6)	62 (61.4)		
Perception of current health status				
Excellent	52 (22.1)	183 (77.9)	39.294[a]	<0.001*
Good	79 (28.9)	194 (71.1)		
Fair	42 (51.2)	40 (48.8)		
Poor	14 (70.0)	6 (30.0)		

***= statistically significant**
[a] = Chi-square (χ^2)
[b] = Fisher's Exact test

The results showed that the age group 55 - 65 years accounted for the majority 33 (48.5%) of respondents with good perception of risk of COVID-19 and the relationship between age and perception of risk of COVID-19 was found to be statistically significant (p = <0.001). Female respondents had a higher proportion 88 (31.2%) of respondents with good perception of risk of COVID-19 than the Male respondents 99 (30.2%) and this was found not to be statistically significant (p = 0.792). Respondents who were divorced had the highest proportion 7 (70.0%) of those with good perception of risk of COVID-19 and relationship between marital status of respondents and their perception of risk of COVID-19 was statistically significant (p = <0.001). There was an equal proportion of respondents from a Monogamous family 160

(30.7%) and those from a Polygamous family 27 (30.7%) who had good perception of risk of COVID-19 and this was not statistically significant (p = 1.000). Respondents from a Household with 1 – 5 individuals 114 (35.1%) had a higher proportion of those with good perception of risk of COVID-19 and the relationship between respondent's perception of risk of COVID-19 and household size was found to be statistically significant (p = 0.014).

Respondents who were Muslim had the highest proportion 33 (44.6%) of those with good perception of risk of COVID-19 and the relationship between respondent's perception of risk of COVID-19 and their religion was found to be statistically significant (p = 0.011). Respondents who had Primary level of education 10 (58.8%) had the highest proportion of those with good perception of risk of COVID-19 respondent's perception of risk of COVID-19 and their level of education was found to be statistically significant (p = 0.047). Respondents who were Employed had a higher proportion of them 109 (39.4%) with good perception of risk of COVID-19 than those who were unemployed 78 (23.4%) and this was found to be statistically significant (p = <0.001). Respondents who had Skill level 1 had the highest proportion of respondents 13 (65.0%) with good perception of risk of COVID-19 and the relationship between respondent's skill level and their perception of risk of COVID-19 was found to be statistically significant (p = <0.001). Respondents who earned <30,000 naira monthly had the highest proportion of respondents 10 (50.0%) with good perception of risk of COVID-19 and the relationship between respondent's average monthly income and their perception of risk of COVID-19 was not statistically significant (p = 0.577). Respondents who considered their current health status to be Poor had the highest proportion of respondents 14 (70.0%) with good perception of risk of COVID-19 and the relationship between respondent's perception of their current health status and their perception of risk of COVID-19 was found to be statistically significant (p = <0.001).

TABLE 8: ASSOCIATION BETWEEN PERCEPTION OF RISK OF COVID-19 AND RESPONDENTS KNOWLEDGE OF COVID-19 AND COVID-19 VACCINE

Variable	Perception of risk		Test Statistic	p-value
	Good (n = 187) Freq(%)	Poor (n = 423) Freq(%)		
Knowledge of COVID-19				
Good	49 (21.0)	184 (79.0)	16.432[a]	<0.001*
Poor	138 (36.3)	239 (63.4)		

***= statistically significant**
[a] = Chi-square (χ^2)
[b] = Fisher's Exact test

The result shows that among those with good knowledge of COVID-19 and COVID-19 vaccine, a higher proportion 184 (79.0%) of them had poor perception of risk of COVID-19 while those with poor knowledge of COVID-19 and COVID-19 vaccine had a higher proportion of those with good perception of risk of COVID-19. The result also shows that there is a statistically significant relationship between knowledge of COVID-19 and perception of risk of COVID-19 (p = <0.001).

TABLE 9: DETERMINANTS OF PERCEPTION OF RISK OF COVID-19 AMONG RESPONDENTS

Factors	B (regression co-efficient)	Odds ratio	95% CI for OR		p-value
			Lower	Upper	
Age	0.010	0.990	0.956	1.025	0.567
Sex					
Male	-0.124	0.883	0.509	1.532	0.659
Female**		1			
Marital status					
Single	1.993	7.339	0.581	92.701	0.123
Married	2.446	11.541	1.090	122.175	0.042
Divorced**		1			
Family type					
Monogamous	-0.152	0.733	0.358	2.062	0.733
Polygamous**		1			
Household size	0.247	1.280	1.048	1.564	0.015
Religion					
Christianity	-0.070	0.932	0.401	2.165	0.870
Islam/ATR**		1			
Level of Education					
No formal/ Primary	-0.278	0.758	0.200	2.875	0.683
Secondary	0.229	1.258	0.627	2.524	0.870
Tertiary		1			
Skill level					
Skill level 0**	-0.501	0.112	0.327	1.124	0.519
Skill level 1,2	-0.198	0.820	0.499	1.347	0.433
Skill level 3,4		1			
Household income					
< ₦30,000	-0.994	0.370	0.116	1.182	0.093
₦30,000 – ₦100,000	0.143	1.154	0.596	2.236	0.671
> ₦100,000**		1			
Perception of current health status					
Excellent	2.370	10.699	2.460	46.535	0.002*
Good	1.352	3.864	0.996	14.994	0.051
Fair	-0.066	1.575	0.392	6.328	0.522
Poor**		1			
Knowledge of COVID-19 vaccine	-0.066	0.937	0.502	1.746	0.837

***= statistically significant;**
R^2 = 26.7 – 39.3
**** = Reference category**
CI = Confidence interval
OR = Odds ratio

The results showed that male respondents had a lower perception of risk than females (OR = 0.883, p = 0.659). Respondents who were single or married were more likely than divorced respondents to have a high perception of risk of COVID-19 but this was not statistically significant (OR = 7.339, p = 0.123). Respondents in monogamous families were less likely to have good perception of risk of COVID-19 and this was statistically insignificant (OR = 0.733, p = 0.733). Christian respondents were less likely to have a good perception of risk of COVID-19 and this was not statistically significant (OR = -0.070, p = 0.870). Respondents with tertiary level of education were more likely to have a better perception of risk of COVID-19 than respondents with lower level of education and this was not statistically significant (OR = -0.278, p = 0.683). Respondents with lower skill level had a lower risk of perception of COVID-19 and this was statistically insignificant (OR = 0.112, p = 0.519). Perception of current health status was statistically significant (p = 0.002) as respondents with excellent health status were more likely to have a better perception of risk of COVID-19.

SECTION D

PERCEPTION OF COVID-19 VACCINE AMONG RESPONDENTS

TABLE 10: RESPONDENTS' PERCEPTION OF COVID-19 VACCINE

Variable	Agree Freq(%)	Undecided Freq(%)	Disagree Freq(%)
PERCEIVED BENEFITS			
Vaccination decrease my chances of getting the COVID-19 or its complications	403 (66.1)	121 (19.8)	86 (14.1)
Vaccination is a good idea because it makes me less worried about getting the COVID-19 vaccine	384 (63.0)	142 (23.3)	84 (13.8)
Getting the vaccine will protect me and others around me	379 (62.1)	157 (25.7)	74 (12.1)
It is safe to take the COVID-19 vaccine	341 (55.9)	200 (32.8)	69 (11.3)
COVID-19 vaccine is effective and likely to work for everybody	285 (46.7)	213 (34.9)	112 (18.4)
PERCEIVED BARRIERS			
I am not sure of the effectiveness of the vaccine	286 (46.9)	185 (30.3)	139 (22.8)
The speed with which the vaccines were developed makes me doubt their safety	259 (42.5)	193 (31.6)	158 (25.9)
I am afraid of the side effects of COVID-19 vaccine	249 (40.8)	156 (25.6)	205 (33.6)
The vaccine center is far from where I live	147 (24.1)	138 (22.6)	325 (53.3)
I think COVID-19 is merely a political issue	117 (19.2)	192 (31.5)	301 (49.3)
I do not believe COVID-19 exists	63 (10.3)	109 (17.9)	438 (71.8)
CUES TO ACTION			
If I get exposed to someone with COVID-19, I will take the vaccine	285 (46.7)	164 (26.9)	161 (26.4)
If family or close friends get infected with the virus, I will take it	284 (46.6)	161 (26.4)	165 (27.0)
I will accept to take the vaccine if the government makes it compulsory	280 (45.9)	160 (26.2)	170 (27.9)
I will take the vaccine if my religious leader recommends it	202 (33.1)	172 (28.2)	236 (38.7)

The result shows that 403 (66.1%) respondents agree that vaccination decrease their chance of getting COVID-19. Three hundred and forty-one (55.9%) respondents agree that it is safe to take the COVID-19 vaccine. A higher proportion of the respondents, 379 (62.1%) agree that getting the vaccine will protect them and others around them. Almost half (46.9%) of the respondents are not sure of the effectiveness of the vaccine. Some of the respondents, 259 (46.7%) doubt the safety of the vaccine because of the speed with which it was developed. Sixty-three respondents (10.3%) believe that COVID-19 does not exist and 241 (40.8%) are

afraid of side effects. Two hundred and eighty-five (46.7%) respondents will take the vaccine if exposed and 280 (45.9%) will accept the vaccine if the government make it compulsory. Two hundred and eighty-four (46.6%) will take the vaccine if family or close friends get infected with COVID-19.

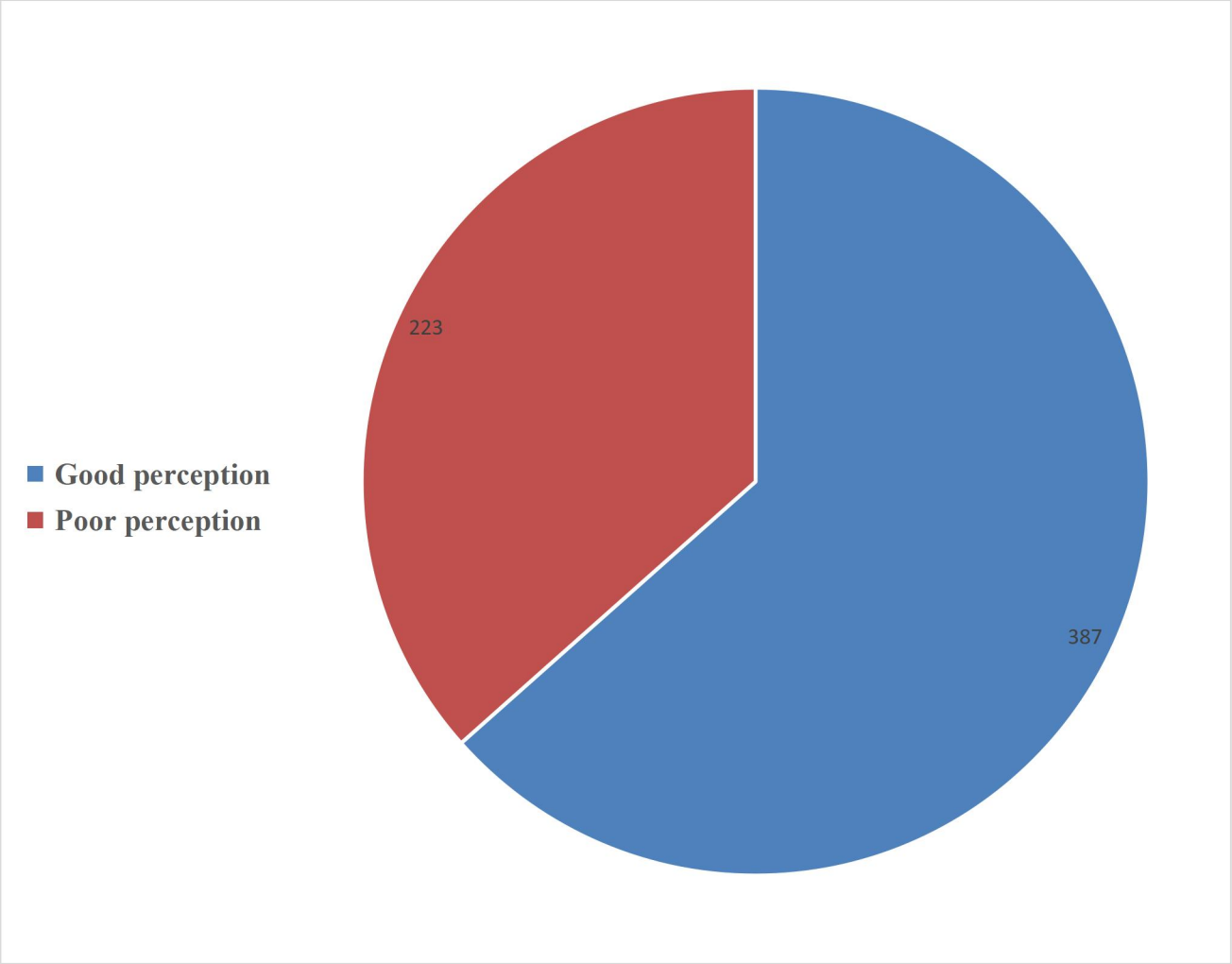


FIGURE 3: PERCEPTION OF COVID-19 VACCINE AMONG RESPONDENTS

Three hundred and eighty-seven (63.4%) of the respondents had good perception of COVID-19 vaccine while 223 (36.6%) of the respondents had poor perception of COVID-19 vaccine.

TABLE 11a: ASSOCIATION BETWEEN PERCEPTION OF COVID-19 VACCINE AND SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Variable	Perception of COVID-19 vaccine		Test statistic	p-value
	Good (n = 387) Freq(%)	Poor (n = 223) Freq(%)		
Age group (years)				
18 – 24	144 (67.3)	70 (32.7)	16.359[a]	0.002
25 – 34	113 (71.5)	45 (28.5)		
35 – 44	36 (47.4)	40 (42.6)		
45 – 54	54 (57.4)	40 (42.6)		
55 – 65	40 (58.8)	28 (41.2)		
Sex				
Male	217 (66.2)	111 (33.8)	2.256[a]	0.152
Female	170 (60.3)	112 (39.7)		
Marital status				
Single	253 (68.9)	114 (31.1)	12.985[a]	0.001*
Married	127 (54.5)	106 (45.5)		
Divorced	7 (70.0)	3 (30.0)		
Family type				
Monogamous	333 (63.8)	189 (36.2)	0.192[a]	0.720
Polygamous	54 (61.4)	34 (38.6)		
Household size				
1 – 5	205 (63.1)	120 (36.9)	0.040[a]	0.866
6 – 10	182 (63.9)	103 (36.1)		
Religion				
Christian	341 (64.0)	192 (36.0)	1.576[b]	0.444
Muslim	45 (60.8)	29 (39.2)		
Traditional religion	1 (33.3)	2 (66.7)		
Level of Education				
No formal education	10 (71.4)	4 (28.6)	11.069[a]	0.010*
Primary	5 (29.4)	12 (70.6)		
Secondary	108 (60.0)	72 (40.0)		
Tertiary	264 (66.2)	135 (33.8)		
Employment status				
Employed	166 (59.9)	111 (40.1)	2.703[a]	0.109
Unemployed	221 (66.4)	112 (33.6)		

***= statistically significant**

[a] = Chi-square (χ^2)

[b] = Fisher's Exact test

TABLE 11b: ASSOCIATION BETWEEN PERCEPTION OF COVID-19 VACCINE AND SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Variable	Perception of COVID-19 vaccine		Test statistic	p-value
	Good (n = 387) Freq(%)	Poor (n = 223) Freq(%)		
Skill level				
Skill level 0	220 (66.1)	113 (33.9)	4.734[a]	0.317
Skill level 1	11 (55.0)	9 (45.0)		
Skill level 2	80 (58.8)	56 (41.2)		
Skill level 3	26 (55.3)	21 (44.7)		
Skill level 4	50 (67.6)	24 (32.4)		
Average monthly income				
< ₦30,000	11 (55.0)	9 (45.0)	5.400[a]	0.072
₦30,000 – ₦100,000	86 (55.1)	70 (44.9)		
> ₦100,000	70 (69.3)	31 (30.7)		
Perception of current health status				
Excellent	163 (69.4)	72 (30.6)	6.778[a]	0.079
Good	166 (60.8)	107 (39.2)		
Fair	48 (58.5)	34 (41.5)		
Poor	10 (50.0)	10 (50.0)		

***= statistically significant**
[a] = Chi-square (χ^2)
[b] = Fisher's Exact test

The results showed that the age group 18 - 24 years had the highest 144 (67.3%) of respondents with good perception of COVID-19 vaccine and the relationship between age and perception of COVID-19 vaccine was found to be statistically significant (p = 0.002). Male respondents had a higher proportion 217 (66.2%) of respondents with good perception of COVID-19 vaccine and this was found not to be statistically significant (p = 0.152). Respondents who were Divorced had the highest proportion 7 (70.0%) of those with good perception of COVID-19 vaccine and the relationship between marital status of respondents and their perception of COVID-19 vaccine was statistically significant (p = 0.001). There was a higher proportion of respondents in a Monogamous marriage 333 (63.8%) and the relationship between respondent's marriage type and their perception of COVID-19 vaccine

was not statistically significant (p = 0.720). Respondents from a Household with 6 – 10 individuals 182 (63.9%) had a higher proportion of those with good perception of COVID-19 vaccine and the relationship between respondent's perception of COVID-19 vaccine and household size was not statistically significant (p = 0.866).

Respondents who were Christian had the highest proportion 33 (44.6%) of those with good perception of COVID-19 vaccine and the relationship between respondent's perception of COVID-19 vaccine and their religion was not statistically significant (p = 0.444). Respondents who had No formal education 10 (71.4%) had the highest proportion of those with good perception of COVID-19 vaccine respondent's perception of COVID-19 vaccine and their level of education as found to be statistically significant (p = 0.010). Respondents who were Unemployed had a higher proportion of them 221 (66.4%) with good perception of COVID-19 vaccine and the relationship between respondent's perception of COVID-19 vaccine was not statistically significant (p = 0.109). Respondents who had Skill level 4 had the highest proportion of respondents 50 (67.6%) with good perception of COVID-19 vaccine and the relationship between respondent's skill level and their perception of COVID-19 vaccine was not statistically significant (p = 0.317). Respondents who earned >100,000 naira monthly had the highest proportion of respondents 70 (69.8%) with good perception of COVID-19 vaccine and the relationship between respondent's average monthly income and their perception of COVID-19 vaccine was not statistically significant (p = 0.072). Respondents who considered their current health status to be Excellent had the highest proportion of respondents 163 (69.4%) with good perception of COVID-19 vaccine and the relationship between respondent's perception of their current health status and their perception of COVID-19 vaccine was not statistically significant (p = 0.709).

TABLE 12: ASSOCIATION BETWEEN PERCEPTION OF COVID-19 VACCINE AND RESPONDENTS KNOWLEDGE OF COVID-19 AND COVID-19 VACCINE

Variable	Perception of COVID-19 vaccine		Test Statistic	p-value
	Good (n = 387) Freq(%)	Poor (n = 223) Freq(%)		
Knowledge of COVID-19				
Good	310 (68.4)	143 (31.6)	18.897[a]	<0.001*
Poor	77 (49.0)	80 (51.0)		
Perception of risk of COVID-19				
Good	124 (66.3)	63 (33.7)	0.956[a]	0.362
Poor	263 (62.2)	160 (37.8)		

The result shows that a higher proportion of respondents with a good knowledge of COVID-19 and COVID-19 vaccine 310 (68.4%) had a good perception towards the COVID-19 vaccine. There was a statistically significant relationship between respondent's knowledge of COVID-19 and COVID-19 vaccine and their perception of COVID-19 vaccine (p = <0.001). The respondents with good perception of risk of COVID-19 had a higher proportion of them with a good perception of COVID-19 vaccine than those who had a poor perception 263 (62.2%). The relationship between respondent's perception of risk of COVID-19 and their perception of COVID-19 vaccine was not statistically significant (p = 0.362).

TABLE 13: DETERMINANTS OF PERCEPTION OF COVID-19 VACCINE AMONG RESPONDENTS

Factors	B (regression co-efficient)	Odds ratio	95% CI for OR		p-value
			Lower	Upper	
Age	0.009	1.009	0.975	1.044	0.622
Sex					
Male	-0.446	0.640	0.378	1.086	0.098
Female**		1			
Marital status					
Single	1.469	4.345	0.355	53.157	0.250
Married	1.512	4.536	0.460	44.725	0.195
Divorced**		1			
Family type					
Monogamous	0.317	1.373	0.584	3.227	0.467
Polygamous**		1			
Household size	-0.064	0.938	0.773	1.138	0.515
Religion					
Christianity	0.139	1.149	0.505	2.612	0.741
Islam/ATR**		1			
Level of Education					
No formal/ Primary	1.194	3.300	0.862	12.639	0.081
Secondary	0.316	1.372	0.708	2.656	0.349
Tertiary		1			
Skill level					
Skill level 0**	-0.163	0.850	0.468	1.124	1.541
Skill level 1,2	-0.198	0.820	0.499	1.347	0.433
Skill level 3,4		1			
Household income					
< ₦30,0000	0.706	2.027	0.666	6.169	0.214
₦30,000 – ₦100,000	0.445	1.561	0.826	2.952	0.171
> ₦100,000**		1			
Perception of current health status					
Excellent	-0.620	0.538	0.128	2.265	0.398*
Good	-0.102	0.903	0.235	3.463	0.881
Fair	-0.600	0.549	0136	2.208	0.398
Poor**		1			
Knowledge of COVID-19 vaccine	-0.353	0.702	0.383	1.288	0.253
Perception of risk of COVID-19	-0.525	0.592	0.335	1.046	0.071

***= statistically significant;**

R^2 = 9.3 – 12.6

**** = Reference category**

CI = Confidence interval

OR = Odds ratio

The results showed that male respondents were more likely to have a poorer perception of risk than females (OR = 0.640, p = 0.098). Respondents who were single or married were more likely than divorced respondents to have a better perception of risk of COVID-19 vaccine but this was not statistically significant (OR = 4.345, p = 0.250). Respondents in monogamous families were less likely to have good perception of risk of COVID-19 and this was statistically insignificant (OR = 1.373, p = 0.467). Christian respondents were less likely to have a good perception of risk of COVID-19 and this was not statistically significant (OR = 0.139, p = 0.741). Respondents with formal/primary level of education were more likely to have a better perception of COVID-19 vaccine than respondents with secondary level of education and this was not statistically significant (OR = 3.300, p = 0.081). Respondents with lower skill level were less likely to have lower risk of perception of COVID-19 vaccine and this was statistically insignificant (OR = 0.850, p = 1.541). Respondents who had an excellent perception of their health status were less likely to have a good perception of COVID-19 vaccine.

SECTION E

LEVEL OF UPTAKE OF COVID-19 VACCINE

TABLE 14: WILLINGNESS TO RECEIVE COVID-19 VACCINE

Variable	Frequency	Percent
Willingness to receive vaccine (n = 610)		
Yes	415	68.0
No	195	32.0
Reasons for unwillingness (n = 195)		
Afraid of side effects	61	31.3
Vaccine not safe	45	23.1
Health so do not need vaccine	33	16.9
Vaccine not effective	28	14.4
Vaccine is designed to harm	14	7.2
Not at risk already comply with other preventive measures	7	3.6
COVID-19 does not exist	4	2.1
Already had COVID-19 so I'm immune	3	1.5

A total of 415 (68%) respondents were willing to take up the COVID-19 vaccine if offered. The most cited reason for not being willing to take the vaccine was fear of side effects 61 (31.3%).

TABLE 15: LEVEL OF UPTAKE OF COVID-19 VACCINE

Variable	Frequency	Percent
Received COVID-19 vaccine (n = 610)		
Yes	249	40.8
No	361	59.2
Number of doses (n = 249)		
1	66	26.5
2	163	65.5
2 and booster	20	8.0

Two hundred and forty-nine (40.8%) of the respondents had taken the COVID-19 vaccine. Most of those who had taken the vaccine (65.5%) had taken 2 doses of the vaccine and a further 20 (8.0%) respondents had taken 2 doses and a booster dose of the vaccine.

TABLE 16: FACTORS ASSOCIATED WITH ACCEPTANCE OF COVID-19 VACCINE

Variable	Frequency	Percent
Will recommend vaccine to others (n = 610)		
Yes	295	48.4
No	197	32.3
I don't know	118	19.3
Know anyone that has taken vaccine (n = 610)		
Yes	478	78.4
No	132	21.6
If yes, any side effects (n = 478)		
Yes	326	68.2
No	89	18.6
I don't know	63	13.2
Side effects experienced (n = 326)		
Headache	260	79.8
Fever	252	77.3
Muscle pain	230	70.6
Dizziness	85	13.9
Paralysis	24	3.9
Vomiting	23	3.8
Close family tested positive (n = 610)		
Yes	87	14.3
No	523	85.7
Infected with COVID-19 (n = 610)		
Yes	53	8.7
No	557	91.3
Tested for COVID-19 (n = 610)		
Yes	196	32.1
No	414	67.9
Test result (n = 196)		
Positive	23	11.7
Negative	173	88.3

Most of the respondents 295 (48.4%) would recommend the vaccine to someone else although 118 (19.3%) were undecided about recommending the vaccine. Most (78.4%) knew someone who had taken the vaccine and most of these persons who had they knew had taken the vaccine (68.2%) had side effects after taking the vaccine. The most common side effects among acquaintances of the respondents who had taken the vaccine were headache 260(79.8%), fever 252 (77.3%) and muscle pain 230 (70.6%) while the last was vomiting 23 (3.8%). Eighty-seven (14.3%) of the respondents had a close family member who had tested

positive for COVID-19 at one time and 53 (8.7%) of the respondents felt that they had been infected. About a third of the respondents (32.1%) of the respondents had taken a COVID-19 test and 23 (11.7%) of them had tested positive.

TABLE 17a: ASSOCIATION BETWEEN SELECTED CHARACTERISTICS OF RESPONDENTS AND UPTAKE OF COVID-19 VACCINE

Variable	Uptake of COVID-19 vaccine		Test statistic	p-value
	Yes (n = 249) Freq(%)	No (n = 361) Freq(%)		
Age group (years)				
18 – 24	84 (39.3)	130 (60.7)	17.940[a]	0.001*
25 – 34	83 (52.5)	75 (47.5)		
35 – 44	19 (25.0)	57 (75.0)		
45 – 54	39 (41.5)	55 (58.5)		
55 – 65	24 (35.3)	44 (64.7)		
Sex				
Male	137 (41.8)	191 (58.2)	0.264[a]	0.621
Female	112 (39.7)	170 (60.3)		
Marital status				
Single	167 (45.5)	200 (54.5)	8.538[a]	0.011*
Married	78 (33.5)	155 (66.5)		
Divorced	4 (40.0)	6 (60.0)		
Family type				
Monogamous	225 (43.1)	297 (56.9)	7.812[a]	0.007*
Polygamous	24 (27.3)	64 (72.7)		
Household size				
1 – 5	139 (42.8)	186 (57.2)	1.094[a]	0.322
6 – 10	110 (38.6)	175 (61.4)		
Religion				
Christian	218 (40.9)	315 (59.1)	2.106[b]	0.400
Islam	31 (41.9)	43 (58.1)		
Traditional religion	0 (0.0)	3 (100.0)		
Level of Education				
No formal education	7 (50.0)	7 (50.0)	4.935[a]	0.176
Primary	3 (17.6)	14 (82.4)		
Secondary	70 (38.9)	110 (61.1)		
Tertiary	169 (42.4)	230 (57.6)		
Employment status				
Employed	106 (38.3)	171 (61.7)	1.369[a]	0.248
Unemployed	143 (42.9)	190 (57.1)		
Skill level				
Skill level 0	143 (42.9)	190 (57.1)	4.815[a]	0.308
Skill level 1	7 (35.0)	13 (65.0)		
Skill level 2	47 (34.6)	89 (65.4)		
Skill level 3	17 (36.2)	30 (63.8)		
Skill level 4	35 (47.3)	39 (52.7)		

***= statistically significant**

[a] = Chi-square (χ^2)

[b] = Fisher's Exact test

TABLE 17b: ASSOCIATION BETWEEN SELECTED CHARACTERISTICS OF RESPONDENTS AND UPTAKE OF COVID-19 VACCINE

Variable	Uptake of COVID-19 vaccine		Test statistic	p-value
	Yes (n = 249) Freq(%)	No (n = 361) Freq(%)		
Average monthly income				
< ₦30,000	6 (30.0)	14 (70.0)	2.867[a]	0.250
₦30,000 – ₦100,000	55 (35.3)	101 (64.7)		
> ₦100,000	45 (44.6)	56 (55.4)		
Perception of current health status				
Excellent	100 (42.6)	135 (57.4)	7.909[a]	0.047*
Good	120 (44.0)	153 (56.0)		
Fair	23 (28.0)	59 (72.0)		
Poor	6 (30.0)	14 (70.0)		
Knowledge of COVID-19				
Good	212 (46.8)	241 (53.2)	26.050[a]	<0.001*
Poor	37 (23.6)	120 (76.4)		
Perception of risk of COVID-19				
Good	73 (39.0)	114 (61.0)	0.355[a]	0.607
Poor	176 (41.6)	247 (58.4)		
Perception of COVID-19 vaccine				
Good	217 (56.1)	170 (43.9)	101.949[a]	<0.001*
Poor	32 (14.3)	191 (85.7)		
Willingness to take vaccine				
Yes	237 (57.1)	178 (42.9)	142.585[a]	<0.001*
No	12 (6.2)	183 (93.8)		
Know someone that has taken the vaccine				
Yes	230 (48.1)	248 (51.9)	48.695[a]	<0.001*
No	19 (14.4)	113 (85.6)		
Person had side effect(s)				
Yes	167 (51.2)	159 (48.8)	6.809[a]	0.033*
No	42 (47.2)	47 (52.8)		
I don't know	21 (33.3)	42 (66.7)		
Close family member tested positive				
Yes	55 (63.2)	32 (36.8)	21.074[a]	<0.001*
No	194 (37.1)	329 (62.9)		
Tested positive for COVID-19				
Yes	16 (69.6)	7 (30.4)	0.157	0.503
No	107 (61.8)	66 (38.2)		

***= statistically significant**

[a] = Chi-square (χ^2)

[b] = Fisher's Exact test

The results showed that the age group 25 - 34 years 83 (52.5%) had the highest proportion of respondents who had taken the COVID-19 vaccine and the relationship between age and uptake of COVID-19 vaccine was found to be statistically significant (p = 0.001). Male respondents had a higher proportion 137 (41.8%) of respondents who had taken the COVID-19 vaccine and this was found not to be statistically significant (p = 0.621). Respondents who were Single had the highest proportion 167 (45.5%) of those with who had taken the COVID-19 vaccine and the relationship between marital status of respondents and their uptake of COVID-19 vaccine was statistically significant (p = 0.011). There was a higher proportion of respondents in a Monogamous marriage 225 (43.1%) and the relationship between respondent's marriage type and their uptake of COVID-19 vaccine was statistically significant (p = 0.007). Respondents from a Household with 1 – 5 individuals 139 (42.8%) had a higher proportion of those who had taken the COVID-19 vaccine and the relationship between respondent's uptake of COVID-19 vaccine and household size was not statistically significant (p = 0.322).

Respondents who were Muslim had the a slightly higher proportion 31 (41.9%) of those who had taken the COVID-19 vaccine and the relationship between respondent's uptake of COVID-19 vaccine and their religion was not statistically significant (p = 0.400). Respondents who had No formal education 7 (50.0%) had the highest proportion of those who had taken the COVID-19 vaccine and the relationship between respondent's perception of COVID-19 vaccine and their level of education was not statistically significant (p = 0.176). Respondents who were Unemployed had a higher proportion of them 143 (42.9%) who had taken the COVID-19 vaccine and the relationship between respondent's uptake of COVID-19 vaccine was not statistically significant (p = 0.248). Respondents who had Skill level 4 had the highest proportion of respondents 35 (47.3%) who had taken the COVID-19 vaccine and

the relationship between respondent's skill level and their uptake of COVID-19 vaccine was not statistically significant (p = 0.308).

Respondents who earned between 30,000 and 100,000 naira monthly had the highest proportion of respondents 55 (35.3%) who had taken the COVID-19 vaccine and the relationship between respondent's average monthly income and their uptake of COVID-19 vaccine was not statistically significant (p = 0.250). Respondents who considered their current health status to be Good had the highest proportion of respondents 120 (44.0%) who had taken the COVID-19 vaccine and the relationship between respondent's perception of their current health status and their uptake of COVID-19 vaccine was found to be statistically significant (p = 0.047).

Respondents with good knowledge of COVID-19 and COVID-19 vaccine had a higher proportion 212 (46.8%) of those who had taken the COVID-19 vaccine and there was a statistically significant relationship between knowledge of COVID-19 and COVID-19 vaccine and uptake of the vaccine (p = <0.001). Respondents with a poor perception of risk of COVID-19 had a higher proportion 176 (41.6%) of those who had taken the COVID-19 vaccine but this was not statistically significant (p = 0.607). Respondents with good perception of COVID-19 vaccine had a higher proportion 217 (56.1%) of those who had taken the COVID-19 vaccine and this was found to be statistically significant (p = <0.001). Respondents who were willing to take the COVID-19 vaccine had a higher proportion 237 (57.1%) of those who had taken the COVID-19 vaccine and this was statistically significant (p = <0.001). Respondents who knew someone who had taken the vaccine had a higher proportion 230 (48.1%) of those who had taken the COVID-19 vaccine and there was a statistically significant relationship between knowing someone who had taken the COVID-19 vaccine and uptake of the vaccine (p = <0.001). Respondents who knew someone who had taken the vaccine and then had a side effect afterwards had a higher proportion 167 (51.2%)

of those who had taken the COVID-19 vaccine and there was a statistically significant relationship between knowing someone who has taken the vaccine and had a side effect afterwards and uptake of the vaccine ($p = 0.033$). Respondents who had a close family member who had tested positive for COVID-19 had a higher proportion 194 (51.2%) of those who had taken the COVID-19 vaccine and there was a statistically significant relationship between having a close family member test positive for COVID-19 and uptake of the vaccine ($p = <0.001$). Respondents who had tested positive for COVID-19 had a higher proportion 16 (69.6%) of those who had taken the COVID-19 vaccine and the relationship between testing positive for COVID-19 and uptake of the vaccine was not statistically significant ($p = 0.503$).

TABLE 18: DETERMINANTS OF UPTAKE OF COVID-19 VACCINE

Factors	B (regression co-efficient)	Odds ratio	95% CI for OR		p-value
			Lower	Upper	
Sex					
Male	-2.031	0.131	0.010	1.804	0.129
Female**		1			
Family type					
Monogamous	-1.994	0.136	0.018	1.005	0.051
Polygamous**		1			
Skill level					
Skill level 0	-0.549	0.578	0.018	18.770	0.757
Skill level 1	-0.805	0.447	0.016	12.444	0.635
Skill level 2	2.303	10.005	0.638	156.997	0.101
Skill level 3	-0.892	0.410	0.039	4.346	0.459
Skill level 4**		1			
Knowledge of COVID-19 and COVID-19 vaccine					
Yes	-3.115	0.044	0.004	0.517	0.013*
No**		1			
Willingness to take COVID-19 vaccine					
Yes	7.616	2029.432	24.729	166547.493	0.001*
No**		1			
Acquittance had side effects after receiving vaccine					
Yes	3.312	27.426	0.825	911.296	0.064
No	4.119	61.511	1.170	3233.888	0.042*
I don't know**		1			

*** = Statistically significant**
R^2 = 50.1 – 72.9%
**** = Reference category**
CI = Confidence interval
OR = Odds ratio

Male respondents were found to be less likely to have taken the COVID-19 vaccine than their female counterparts although this was not statistically significant (OR = 0.131, p = 0.129). Respondents in a Monogamous marriage were less likely to have taken the COVID-19 vaccine than those in a Polygamous marriage but this was not statistically significant. (OR = 0.136, p = 0.051). Respondents who were in Skill level 2 were found to be more likely than those in Skill level 4 to have taken the COVID-19 vaccine although this was not statistically

significant (OR = 10.005, p = 0.101). Respondents with Skill levels 0, 1 and 3 were less likely to have taken the vaccine than those with Skill level 4. This was also no statistically significant (OR = 0.578, p = 0.757; OR = 0.447, p = 0.635; and OR = 0.410, p = 0.459 respectively). Respondents with Good knowledge of COVID-19 and COVID-19 vaccine were less likely to have taken the COVID-19 vaccine and this was found to be statistically significant. (OR = 0.044, p = 0.013). Respondents who were willing to take the vaccine were more likely to have taken the COVID-19 vaccine and this was also statistically significant (OR = 2029.432, p = 0.001). Respondents who knew someone who had taken the vaccine and either had a side effect afterwards more likely to have taken the COVID-19 vaccine than those who did not know if their acquittance who took the vaccine had a side effect after taking the vaccine but this was not statistically significant (OR = 27.426, p = 0.064). Those who had an acquittance who did not have a side effect after taking the vaccine were more likely to have taken the vaccine and this was found to be statistically significant (OR = 61.511, p =0.042).

CHAPTER FIVE

DISCUSSION

The spread of the COVID-19 pandemic and the resultant effects on public health and the global economy in the absence of a definitive cure has heightened the demand for a vaccine and progress toward vaccine development. Vaccine hesitancy poses a real threat, as adequate coverage levels are required to stop transmission of the virus.[45] This study examined the assessment of acceptance of the COVID-19 vaccine and its associated factors among residents in Benin City.

Six hundred and ten residents in Benin City participated in this study, the majority of the participants were aged 18-24 years with a mean age (S.D) of 33.8 (13.4) and more than half of the respondents were males. This is similar to a study done in Kano, Northern Nigeria in March 2020 to assess knowledge, attitude, and practice survey of the COVID-19 pandemic which showed a higher proportion of males.[20] Another study done in Ethiopia, in April 2020 to assess for risk perceptions and attitudinal responses to the COVID-19 pandemic also showed a higher proportion of males.[23]

About one-third of the respondents were Benin and were closely followed by Igbo this is because the study was carried out in Edo State and it is similar to the Edo State Demographic Data which states that Benin is the predominant tribe in Edo State.[35] Majority of the respondents are unmarried, this is similar to a study carried out in Northern Nigeria where the majority of the respondents were unmarried.[47] This may be because a majority of the respondents are young adults between 18-24 years.

The majority of the respondents practiced Christianity; this is similar to a study done in Nigeria, where more than two-thirds of the respondents were Christians.[45] This could be

because the study was done in the southern part of the country and the majority of the populace are Christians.

About three-quarters of the respondent had good knowledge of COVID-19 causes, routes of transmission, and preventive measures for the disease. Respondents aged 25-34 years were more knowledgeable and males were more knowledgeable than females. This could be due to the mass awareness campaigns that were launched via various social media platform and television stations, the internet which were a major information hub among the young people. This is similar to a study done in Pakistan to evaluate the knowledge, attitude, and perceptions regarding COVID-19 which showed that the majority of the respondents had good knowledge of COVID-19.[17] Respondents who are single and those with higher levels of education were more knowledgeable and this was statistically significant, the study also revealed that three-quarter of respondents with skill level 1 had poor knowledge of COVID-19 and more than half respondents who earned less than 30,000 Naira monthly had poor knowledge of COVID- 19. This may be because a higher level of education and higher skill level can lead to better knowledge. This is in tandem with a study conducted in Kenya in May 2020 to assess the knowledge and perceived risk of COVID-19 which revealed that participants with higher levels of education were more knowledgeable than those with lower levels of education.[18] And also in keeping with a study done in Iran to assess the knowledge, skill level, and preventive behaviors regarding COVID-19.[17,54]

Good knowledge of COVID-19 promotes protective behaviors by buffering the negative effects of pessimistic illness expectations, public enlightenment and prevention are of paramount importance.[49]

The study revealed that the determinants of good knowledge of COVID-19 were male sex, increasing age, Christianity, and a higher level of education. This may be because males,

older individuals, Christians, and individuals with higher levels of education often have better access to information. This is in tandem with a study done in Nigeria and Egypt to assess the determinant and perception of COVID-19, the associated factor are level of education, age, and socio-economic status.[19] Good knowledge of COVID-19 support disease prevention effort and encourages adherence to public health measures, these measures can mitigate the impact of the virus, protect the population and control the spread of the disease.[56]

About two-thirds of the respondents had poor knowledge of the COVID-19 vaccine, the types, importance, and side effects following vaccination. This could be due to disinterested, and non-focused attention on the COVID-19 vaccine as a result of missed information and conspiracy theories following low patronage by the government on various social media platforms on the awareness of the COVID-19 vaccine. This was similar to a study done in Bangladesh to assess the knowledge of the COVID-19 vaccine among respondents which revealed low knowledge of the vaccine among more than half of the respondents[50]. Vaccines are the most important public health measures and most effective strategy to protect the population from COVID-19, therefore having a good knowledge of COVID-19 vaccines in terms of the types, merits, and expected side effects will aid acceptance of the vaccine.[51]

This study revealed that about two-thirds of the respondents had a poor perception of the risk of COVID-19. This is because most of the respondents believed COVID-19 is a disease that is more detrimental to caucasians, mistrust the government and government policy toward COVID-19, and various conspiracy theories about COVID-19 diseases. This is similar to a study done in Ethiopia to access the perception of risk and attitudinal response to COVID-19 among an educated section of the society in Ethiopia where the majority of the respondent have a poor perception of the risk of COVID-19.[23] Also in contrast to a study done in Nigeria and Egypt where the majority of the respondent has a good perception of the risk of COVID-19.[19] From our study respondent age group 55 - 65 years accounted for the majority of

respondents with a good perception of risk of COVID-19 and the relationship between age and perception of risk of COVID-19 was found to be statistically significant. This may be due to their vulnerability to severe illness thus leading to greater awareness and concern about COVID-19. This is in contrast to a study done in Pakistan to evaluate the knowledge, attitude, and perceptions regarding COVID-19 which showed that the majority of the respondents age 20-29 years have a good perception of COVID-19.[17] Understanding the risk perception of COVID-19 to the public is central for risk communications and infodemic management during emergency and preparedness planning as people's behaviors depend on how they perceive the risk.[52]

The study revealed that a third of the respondent with a tertiary level of education had a good perception of the risk of COVID-19. Risk perception can be influenced by ideologic or political factors (lack of trust in government) which may not be related to educational level. One-third of the respondents who were employed had a good perception of the risk of COVID-19. This may be due to the culture in their workplaces, if an organization fosters a culture of health and safety, it can shape employee's attitudes toward risk perception. This study is in contrast to a web-based study in the Sub-Saharan region which showed that employment is associated with higher risk perception.[53]

The study also revealed that respondents that had good knowledge of COVID-19 had a poor perception of the risk of COVID-19. Constant exposure to information about the COVID-19 outbreak and response has been accompanied by massive infodemic. This made it difficult for people to find trustworthy sources and reliable guidance when they need it. This can lead to a diminished perception of personal risk as people may feel that the disease is not as severe or threatening as initially perceived. These can lead to higher rates of COVID-19 infections.[53]

The results showed that about two-thirds of the respondents agreed that vaccination decreased their chance of getting COVID-19 and its complications. About half of the respondents were not sure of the effectiveness of the vaccine. Also, the results showed that about half of the respondents would take the vaccine if they get exposed to COVID-19 or if their family members get exposed to the disease. Most of the respondents had proper knowledge of COVID-19 and its consequences, however, may not be sure of the effectiveness of the vaccine due to the various misconception of vaccines. This is similar to a study done in Egypt to assess the perception and attitude of COVID-19 vaccines.[26] The respondent's opinion of COVID-19 as a risk to their health, family, and livelihood is the basis for their willingness to receive the COVID-19 vaccine. [57]

From this study about two-thirds of the respondents had a good perception of the COVID-19 vaccine, and also noted that the positive perception increases from primary to tertiary level of education. This is because of the perceived benefit of vaccination generally, the perceived benefit of the COVID-19 vaccine, and the fear of contracting the virus. This is similar to a study in Jordan to assess the perception and acceptance of the COVID-19 vaccine where the majority of the respondents had a good perception of the COVID-19 vaccine.[24] A good perception of the COVID-19 vaccine is important to break the transmission of disease and reduce infection rates. Strategic educational interventions would also improve the perception of the risk of the disease.[53]

About two-thirds of respondents were willing to take up the COVID-19 vaccine if offered. However, less than half of the total respondents had received the COVID-19 vaccine with the most cited reason for not being willing to take the vaccine is the fear of side effects of the vaccine. Factors that affect vaccine hesitancy such as complacency, confidence, and convenience influenced the uptake of the COVID-19 vaccine among respondents. Also, the majority are willing to accept the vaccine if the government made it compulsory if they get

exposed to COVID-19 and when family and close friends get infected with the virus. The findings are similar to a study done across 19 countries in 2020 including Nigeria, to assess the potential acceptances of the COVID-19 Vaccine in which the majority of respondents were willing to accept the COVID-19 Vaccine.[30] knowing the levels of uptakes and the factors associated with the acceptances of COVID-19 Vaccine will help the Government and health organization with specific intervention and incentive programs need to promote the uptake of COVID-19 Vaccine among the populace.[54]

CONCLUSION

The study showed that three-quarters of the respondents had good knowledge of COVID-19 and about two-thirds of the respondent had poor knowledge of the COVID-19 vaccine.

About two-thirds of the respondents had a poor perception of the risk of COVID-19.

Two-thirds of the respondent had a good perception of the COVID-19 vaccine.

Two-thirds of the respondents are willing to take the COVID-19 vaccine if offered to them. Two-fifth of the respondents had taken the COVID-19 vaccine.

The factors associated with acceptance of the COVID-19 vaccine among the respondents include the side effects of the vaccine, and having a close friend that tested positive for COVID-19 disease or received the vaccine.

RECOMMENDATIONS

TO THE FEDERAL GOVERNMENT

The federal government should continue to provide accurate and up-to-date information about the safety and efficacy of COVID-19 vaccines to the public through various media channels across all social demographic The government should also work with local health authorities to ensure that vaccines are distributed fairly and efficiently across the country.

TO THE STATE GOVERNMENT

State governments should prioritize the vaccination of high-risk populations, such as healthcare workers and the elderly. They should also work with local health authorities to create public awareness campaigns that address vaccine hesitancy and promote the benefits of getting vaccinated.

TO THE LOCAL GOVERNMENT

Local governments should support the efforts of state and federal authorities by providing resources and facilities for vaccination clinics. They can also partner with community leaders to educate residents about the Importance of getting vaccinated.

TO INDIVIDUALS

Individuals must take responsibility for their health and that of their loved ones by getting vaccinated, they should consult their healthcare providers and seek reliable sources of information about the vaccines, individuals should also continue to practice preventive measures such as wearing masks and maintaining physical distancing even after getting vaccinated.

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APPENDIX I

INFORMED CONSENT FORM

TITLE OF RESEARCH: ASSESSMENT OF ACCEPTANCE OF COVID-19 VACCINE AND ITS ASSOCIATED FACTORS AMONG RESIDENTS IN BENIN CITY.

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PURPOSE OF RESEARCH

This study aims to assess the level of acceptance of COVID-19 vaccine and its associated factors among residents in Benin City, Edo State, Nigeria.

PROCEDURES INVOLVED IN THE STUDY: In this study, questions will be asked regarding the knowledge, perception of risk of COVID-19, Perception of COVID-19 vaccine, level of acceptance of COVID-19 vaccine and factors associated with the acceptance of COVID-19 vaccine among residents in Benin City.

CONFIDENTIALITY: All data collected will be treated with utmost confidentiality. participants who volunteer to take part in this study will be given a unique study number and data will be collected. Participants' information will be stored safely secured by codes in computers using only the study identification number. All those handling data will not at any time reveal participants' identity.

FINANCIAL COMPENSATION: There shall be no financial compensation for participants in this study.

VOLUNTARY PARTICIPATION: Participation in this study is entirely voluntary and 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.

RISK: It is not expected that any harm will come to you because of your participation in this study. The study does not entail any activity that would result in harm to you.

BENEFIT: The study will help assess the level of acceptance of COVID-19 vaccine and its associated factors among residents in Benin City, Edo State, Nigeria.

FINANCIAL SPONSORSHIP: This study will be sponsored by the principal investigators. The under-listed may be contacted in case you have any clarifications to make.

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APPENDIX II

QUESTIONNAIRE

ASSESSMENT OF ACCEPTANCE OF COVID-19 VACCINE AND ITS ASSOCIATED FACTORS AMONG RESIDENTS IN BENIN CITY.

Dear respondent,

I am a 600L medical student carrying out a one-year project which is designed to assess the acceptance of the COVID-19 vaccine and its associated factors among residents in Benin City. You are kindly requested to give your opinion about each statement as your opinion would be treated with utmost confidentiality, hence no name is required

Thanks for your cooperation and please tick where appropriate [ ]

SECTION A: SOCIO-DEMOGRAPHICS

1. Age (in years) as at last birthday _____
2. Sex: Male [ ] Female [ ]
3. Ethnicity _____
4. Marital status: Single [ ] Married[ ] Divorced[ ] Separated[ ] Co-habiting[ ]
5. Family type: Monogamous [ ] polygamous [ ]
6. Household Size: _____
7. Religion: Christian [ ] Muslim [ ] Traditional religion [ ] others, specify…….
8. Level of education: No formal education [ ] Primary [ ] secondary [ ] Tertiary [ ]
9. How would you rate your current health status: Excellent [ ] Good [ ] Fair [ ] Poor [ ] Very Poor [ ]
10. Employment status: Employed [ ] Not Employed
11. If employed, Occupation (please specify) _____
12. Average monthly income _____
13. LGA: _____
14. Ward: _____

SECTION B:

KNOWLEDGE OF COVID-19

15. Have you heard about COVID-19 yes [ ] No [ ]
16. If yes, what is your source of information. Television [ ] Radio [ ] Newspaper [ ] Internet [ ] Social media [ ] family [ ] friends [ ] health professional [ ] church [ ] Others specify_____, [Multiple Response Question]
17. What is COVID-19? Staphylococcus Aureus Infection [ ] Flu [ ] corona virus disease 19 [ ] I don't know [ ] others (specify) _____
18. What is the cause of COVID-19? Fungi [ ] Virus [ ] Bacteria [ ] 5G Installation [ ] Curse from God [ ] others (specify) _____
19. What are the symptoms of COVID-19? Cough [ ] sneezing [ ] fever [ ] loss of sense of smell [ ] loss of taste [ ] neck stiffness [ ] muscle weakness [ ] difficulty in breathing [ ] blood in urine [ ] diarrhea [ ] I don't know [ ] others (specify) _____
20. How is COVID-19 transmitted? Contact with fluid and droplets from an infected person [ ] touching an infected surface [ ] Contact with objects used by an infected person [ ] close contact with an infected person[ ] Contact with 5G network [ ] insect bites [ ] exposure to rat [ ] others (specify) _____ [Multiple Response Question]
21. Who are people most at risk of COVID-19? Children [ ] Adolescent [ ] Adults [ ] Elderly [ ] People with chronic diseases such as diabetes [ ] [Multiple Response Question]
22. What are the preventive/mitigation measures for COVID-19 you know? Covering your mouth [ ] Covering the nose while sneezing [ ] Social/Physical distancing [ ] Use of alcohol-based hand sanitizer [ ] Regular handwashing [ ] Use of face masks [ ] Bathing with salt water [ ] Vaccines [ ] When going outside the home, avoiding crowded places [ ] Quarantine of persons exposed to an infected person [ ] Isolating a person with symptoms [ ] Others (specify) _____
23. Who should practice preventive measures? Everybody [ ] Health workers only [ ] Youth only [ ] Elderly only [ ] Pregnant women only [ ] others (specify) _____
24. Are there any effective treatment to COVID-19? Yes [ ] No [ ]

25. If yes, which of these? Vitamin C [ ] Hydroxychloroquine [ ] Ivermectin [ ] Ginger [ ] Herbs [ ] Antibiotics [ ] Antiviral drugs [ ] Use of Garlic [ ] None of the above [ ] Others (specify) _____
26. Have you heard about COVID-19 vaccine? Yes [ ] No [ ]
27. If yes, what is your source of information? If yes, what is your source of information. Television [ ] Radio [ ] Newspaper [ ] Internet [ ] Social media [ ] family [ ] friends [ ] health professional [ ] church [ ] Others specify_____, [Multiple Response Question]
28. What types of COVID-19 vaccine do you know? Moderna [ ] Pfizer [ ] AstraZeneca[ ] Johnsons and Johnsons [ ] Sputnik V [ ] None [ ] others (specify)……
29. What is the importance of the COVID-19 vaccine? To reduce the spread of the disease [ ] To reduce the severity of the disease [ ] To cure the disease [ ] To prevent other respiratory diseases [ ] others (specify) _____
30. What are the side effects of COVID-19 vaccination? Fever [ ] headache [ ] Muscle pain [ ] Paralysis [ ] Microchip implant [ ] Asthma [ ] others (specify) _____

PERCEPTION OF RISK OF COVID-19

A	**PERCEIVED SUSCEPTIBILITY**	**Agree**	**Undecided**	**Disagree**
32.	I am at a high risk of catching the COVID-19 virus			
33.	I worry a lot about getting COVID-19 infection			
34.	I think I would get COVID-19 infection within the next year			
35.	My physical health makes it more likely that I will get COVID-19			
36.	My job puts me at a high risk of getting COVID-19			
B	**PERCEIVED SEVERITY**			

37.	The thought of COVID-19 scares me			
38.	COVID-19 is a very serious disease			
39.	If I do contract the virus, I will likely transmit it to others			
40.	If I do contract the virus, I will likely have severe illness			
41.	My health will be seriously affected if I contract the COVID-19 virus			
42.	I will be greatly affected economically if I contract the COVID-19 virus (eg through loss of work)			

SECTION C

PERCEPTION OF COVID-19 VACCINE

SN	**PERCEPTION OF COVID-19 VACCINE**	**Agree**	**Undecided**	**Disagree**
A	**PERCEIVED BENEFITS**			
43.	Vaccination decrease my chances of getting the COVID-19 or its complications			
44.	Vaccination is a good idea because it makes me less worried about getting the COVID-19 vaccine			
45.	COVID-19 vaccine is effective and likely to work for everybody			

46.	It is safe to take the COVID-19 vaccine			
47.	Getting the vaccine will protect me and others around me			
B	**PERCEIVED BARRIERS**			
48.	I am not sure of the effectiveness of the vaccine			
49.	The speed with which the vaccines were developed makes me doubt their safety.			
50.	I do not believe COVID-19 exists			
51.	The vaccination center is far from where I live			
52.	I am afraid of the side effects of the COVID-19 vaccine			
53.	I think COVID-19 vaccination is merely a political issue			
C.	**CUES TO ACTION**			
54.	If I get exposed to someone with COVID-19, I will take the vaccine			
55.	I will accept to take the vaccine if the government makes it compulsory			
56.	I will take the vaccine if my religious leader recommends it			
57.	If family or close friends get infected with the virus, I will take it			

SECTION D

ACCEPTANCE OF COVID-19 VACCINE

58. Will you take the COVID-19 vaccine if offered to you? Definitely yes [ ] Probably yes [ ] Probably no [ ] Definitely no [ ]

59. If No(probably no or definitely no), Why? COVID-19 vaccine is not effective [ ] COVID-19 vaccine is not safe [ ] The vaccine is designed to harm us [ ] I am afraid of the side effects [ ] I am healthy and so I do not need the vaccine [ ] I already had COVID-19 so I am immune to the disease [ ] COVID-19 does not exist [ ] I am not at risk because I always comply with other preventive measures (face masks, hand sanitizers,etc) Others (Specify)_____

60. Will you recommend the COVID vaccine to others? Yes [ ] No [ ] I don't know [ ]

61. Do you know anyone that has received the COVID-19 vaccine? Yes [ ] No[ ]

62. If yes to the above, were there any side effects after receiving the vaccine? Yes[ ] No [ ] I don't know [ ]

63. If yes, what were the side effects? Fever [ ] headache [ ] Muscle pain [ ] Paralysis [ ] Vomiting [ ] Dizziness [ ] others (specify) _____

64. Have you received the COVID-19 vaccine? Yes [ ] No [ ]

65. If yes, how many doses? _____

66. If no, state reasons _____

67. Is there any of your close family members that have tested positive for COVID-19? Yes [ ] No [ ]

68. Have you been infected with COVID-19? Yes [ ] No [ ]

69. Have you been tested for COVID-19? Yes [ ] No [ ]

70. If yes, what was the test result? Positive [ ] Negative [ ]

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HEALTH RESEARCH ETHICS COMMITTEE APPROVAL

PROTOCOL NUMBER: ADM/E 22/A/VOL. VII/14831244

PROPOSAL TITLE: "ASSESSMENT OF ACCEPTANCE OF COVID-19 VACCINE AND ITS ASSOCIATED FACTORS AMONG RESIDENTS IN BENIN CITY"

PRINCIPAL INVESTIGATOR(S): KIKOSEM IGWUBOR, JESSICA IYOHA, JAMES SAVIOR CHIMAOBI

DEPARTMENT/INSTITUTION: DEPARTMENT OF COMMUNITY HEALTH, UNIVERSITY OF BENIN TEACHING HOSPITAL, BENIN CITY

DATE CONSIDERED NOVEMBER 23TH, 2021

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 23/11/2021 TO 11/11/2022. IF THERE IS DELAY IN STARTING THE RESEARCH, PLEASE INFORM THE HREC SO THAT THE DATES OF APPROVAL CAN BE ADJUSTED ACCORDINGLY

REMARK:

CHAIRMAN: PROF. (MRS) A.N. OFILI **SIGNATURE & DATE**..... 23/11/2021

SUPERVISOR (S): PROF (MRS) V.O. OMUEMU

DECLARATION BY INVESTIGATOR(S):
PROTOCOL NUMBER (please quote in all enquiries)
Note that no participant accrual or activity related to this research may be conducted outside of these dates and **you are to furnish the committee with the research activities at the completion of the study**. All informed consent forms used in this study must carry the HREC assigned number and duration of HREC approval of the study. In multiyear research, endeavor to submit your annual report to the HREC early in order to obtain renewal of your approval and avoid disruption of your research. No changes are permitted in the research without prior approval by the HREC except in circumstances outlined in the Code. The HREC reserves the right to conduct compliance visit your research site without previous notification.

Signature & Date..... 29/11/2021