KNOWLEDGE AND UPTAKE OF HEPATITIS B VACCINATION AMONG YOUNG ADULTS IN BENIN CITY, EDO STATE

BY

OLUWAFUNMIBI GRACE ABIONA (MISS) MED1807353

PERFECT ELOHOR AKUDO (MISS) MED1807368

DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE,

SCHOOL OF MEDICINE,

COLLEGE OF MEDICAL SCIENCES

UNIVERSITY OF BENIN, BENIN CITY, EDO STATE, NIGERIA.

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BEING A ONE-YEAR PROJECT PRESENTED TO THE DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE, SCHOOL OF MEDICINE, COLLEGE OF MEDICAL SCIENCES, UNIVERSITY OF BENIN, BENIN CITY, EDO STATE, NIGERIA

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DEDICATION

ABIONA OLUWAFUNMIBI GRACE

I dedicate this work first to God, who walked these eight years with me, carried me through in the toughest moments, and saw me through to the end of this journey. He girded me with strength, and made my ways perfect. I also dedicate this work to my wonderful family, my parents Mr and Mrs Abiona, and brothers Samuel and Opeoluwa Abiona, whose unwavering love, support and encouragement made this journey a lot lighter.

AKUDO PERFECT ELOHOR

This work is first and foremost dedicated to God Almighty for His infinite grace, wisdom, strength, and steadfast faithfulness throughout the course of this study and my entire academic journey. I also dedicate this work to myself in recognition of my resilience, perseverance, and unwavering determination throughout this academic journey. This accomplishment stands as a testament to my hard work, personal growth, and the inner strength that sustained me through every challenge.

DECLARATION

I hereby declare that this research project titled "Knowledge and uptake of Hepatitis B virus vaccine among young adults in Benin City" was conducted under supervision and has not been submitted in part or in full for any purpose.

______________________________ ______________________________

Oluwafunmibi Grace Abiona
MED1807353
08139149691
funabi10@gmail.com

Date

______________________________ ______________________________

Perfect Elohor Akudo
MED1807368
09031924945
eloho69akudo@gmail.com

Date

CERTIFICATION

This is to certify that this research study titled "Knowledge and uptake of Hepatitis B vaccination among young adults in Benin City, Edo State" was conducted by Oluwafunmibi Grace Abiona with matriculation number MED1807353 and Perfect Elohor Akudo with matriculation number MED1807368 under the supervision of Prof. Vivian Omuemu in the Department of Public Health and Community Medicine, College of Medical Sciences, University of Benin as part of the requirements for the award of Bachelor of Medicine, Bachelor of Surgery (MBBS) degree.

______________________________	______________________________
Supervisor	Head of Department
Professor (Mrs.) Vivian O. Omuemu	**Dr. (Mrs.) O. E. Obarisiagbon**
MBBS, MPH, MD, FMCPH, FWACP FNAMed	*MBBS, MPH, FMCPH*

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LIST OF ABBREVIATIONS

ATR	African Traditional Religion
CDC	Centre for Disease Control and Prevention
FMH	Federal Ministry of Health
GHSS	Global Health Sector Strategy
HBcAg	Hepatitis B core antigen
HBeAg	Hepatitis B envelope antigen
HBsAg	Hepatitis B surface antigen
HBV	Hepatitis B Virus
HCW	Health Care Workers
LGA	Local Government Area
MRQ	Multiple Response Question
NAACP	National Aids and STI Control Program
PEP	Post Exposure Prophylaxis
TWG	Technical Working Groups
WHA	World Health Assembly
WHO	World Health Organization

DEFINITION OF TERMS

Acute Hepatitis B: a short-term liver infection caused the Hepatitis B virus lasting up to six months and often resolving without treatment.

Awareness: knowledge or perception of a situation or fact.

Chronic Hepatitis B: a long-term liver infection caused the Hepatitis B virus that lasts more than six months.

Economic burden: the financial impact that a particular health issue or disease places on individuals, healthcare systems and society as a whole.

Hyperendemic regions: areas where Hepatitis B prevalence ≥ 8% in the general population.

Impact: a marked effect or influence.

Knowledge: awareness or familiarity gained by experience of a fact or situation.

Seropositive: showing a significant level of serum antibodies, or other immunological marker in the serum, indicating previous exposure to the infectious agent being tested.

Uptake: the action of taking up or making use of something that is available.

Vaccination: the process of administering a vaccine to stimulate the immune system to produce protective immunity against a specific disease.

ABSTRACT

BACKGROUND: Hepatitis B remains a major global public health problem, particularly in low- and middle-income countries such as Nigeria, where it contributes significantly to chronic liver disease, cirrhosis, and hepatocellular carcinoma. Despite the availability of an effective vaccine, poor knowledge of the infection and its vaccine, as well as low vaccine uptake, continue to sustain transmission.

AIM: This study assessed knowledge of the Hepatitis B vaccine, vaccination uptake, associated factors, and barriers to uptake of the vaccine among young adults in Benin City, Edo State.

METHODS: A descriptive cross-sectional study was conducted among 543 respondents selected using a multistage sampling technique. Data was collected using a pretested structured interviewer and self-administered questionnaire covering socio-demographic characteristics, knowledge of Hepatitis B virus infection, knowledge of the Hepatitis B vaccine, vaccination status, and factors associated with these outcomes. Data was analyzed using IBM SPSS Statistics version 27.0. Univariate analysis summarized means, frequencies, and percentages. Bivariate analysis using chi-square tests determined associations between socio-demographic factors and respondents' knowledge of Hepatitis B infection, knowledge of the vaccine, and vaccination uptake. Binary logistic regression identified predictors of good vaccine knowledge and full vaccination status. Statistical significance was set at $p < 0.05$, and results were presented in prose and tables.

RESULTS: A total of 543 individuals took part in the study. The mean age of participants was 21.0 ± 2.8 years and 302 (55.6%) were females. Overall, 99 (24.6%) respondents had good knowledge of Hepatitis B virus infection, while 303 (75.4%) had poor knowledge. Regarding knowledge of the Hepatitis B vaccine, 50 (16.9%) had good knowledge, while 246

(83.1%) had poor knowledge. At the bivariate level, respondents age (χ^2=17.131, p= <0.001), sex (χ^2=5.122, p= 0.024), monthly income (χ^2=14.319, p= 0.001), and individuals with good knowledge of Hepatitis B infection (χ^2=91.056, p= <0.001) were significantly associated with knowledge of the vaccine. Older respondents, females, individuals with higher monthly income, and those with good knowledge of Hepatitis B infection were more likely to have good knowledge compared to their counterparts. Ethnic group, marital status, religion, employment status and occupation were not statistically significant. Multivariate analysis showed that respondents earning ≥₦70,000 were 2.467 times more likely to have good knowledge of the vaccine (95% CI: 0.909–6.698), while respondents with good knowledge of Hepatitis B infection were 45.414 times more likely to have good knowledge of the vaccine (95% CI: 12.092–170.561), this was statistically significant ($p < 0.001$).

Regarding vaccine uptake, 33 (6.1%) respondents were fully vaccinated, 66 (12.2%) were partially vaccinated, and 444 (81.8%) were not vaccinated. Bivariate analysis showed that age ($\chi^2 = 36.067$, $p < 0.001$), sex ($\chi^2 = 10.591$, $p = 0.005$), knowledge of Hepatitis B infection ($\chi^2 = 105.384$, $p < 0.001$), and knowledge of the Hepatitis B vaccine ($\chi^2 = 93.812$, $p < 0.001$) were significantly associated with vaccination status. Respondents aged ≥25 years had the highest proportion of full vaccination 12 (16.7%), while those aged <20 years had the highest proportion of non-vaccination 190 (92.2%). Females had a higher proportion of partial vaccination 49 (16.2%), while males had a higher proportion of non-vaccination 206 (86.7%). Among respondents with good knowledge of Hepatitis B infection, 27 (27.3%) were fully vaccinated compared to 5 (1.7%) among those with poor knowledge. Similarly, 21 (42.0%) respondents with good vaccine knowledge were fully vaccinated compared to 9 (3.7%) among those with poor knowledge. Multivariate analysis showed that respondents with good knowledge of Hepatitis B infection were 9.011 times more likely to be fully vaccinated (95%

CI: 1.962–41.393, p = 0.005), while those with good knowledge of the Hepatitis B vaccine were 5.618 times more likely to be fully vaccinated (95% CI: 1.813–17.410, p = 0.003).

CONCLUSION: Knowledge of Hepatitis B infection and its vaccine was generally poor among respondents, and vaccination uptake was suboptimal. However, better knowledge of the infection and vaccine significantly improved the likelihood of full vaccination. Strengthening health education and awareness campaigns through healthcare workers, schools, and media platforms is essential to improve knowledge and increase vaccine uptake among the population.

KEYWORDS: Hepatitis B virus; Hepatitis B vaccine; Knowledge; Vaccination uptake; Associated factors; Benin City; Edo State.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Viral hepatitis type B, caused by the hepatitis B virus, is a significant infectious disease that poses a serious risk to liver health and can lead to life-threatening complications.[1]

The Hepatitis B virion is a double stranded oncogenic DNA virus belonging to the hepadnaviridae family that replicates by reverse transcription. It contains 3 primary structural antigens which are surface (HBsAg), core (HBcAg) and the envelope (HBeAg). These antigens are essential in the diagnosis of the disease.[1]

The primary modes of transmission of the virus are perinatal transmission from mother to child during birth and delivery, in early childhood through close household contact, and through exposure to infected blood or bodily fluids via unprotected sexual contact, unsafe injections, or contaminated sharp instruments.[2]

Infection with this virus is typically self-limiting, as most (over 95%) immunocompetent adults exposed to the hepatitis B virus (HBV) achieve spontaneous viral clearance without requiring medical intervention. However, the clinical presentation varies, with some individuals experiencing acute symptomatic illness, while others remain asymptomatic, with HBV detected through routine screening.[3]

Acute HBV infection can present as subclinical or anicteric hepatitis, icteric hepatitis, or, in rare cases, fulminant hepatitis. When the infection becomes chronic, it can lead to an asymptomatic carrier state, chronic hepatitis, cirrhosis, or hepatocellular carcinoma. This poses a significant public health challenge requiring targeted prevention and control

strategies. However, Hepatitis B virus is preventable through effective and safe vaccination methods.[2,3]

The Hepatitis B vaccine is one of the essential vaccines given to a child in the first few weeks of life, administered singly at birth, and subsequently as part of the pentavalent vaccine.[4] This is because perinatal and early postnatal transmission are the major causes of chronic hepatitis infection.[1]

Immunization during this early phase of life does not always guarantee lifelong protection against the Hepatitis B Virus with immunity lasting about 20 - 30 years, as such, the Centre for Disease Control and prevention (CDC) recommends that: all children, adolescents and adults who have not been vaccinated receive the vaccine, as this will reduce the burden of the disease.[5]

The Nigerian National Programme on Immunization (NPI) schedule for infants includes four doses of the Hepatitis B vaccine. The first dose is the monovalent HBV vaccine administered within the first 24 hours of life. Subsequent doses are given as a component of the pentavalent vaccine at 6, 10 and 14 weeks of age.[5]

The Nigerian Federal Ministry of Health recommends three doses of the vaccine for unvaccinated adolescents and adults to be taken at 0, 4 weeks and 6 months interval and this immunization confers lifelong immunity against the virus.[15]

1.2 STATEMENT OF PROBLEM

According to the World Health Organization (WHO), it is estimated that about 254 million people globally were infected chronically with the Hepatitis B virus infection as at 2022, with 1.2 million new infections every year.[6] It is a major public health concern as it is the seventh leading cause of death globally.[10] When left untreated, Hepatitis B could proceed to chronic liver disease or liver cancer.[6] It is estimated that yearly, about 1.1 million people lose their lives due to chronic hepatitis, liver cirrhosis and hepatocellular carcinoma, which are all complications of the infection.[11]

In many countries of the world, Hepatitis B infection remains grossly undiagnosed, and the strategies for prevention such as vaccination are widely underutilized. Birth dose coverage for HBV vaccines are low, especially in low-income countries that have a high burden of disease.[7]

In Africa, more than 90 million people are living with the infection, which accounts for 26% of the global total. HBV is a 'silent epidemic' as many people are not even aware, they have the infection, and many discovered their diagnosis accidentally while donating blood or undergoing medical screening for other reasons.[8]

Countries in the global south, particularly sub-Saharan Africa and Southeast Asia account for about 10-20% of chronic Hepatitis B virus, which is the highest in the world. In Uganda, more than 8% of the populace are infected with the virus. In South-Africa, Hepatitis B is seen to be the main cause of liver related diseases, with more than 70% of the population exposed to the infection, and in Ghana, the prevalence of HBV as detected by HBsAg seropositivity is 12.3%.[11]

Nigeria, a hyper endemic region is among the countries with the highest burden of viral hepatitis with the prevalence of Hepatitis B at 11%. The infection is most common among

21- 40 year olds, but there are also substantial neonatal and childhood transmissions.[9] According to estimates, there are more than 20 million people who live with the disease in Nigeria, but are unaware of their status.[8]

Hepatitis B virus infection continues to pose a heavy burden especially in low and middle income countries like Nigeria, as many infected people cannot afford proper diagnosis or long term treatment.[2] The complications like cirrhosis and liver cancer are expensive to treat and often diagnosed late, this results in increased hospital admissions, loss of income due to poor health and financial strain on families.[7] The economic burden also affects the country's health system which struggles with limited resources and poor access to vaccines and antiviral drugs.[8,15] The situation is made worse by low awareness about the disease, stigma and inadequate preventive measures, making it harder to control the spread of the disease.[10] Overall, the impact of HBV does not only affect health, it affects the social and economic wellbeing of individuals, households, and the nation at large.

Studies done across Nigeria have shown average to poor knowledge about the HBV infection and its transmission routes, as well as a general lack of awareness about the vaccine among young adults. This points to an urgent need for intervention in the area of HBV awareness and vaccination.[10,22,23]

Despite the availability of vaccines, there is a low level of uptake especially in low and middle income countries. In Nigeria, only about 36.2% to 59.5% of people are fully vaccinated against the virus, with the highest rate among doctors.[11]

There are numerous factors that affect the level of uptake of the HBV vaccine which include: health insurance, social support, stigmatization of sex workers, use of healthcare services, level of education, income level, fear of vaccine safety, and many more.[12,21,31] National surveys have shown that health insurance coverage is fundamentally associated with

Hepatitis B vaccination as uninsured people have lower health outcomes and survival than insured people.[12] Visits to healthcare providers have also been reported to play an important role in Hepatitis B vaccination as studies revealed that homosexual men who disclose their sexual practices to healthcare workers are more likely to be vaccinated than men who do not disclose their sexual practices and contacts.[39] Stigmatization of sex workers has been another major factor that affects the level of Hepatitis B screening and vaccine uptake as they hide due to fear of being judged or treated with disdainful attitudes from healthcare staff and other patients. [12`]

1.3 JUSTIFICATION OF THE STUDY

Hepatitis B is a chronic viral disease that is a major global health threat especially in Asia, Sub-Saharan Africa and Egypt. Nigeria accounts for 8.3% of the global health burden for Hepatitis B infection.[9]

Transmission is through infected blood, semen and other body fluids. People who are especially at risk are homosexual men, heterosexual people with multiple sexual partners, people who live and work in care facilities and people who inject drugs.[13]

Despite the fact that Hepatitis B is a vaccine preventable disease, and its vaccine confers at least 89% protection to infants, children and adults who are fully immunized before exposure, the disease continues to spread, and it is estimated that about 20 million Nigerians are chronically infected.[9]

In Nigeria, the infection is most common among young adults (21-40 year olds) as they are at a higher risk of exposure to Hepatitis B virus through engaging in risky practices like body piercings, tattoos, unsafe and unprotected sexual activities, and young people often are a critical demographic for public health interventions.[9]

Understanding the factors and barriers to the uptake of the Hepatitis B vaccine is crucial to creating measures and strategies to tackle these barriers and improving the rate of uptake. This is why this study aims to assess and understand why young adults do not take the vaccine to protect themselves.

The proposed study also assesses the level of knowledge of young Nigerians on the importance of taking the Hepatitis B vaccine for the control of disease spread. This study will be carried out in Benin City, and focuses on increasing the level of awareness of people (young adults) on the importance of the vaccine uptake to reduce the burden of disease. There is a dearth of information on this topic, so this study will bridge a significant knowledge gap on the knowledge, barriers and determinants of Hepatitis B vaccination uptake specifically in Benin City, and inform strategies like local educational campaigns, screening of the general population, and making the vaccines more accessible.

Assessing the current level of public health education on Hepatitis B vaccination in Nigeria will show the need for better health education and outreach efforts. A study that identifies the determinants and barriers to uptake of the vaccine could drive policy changes, and highlight the need for improved strategies.

Studies on Hepatitis B vaccine carried out in Nigeria previously have focused more on healthcare workers, these studies have also been limited to specific areas of Nigeria and to tertiary healthcare facilities, thus neglecting young people, who contribute majorly to the burden of disease.[31,35]

1.4 RESEARCH QUESTIONS

1. What is the level of knowledge about Hepatitis B vaccine among young adults in Benin City?

2. What is the level of uptake of Hepatitis B vaccine among young adults in Benin City?

3. What are the factors associated with the uptake of the Hepatitis B vaccine among young adults in Benin City?

4. What are the barriers to the uptake of Hepatitis B vaccine among young adults in Benin City?

1.5 RESEARCH OBJECTIVES

General Objective

To assess the knowledge, level of uptake, factors and barriers to the uptake of Hepatitis B vaccination among young adults in Benin City, Edo State.

Specific Objectives

1. To assess the level of knowledge about the Hepatitis B vaccine among young adults in Benin City.
2. To assess the level of uptake of Hepatitis B vaccine among young adults in Benin City.
3. To identify the factors associated with the uptake of Hepatitis B vaccine among young adults in Benin City.
4. To determine the barriers to the uptake of Hepatitis B vaccine among young adults in Benin City.

CHAPTER TWO

LITERATURE REVIEW

Hepatitis B, a major public health concern takes a heavy toll on lives, communities and health systems. Without an expanded and accelerated response, the number of people living with Hepatitis B is projected to remain at the current high level for the next 40-50 years, with an estimated 20 million deaths occurring between 2015 and 2030.[14] Over the years, different policies and guidelines have been developed to prevent and control the spread of the virus.

In May 2010, the World Health Assembly (WHA) adopted the resolution WHA63.18 that recognized viral Hepatitis as a global health problem, highlighting the need for an all-inclusive action to prevent, diagnose and treat these diseases. It was endorsed in 2014, emphasizing the need for countries to prioritize the development of national policies, strategies and guidelines for the control of viral hepatitis based on their specific needs and available resources.[15] The resolution also included the commemoration of 'World Hepatitis Day' on the 28th of July every year.[15]

In 2016, WHO launched the Global Health Sector Strategy (GHSS) on viral Hepatitis, with the goal of eradicating viral Hepatitis as a public health threat by 2030. The strategy addresses all 5 Hepatitis viruses, with special focus on Hepatitis B and C viruses, as they cause the greatest burden of disease. The WHO GHSS focuses on five core intervention areas: making effective vaccines available; prevention of mother to child transmission; injection, blood and surgical safety; harm reduction for people who inject drugs; making effective and well tolerated treatment regimens available.[14]

The WHO African regional office developed the "Framework for action for the prevention and control of viral Hepatitis 2016-2020" to guide African countries in adapting global recommendations to local realities. The framework contains recommendations which include:

provision of free Hepatitis B vaccines for healthcare workers, as well as Hepatitis B virus post-exposure prophylaxis; promotion of safe sex by intensifying condom programming especially for populations at risk; strengthening national hepatitis B virus vaccination programmes and introducing the Hepatitis B virus birth dose which many African countries including Nigeria have adopted.[16]

The Nigerian government has over the years laid down strategies for the control and prevention of Hepatitis B. In 2013, the government through the Federal Ministry of Health established the National Viral Hepatitis Control Programme within the National AIDS and STI Control Programme (NASCP). Subsequently, a National Technical Working Group (TWG) was inaugurated and a national policy was developed in 2015. The country also subscribed to the Global Health Sector Strategy (GHSS), and developed a national strategic plan (2016-2020), training materials, national viral hepatitis facility directory (2018), and viral hepatitis state roadmap (2020).[16]

In 2023, the Nigerian Federal Ministry of Health released an updated guideline for the prevention, treatment and care of viral hepatitis in Nigeria. Key intervention areas highlighted in the guideline include: scaling up timely administration of HBV vaccines using a patient centred approach; preventing mother to child transmission of Hepatitis; strengthening injection and blood safety; scaling up harm reduction for people who inject drugs; expanding access to viral Hepatitis screening and diagnosis; and expanding access to quality assured viral hepatitis treatment.[15]

The Nigerian National Programme on Immunization (NPI) schedule for infants includes four doses of the Hepatitis B vaccine. The first dose is the monovalent HBV vaccine administered within the first 24 hours of life. Subsequent doses are given as a component of the pentavalent vaccine at 6, 10 and 14 weeks of age.[15]

For older children, adolescents and adults, it is recommended that all HBsAg negative individuals should be vaccinated, however, where the Anti-HBs test is available and the titre is greater than or equal to 10mIU/ml, vaccination is not required. The recommended vaccination schedule for unvaccinated persons is as follows:

Children aged 1-11 years, adolescents and adults: Monovalent HBV vaccine at 0 (start dose), 4 weeks after start dose, and 6 months after start dose or 5 months after the second dose.[15]

The accelerated (rapid) vaccination schedule is a short-term schedule for special circumstances. It is recommended for those travelling on short notice, at high risk of facing exposures such as healthcare workers, and emergency responders in disaster areas. The schedule is as follows: first shot is given at first contact, second shot is given 7 days after the first shot, third shot is given 21-30 days after the first shot and fourth shot is given 1 year after first shot.[15]

2.1 LEVEL OF KNOWLEDGE ABOUT HEPATITIS B VACCINE

A descriptive cross-sectional study was carried out in Vietnam between April and June 2022, among 459 students to evaluate hepatitis B virus (HBV) vaccine coverage and its associated factors among health science students. Respondents were selected via the non-probability convenience sampling technique and a pretested self-administered questionnaire was used to collect data. Results revealed that 377 (82.1%) knew that Hepatitis B was a vaccine preventable disease while 82 (17.9%) were not aware.[17] The study made use of a pretested questionnaire which improves the reliability and clarity of the data collected.

Another descriptive cross-sectional study was conducted in Nepal between May and June 2022 to assess knowledge, attitude, and practice of medical students towards Hepatitis B vaccination. A pretested self-administered questionnaire was used to collect data from 206 medical undergraduate students via non-probability convenience sampling. Results revealed

that majority, 192 (93.2%) had good knowledge about hepatitis b vaccination, while about 14 (6.8%) had poor knowledge of Hepatitis B vaccination.[18] While this study assessed if the students knew the dosing for the Hepatitis B vaccine in adults, it would have also been necessary for it to know if the students were aware of the hepatitis B vaccine schedule in babies, and the associated side effects of the vaccines as this would confirm if they have a well-rounded knowledge of the Hepatitis B vaccine. The study employed a non-probability convenience sampling technique, this may introduce selection bias as it does not ensure everyone in the population is given an equal chance of being selected.

In 2020, a concurrent mixed methods study was carried out among 487 students in a medical training college in Kenya to assess the awareness, knowledge, attitudes and practices towards HBV disease and vaccination. A multistage sampling design and a structured questionnaire was used to collect data from the participants. The study revealed that most respondents (88.17%) believe that vaccination against HBV can protect one against the disease. A majority (75.3%) of respondents knew the correct mode of administration of the vaccine. However, only 43.2% knew that the Hepatitis B vaccine is given in three doses.[19] The study did not assess if the students knew that full HBV vaccination confers lifelong immunity. This study was carried out in within one medical college thus, findings cannot be generalized.

In South Sudan, an analytical cross-sectional study was carried out in 2020 to assess the uptake of Hepatitis B vaccination among health care workers. A purposive sampling method was used in the selection of the teaching hospital while a convenience sampling technique was used to select participants for this study. A self-administered semi-structured questionnaire was used to collect data from 154 participants. The majority of the respondents were aware that Hepatitis B is a viral infection and that it can be acquired through body fluids(80.5%), needle sticks (77.3%), if vaccination is effective in preventing Hepatitis B infection (79.2%), and only a few of respondents (20.1%) knew that receiving a full dose of

HBV was vital in preventing one from HBV infections.[20] The study did not assess if they knew at risk groups to Hepatitis B virus and side effects of the vaccine. Study cannot be generalized due to limited population size.

From July to September 2022, a descriptive cross-sectional online survey to ascertain the uptake of Hepatitis B vaccination and associated factors among 569 health sciences students was carried out in Somalia. The population was sampled using purposive nonprobability sampling technique and participants' information was collected using a structured questionnaire. Results showed that 502 (89.1%) of students knew HBV is a vaccine preventable disease, while 62(10.9%) students were not aware.[21] The study assessed how much they knew about HBV prevention but did not assess how much they knew about the vaccine, including the dosage schedule. Limited generalizability of the study.

In 2021, a descriptive cross-sectional study done in Anambra State among 178 undergraduate clinical students. A convenient sampling technique and a self-administered questionnaire was used to select participants and obtain information from the students respectively. Results revealed that 97.2% (173) agreed that HBV can be prevented by vaccination while 2.2% (4) were not sure if HBV vaccination can prevent it.[22] While the study assessed if they knew the standard dosing schedule, the study did not assess if they knew at risk groups and common side effects associated with the hepatitis B vaccination. The study employed a convenience sampling technique which may introduce selection bias.

In Ekiti State, a descriptive cross-sectional study carried out among 420 registered non-medical students to assess the knowledge and associated factors for the uptake of Hepatitis B vaccine in 2022. A multistage sampling technique was used to select the eligible students for the study while a structured pretested, self-administered questionnaire was used to collect data. Results showed that majority (77.6%) of the students had good knowledge about the

HBV vaccine while 22.4% had poor knowledge of the vaccine.[23] The study did not assess possible side effects of the vaccine. The study utilized a structured questionnaire which may not reflect the depth of the participants knowledge.

2.2. LEVEL OF UPTAKE OF HEPATITIS B VACCINE

A cross-sectional study was done in Turkey in 2022, which aimed to identify the barriers against Hepatitis B vaccination in high-risk adults. It was conducted in a 1000 bed tertiary care hospital, and 156 adults were selected using a systematic random sampling technique. Data was collected with a 34-item questionnaire administered over a phone call. The findings showed that 59.8% had received at least one dose of Hepatitis B vaccination.[24] The major strength of this study is the use of a systematic random sampling technique, which minimizes bias and ensures a representative sample.

An institution based cross-sectional survey was carried out between February and March 2020 in Aceh and Yogyakarta, Indonesia, to determine the barriers to and facilitators of Hepatitis B vaccination among the adult population. The study involved 893 participants who were randomly sampled from employment data and patient register in sixteen selected health centers. Data was collected quantitively and qualitatively using study questionnaires and face to face interviews conducted by interviewers. The study findings revealed that only 15% of the participants had received at least one dose of the Hepatitis B vaccine.[25] The key strength of this study is it mixed methods design, it combined quantitative and qualitative methods, which allowed the researchers to have a broader and deeper understanding of the barriers and facilitators to Hepatitis B vaccination.

A study was done in Mogadishu, Somalia between July to September 2022, it was a cross-sectional online survey involving a total of 569 students. A purposive nonprobability sampling technique was used, and data was collected using a structured questionnaire which

was distributed via kobo toolbox. The objective of the study was to assess the level of uptake of Hepatitis B vaccination among health sciences students, and the results revealed that only 33.4% of the participants had received a full dose of the vaccine.[21] The key limitation to this study is the sampling technique, since a purposive sampling technique was used, there is a risk of selection bias thus the findings cannot be generalized to all health science students in Mogadishu.

In Mwanza region, North-Western Tanzania, a study was carried out to assess the level of uptake of Hepatitis B vaccination among healthcare workers in primary health facilities in Mwanza region. The study was a cross-sectional analytic study conducted between June and July 2022, study population involved healthcare workers from 27 health facilities in the Misungwi and Ilemela districts, with a sample size of 402 healthcare workers. Data was collected using a semi-structured self-administered questionnaire. Findings showed that only 18% (76/402) healthcare workers were fully vaccinated.[26] The major strength of this study is the use of semi-structured questionnaires, allowing for some flexibility and freedom in respondents' responses.

Between April and June 2022, a mixed methods cross sectional study was conducted among 434 adult residents to assess the prevalence and factors associated with Hepatitis B vaccination uptake and completion among communities targeted for mass vaccination in Gulu, Northern Uganda. The study population consisted of individuals 18 years and above, residing in both urban and rural areas of Gulu, a multistage sampling method was used, and data was collected quantitatively using interviewer administered semi structured questionnaires. Findings revealed that out of 434 respondents, 41.9% had received at least one dose of the Hepatitis B vaccine, 32.5% had received at least 2 doses, and only 20% had completed all 3 doses.[27] The major strength of this study is the use of a multistage sampling

method to include both rural and urban areas, this makes the findings more representative of the broader community.

A comparative cross-sectional survey was employed in 2021, to examine the Hepatitis B vaccination status among university students in Accra, Ghana. The study population consisted of students from 3 universities across all levels (100-400), and a simple random sampling technique was used to select students for the study. Sample size was 2,712, data was collected using structured questionnaires. Results showed that less than half of the participants (38.2%) have been vaccinated, and 57.3% were yet to take all three doses required for full vaccination.[28] The strength of this study is the adequate sample size, which could be a true reflection of the level of vaccination of the study population.

A comparative cross-sectional study was carried out in Jos, Plateau state, Nigeria in 2017, among 1,200 students. The study aimed to assess the level of uptake of Hepatitis B vaccine among medical students compared with non-medical students of the University of Jos. The study population comprised of students from 3 selected departments, who were greater than 25 years of age, and were in their 2nd, 3rd and 4th years at the time of study. A multistage sampling technique was used to select participants, and the data collection tool was semi-structured, self-administered questionnaires. The study showed the level of uptake of full dose Hepatitis B vaccine to be 60.2% among medical students, 20.6% among nursing students, and 15.1% among public administration students.[29] The large sample size of this study could be a true reflection of the level of uptake of the level of uptake of Hepatitis B vaccine among students of the University of Jos.

In 2021, a study was done to assess the Hepatitis B virus knowledge and vaccination status among healthcare workers in Calabar, Nigeria. It was a cross-sectional analytical study done among 392 healthcare workers, a multistage sampling method comprising of 2 stages was

used to recruit participants. The study population comprised of doctors, nurses, laboratory scientists, pharmacists, ward orderlies and mortuary attendants. Data was obtained using a semi structured self-administered questionnaire. The results revealed that less than half of the healthcare workers (43.4%) had received the full dose of vaccine.[30] The use of semi structured questionnaires allows for more in depth responses which provides a better understanding of issues that quantitative data might overlook.

2.3 FACTORS ASSOCIATED WITH THE UPTAKE OF HEPATITIS B VACCINE

In 2020, a mixed-methods study was conducted to identify factors influencing Hepatitis B vaccination uptake among adults in Indonesia. The study aimed to assess barriers and facilitators of hepatitis B vaccination in the adult population and among healthcare providers. The survey was conducted among 893 participants from two provinces (Aceh and Yogyakarta), and in-depth interviews were conducted with 14 healthcare providers. The study used a sequential explanatory design, combining both quantitative and qualitative methods. The survey found that only 15% of participants received at least one dose of the Hepatitis B vaccine. Sociodemographic factors associated with vaccine uptake included living in Yogyakarta (higher vaccine uptake compared to Aceh), having secondary or higher education (compared to primary education), working as a healthcare worker (compared to other sectors), and having health insurance covering hepatitis B vaccination costs. [25] The strength of this study is the use of a mixed method design, that described potential discrepancies and correspondences of barriers from two different sides; the population (outpatient and healthcare workers) and the government.

A descriptive cross-sectional study carried out in Vietnam between April and June 2022, among 459 students to evaluate Hepatitis B virus (HBV) vaccine coverage and its associated factors among health science students. Respondents were selected via the non-probability

convenience sampling technique and a pretested self-administered questionnaire was used to collect data. Factors associated with full–dose vaccination status as revealed by the study was vaccination being 11.8 times higher in sixth-year medical students than any healthcare student in their first-year and significantly higher in those who had sufficient knowledge and positive attitudes than in their counterparts.[17] The key limitation of this study is the potential for lack of representativeness and bias.

In Somalia, a descriptive cross-sectional online survey to ascertain the uptake of hepatitis B vaccination and associated factors among 569 health sciences students was carried out from July to September 2022.The population was sampled using purposive nonprobability sampling technique and participants' information was collected using a structured questionnaire. Results showed that students greater than the age of 20 years were more likely to be vaccinated than those younger. Among those who had been vaccinated, second-year students were 78% less likely to be fully vaccinated compared to fourth-year students and students with good vaccination practices were almost 7 times more likely to be fully vaccinated compared to those with poor practices.[21] A short data collection period which may not fully capture seasonal variations or trends in vaccination uptake.

An analytical cross-sectional study was carried out in South Sudan in 2020 to assess the uptake of Hepatitis B vaccination among health care workers. A purposive sampling method was used in the selection of the teaching hospital while a convenience sampling technique was used to select participants for this study. A precoded self-administered semi structured questionnaire was used to collect data from 154 participants. In this study 51.9% of the respondents were married and were 8.942 times more likely to have been vaccinated compared to those who were not married. Also, respondents who knew that Hepatitis B is a vaccine preventable disease (79.2%) were 4.192 times more likely to get vaccinated than those who did not know. Willingness to receive the vaccine was also significantly associated

with the uptake of hepatitis B vaccine.[20] The study used a small sample size, so the findings cannot be generalized.

In 2022, A community-based, descriptive, cross-sectional study design was conducted between March and May in Gulu City, Uganda among 360 residents to determine HBV vaccine uptake and associated factors among adults. Samples were obtained by random sampling and data was collected using pretested structured questionnaires. Factors found to be significantly associated with vaccine uptake were access to health education and knowledge regarding HBV transmission. Among the participants who had received health education about two out of every five were vaccinated (44.1%), and the odds of vaccination was four times higher than those who did not receive health education about HBV vaccination. The study also revealed that among the participants who were not vaccinated at all, lack of trust for the vaccine was the most stated reason by 3 of every 10 participants, and about 10.5% were too busy which prevented them from taking up the HBV vaccine.[31] The major limitation of this study was the short data collection period which may not capture seasonal variations or trends in vaccination uptake.

A descriptive cross-sectional study was conducted in 2019 among 226 students in Ghana to assess Hepatitis B knowledge, testing, and vaccination history. A stratified sampling was used to select the study participants while a structured pretested questionnaire was used to collect data. The study showed that females were 2.18 times more likely to receive complete dose of Hepatitis B vaccine compared to their male counterpart. Top-up students and students that were never married had higher odds of being vaccinated than their respective counterparts.[32] Recall bias was minimized during data analysis as students were called to clarify inconsistent responses.

In Ekiti State, Nigeria, a descriptive cross-sectional study carried out among 420 registered non-medical students to assess the knowledge and associated factors for the uptake of Hepatitis B vaccine between March and May 2019. A multistage sampling technique was used to select the eligible students for the study while a structured pretested, self-administered questionnaire was used to collect data. Factors associated with the uptake of Hepatitis B vaccine revealed by the study include being female (45.7%), being between the age range of 25 – 29 years (30.6%), being Christian (27.4%), having a monthly allowance between 80,000 – 100,000 naira (28.6%) and having a good knowledge of the Hepatitis B vaccine (31.3%).[23]

In Calabar, Nigeria, a cross-sectional analytical study conducted among 392 health care workers between January and February 2021, to determine HBV knowledge and vaccination uptake among healthcare workers. A probability sampling method was used to recruit participants into this study and a semi-structured self-administered questionnaire was used to collect data from consenting HCWs. Vaccination status was classified as suboptimal (incomplete vaccination) and optimal (complete vaccination). Results showed that persons within the age group of 25 – 34 years were more fully vaccinated compared to the other age groups studied. The study also revealed that males (29.8%), people with tertiary level of education (29.1%), married people (25.8), doctors (45.3%) and people with adequate knowledge (32.7%) of Hepatitis B were more optimally vaccinated.[30] The probability sampling method used enhances the representation of sample and reduces selection bias of the study.

An institution-based cross-sectional study was conducted in 2022 with 260 health professionals working at primary health centers, private hospitals, and tertiary health institutions to investigate the relationship between knowledge, attitude, perception, and practice of hepatitis B vaccination among health workers in Ondo, Nigeria. The health

facilities were selected via simple random sampling and data was collected using interviewer-administered questionnaire. The study showed that being male (43.2%), people within the 31 – 35 years age group (53.3%), married people(57.6%), being Christian(41.6%), having a tertiary level of education(45.9%), being a community health officer(75%) and working in a teaching hospital(40%) were factors associated with the full uptake of the Hepatitis B vaccine.[33] Limited geographic scope, as such findings cannot be generalizable to health care workers in other regions on Nigeria.

2.4. BARRIERS TO THE UPTAKE OF HEPATITIS B VACCINE.

A cross-sectional study was done in Turkey in 2022, which aimed to identify the barriers against hepatitis B vaccination in high-risk adults. It was conducted in a 1000 bed tertiary care hospital, and 156 adults were selected using a systematic random sampling technique. Data was collected with a 34-item questionnaire administered over a phone call. The barriers to the uptake of the vaccine identified in this study were: fear of side effects, lack of recommendation of the vaccine from a healthcare worker, and the absence of a healthcare worker to monitor the completion of the 3 dose vaccine.[24] The major strength of this study is use of systemic random sampling which reduces selection bias and increases the representativeness of the sample within the hospital population.

An institution based cross-sectional survey was carried out between February and March 2020, in Aceh and Yogyakarta, Indonesia, to determine the barriers to and facilitators of Hepatitis B vaccination among the adult population. The study involved 893 participants who were randomly sampled from employment and data and patient register in sixteen selected health centers. Data was collected quantitively and qualitatively using study questionnaires and face to face interviews conducted by interviewers. Barriers noted in the findings were: lack of vaccine accessibility in certain areas, high cost of vaccination, limited human

resources to implement the Hepatitis B vaccination programme and the ineffective dissemination of the vaccine.[25] The major strength of this study is that the survey was conducted in two different regions and across sixteen health centers which increases the generalizability of the findings to a broader adult population in Indonesia.

Between April and June 2022, a mixed methods cross sectional study was conducted among 434 adult residents to assess the prevalence and factors associated with Hepatitis B vaccination uptake and completion among communities targeted for mass vaccination in Gulu, Northern Uganda. The study population consisted of individuals 18 years and above, residing in both urban and rural areas of Gulu, a multistage sampling method was used, and data was collected quantitatively using interviewer administered semi structured questionnaires. Findings revealed barriers to be: inadequate knowledge about the disease, access to vaccination sites, myths about the vaccine and inadequate community engagement.[27] The major strength of this study is the use of a multistage sampling technique which improves the representativeness of the sample and helps to include people from different demographics and geographic locations (urban and rural).

A qualitative study using key informant interviews was carried out among 18 midwifes in Accra, Ghana to identify the barriers to the timely administration of Hepatitis B birth dose vaccines to neonates of mothers with Hepatitis B. The study was done between January and March 2020, a purposive sampling technique was used, and the study population included midwives from two hospitals who had assisted or cared for mothers with HBV and their newborns in labour or postpartum ward for at least 6 months. The barriers identified in the results included mother's denial of Hepatitis B seropositivity; the mother's ignorance of the impact of Hepatitis B on their newborn; partners' non-involvement in post-test counselling; the high cost of Hepatitis B immunoglobulin and Hepatitis B monovalent vaccine; vaccine unavailability; and midwives' oversight and documentation lapses.[34] The key strength of this

study is the use of key informant interviews which provides in-depth and contextual understanding of the local culture, challenges or hidden issues that quantitative data might overlook.

In 2021, a study was done among healthcare workers to assess the Hepatitis B virus knowledge and vaccination status among healthcare workers in Calabar, Nigeria. It was a cross-sectional analytical study done among 392 healthcare workers, a multistage sampling method comprising of 2 stages was used to recruit participants. The study population comprised of doctors, nurses, laboratory scientists, pharmacists, ward orderlies and mortuary attendants. Data was obtained using a semi structured self-administered questionnaire. The result of the study showed the major barrier to receiving the vaccine was difficulty in accessing the vaccine.[30] The major strength of this study is the use of semi structured questionnaires allows for more in-depth responses which provides a better understanding of issues that quantitative data might overlook.

A qualitative study using key informant interviews was conducted among healthcare providers and pregnant women in Adamawa and Enugu States, Nigeria between August and September 2021, to identify the barriers and facilitators to hepatitis B birth dose vaccination. A total sample size of 87 individuals was used and data was collected using semi structured interviews. The barriers reported include: lack of Hepatitis B vaccine specific knowledge in the community, limited staffing within the health facility, lack of outreach to provide timely Hepatitis B birth dose to children born outside health facilities, and misconceptions on Hepatitis B birth dose timeliness and contraindications.[35] The key strength of this study is the use of key informant interviews which provides more depth to the answers, and allows the interviewers have a better understanding of the barriers.

In 2023, a descriptive cross-sectional study was carried out in Rivers State, Nigeria to assess the awareness of Hepatitis B vaccination and its uptake among adults in a tertiary health facility in South-South Nigeria. The study targeted the Rivers State University Teaching Hospital, a purposive sample of 260 consenting hospital personnel, adult patients and caregivers was used, data was collected using interviewer administered structured questionnaire. The barriers revealed in the study were: unavailability of the vaccine, cost of the vaccine, misconception on vaccines and safety concerns.[36] The key drawback of this study is the use of structured questionnaires which reduced flexibility of answers, and limited the ability of the interviewer to have a deeper understanding of the barriers to the uptake of the vaccine.

CHAPTER THREE

METHODOLOGY

STUDY AREA

The study was carried out in Benin City, which is the capital of Edo state, Nigeria. Edo state is one of the 6 southern states in the 36 states of Nigeria, with a population of approximately 8 million. It covers an area of about 17,802 square kilometres, and is bounded by Kogi State to the northeast and east, Anambra State to the east, Delta State to the southeast and east, and Ondo State to the west and northwest.[38] The Niger river flows along the state's eastern boundary. Edo State was formed in 1991 from the northern portion of Bendel, with the southern part becoming Delta State. Edo State lies at elevations between 500 feet in the South and more than 1,800 feet in the north. Its landscape is a mix of rainforest, savannah and wetlands which makes it suitable for agriculture.[38] The state is rich in natural resources which include crude oil, limestone and forests which contribute to its economy, agriculture remains a significant contributor to the economy with crops like cassava, yam, rice, maize and oil palm being cultivated. The main ethnic groups in Edo state are Edos, Afemais, Esans, Akoko Edos, and Owans. There are 18 local governments in Edo State, they are: Akoko-Edo, Egor, Esan Central, Esan North-East, Esan South-East, Esan West, Etsako Central, Etsako East, Etsako-West, Igueben, Ikpoba-Okha, Oredo, Ovia North-East, Ovia South-West, Owan East, Owan West and Uhunmwonde.[39]

Benin City is the capital and largest city of Edo State, it is the 4th largest city in Nigeria with a landmass of 1,204 km^2 and a total population of about 2,044,650 as at 2025.[40] It is situated along a branch of the Benin river, and lies along the main highways from Lagos to the Eastern states. Benin City is one of the principal historic kingdoms of the Western African forest region, and has long been famous for its brass work(bronzes), some of which are said

to date back to the 13th century, as well as its ivory and wood carvings. Benin City is the centre of Nigeria's rubber production, and it has several processing plants and a crepe rubber factory. Benin City is made up of five Local Government Areas: Egor, Ikpoba-Okha, Oredo, Uhunmwonde and Ovia North-East. Benin city has 445 healthcare facilities. There are 148 public primary healthcare centres (PHC), 223 private primary healthcare centres, 9 public secondary hospitals and 3 public tertiary hospitals.[41]

STUDY DESIGN

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

STUDY POPULATION

The study was carried out among residents in Benin city, Edo state.

SELECTION CRITERIA

Inclusion criteria

1. Adults aged 18-29 years above residing in Benin City. This was adapted from the Nigerian National Youth Policy which defines youths as young males and females in Nigeria and Diaspora between the ages of 18 and 29 years.[41]
2. Individuals who gave their consent.

Exclusion Criteria

1. Temporary visitors in Benin City.

STUDY DURATION

The study was carried out between January 2025 and April 2026, the timeline is represented in the Gantt chart presented in Appendix III.

SAMPLE SIZE DETERMINATION

The minimum sample size (n) was calculated using the Cochran's formula used for descriptive studies.

Cochran's Formula:

$$n = \frac{Z^2 * p * q}{d^2}$$

Where:

n = minimum sample size

z = standard normal deviate at 95% confidence level (1.96)

p = estimated proportion of the population with the attribute of interest

q = 1 - p

d = desired level of precision (0.05)

Parameter Estimation:

p: Based on a study conducted in Rivers Sate, Nigeria, only 69% of respondents were aware of the hepatitis B vaccine.[37]

Thus, p = 0.69

q = 1 - p = 1 – 0.69 = 0.31

Z = 1.96 (for 95% confidence level)

Sd = 0.05

Calculating the Sample Size:

$$n = \frac{Z^2 * p * q}{d^2}$$

$$n = \frac{1.96^2 * 0.69 * 0.31}{0.05^2}$$

= 328.84

Adjusting for non-response:

To account for a 10% non-response rate:

Non-response adjustment=10% of 328.84

= 32.884

≈ 32.9

Adjusted sample size = 328.84+32.9

= 361.9

≈ 362

Multiplying by a design effect of 1.5;

= 362 * 1.5

= 543

SAMPLING TECHNIQUE

A multistage sampling technique was used to select participants for this study. The sampling process was carried out in the following stages:

Stage 1: Selection of Local Government Area

One Local Government Area was selected by simple random sampling technique (balloting) from the four Local Government Areas in Benin City.

Stage 2: Selection of Wards

Ovia North East LGA has 13 administrative wards, using simple random sampling technique, three wards were selected from the total number of wards in the LGA.

Stage 3: Selection of Streets

From each of the three selected wards, the number of streets were enumerated, and half of the enumerated streets were selected using a systematic sampling technique.

Stage 4: Selection of Houses

From the selected streets, a systematic sampling method was used to select houses. A sampling interval was calculated based on the number of houses in the street. Every alternate house was selected till the required number of houses per street were achieved.

Stage 5: Selection of Households

In each selected house, one household was selected by simple random sampling (balloting).

Stage 6: Selection of Respondents

In each selected household, the eligible respondents (young adults aged 18-29 years) were selected.

DATA MANAGEMENT

Method of Data Collection

A pre-tested, web based, structured questionnaire was used, which was both interviewer and self-administered to eligible participants in Benin City, Edo State. Prior to participation, informed consent was obtained, and participants were assured of anonymity and confidentiality. Participation was entirely voluntary.

Tools for Data Collection

Data was collected using a structured, self-administered questionnaire comprising both close-ended and open-ended questions designed to address the objectives of the study. The questionnaire was divided into five sections:

Section A: Respondents' socio-demographic information (e.g., age, sex, faculty, department, academic level, socioeconomic background)

Section B: Knowledge of Hepatitis B vaccine among respondents

Section C: Level of uptake of Hepatitis B virus vaccine among respondents

Section D: Factors associated with level of uptake of Hepatitis B virus vaccine among respondents

Section E: Barriers to uptake of Hepatitis B virus vaccination among respondents

Research Assistants

Two research assistants who were university undergraduates were recruited and trained for two days on the objectives of the study and standard administration of the questionnaire.

They were briefed on how to ensure confidentiality and handle informed consent appropriately.

Pretesting

The questionnaire was pretested among 10% of the estimated sample size. This was to help identify ambiguous or unclear questions and allow for modifications to improve clarity, reliability, and validity of the tool.

Data Analysis

The filled questionnaires were thoroughly checked for any inconsistencies. Data coding and cleaning was performed. Data entry and analysis was carried out using the Statistical Package for the International Business Machines Corporation Social Science (IBM SPSS) version 27.0 software. Univariate analysis was done for continuous variables, measures of central tendencies (mean, median and mode) were used to describe the average and most common values. Measures of dispersion (standard deviation, range, interquartile range) were used to assess the spread and variability of the data by tabulating and reporting frequencies with their respective percentages. Bivariate analysis was carried out using the chi square test with p-values less than 0.05 considered statistically significant for qualitative variables, while multivariate analysis was done using binary logistic regression to control potential confounders. Results were interpreted in line with the study objectives.

Measurement of variables and Scoring

Occupation of respondents was classified using the revised socioeconomic classification by Ibadin and Akpede, which groups occupations into six classes based on level of skill, with the lower skill levels having a higher score.[42]

Skill level 1: Senior political office holders, top military officers, chief executives, and top professionals. Common examples include commissioners, directors, chief judges, professors, consultants, and chief executive officers.

Skill level 2: Senior public servants and large-scale business owners. Examples include senior civil servants, senior lecturers, large-scale contractors, big traders, and senior clergy.

Skill level 3: Skilled workers and middle-level officers. Examples include technologists, nurses, teachers, junior professionals, medium-scale business owners, and other skilled self-employed workers.

Skill level 4: Semi-skilled workers. Examples include clerical staff, technicians, artisans, drivers, mechanics, tailors, hairdressers, welders, carpenters, and electricians.

Skill level 5: Low-skilled workers. Examples include petty traders, clerical assistants, attendants, messengers, and subsistence farmers.

Skill level 6: Unemployed and dependents. Examples include the unemployed, full-time housewives, students, and apprentices.

For knowledge of Hepatitis B virus and its vaccination, correct answers were awarded a score of 1, and incorrect or "I don't know" answers were scored 0. Scores were totaled and converted into percentages. Knowledge was categorized as:[43]

Good Knowledge: ≥ 70%

Poor Knowledge: < 70%

Vaccination status of the respondents was determined using one question and grouped into 3 categories:[44]

Fully vaccinated: Those who have completed the 3 doses of the vaccine.

Partially vaccinated: Those who have taken 1 or 2 doses of the vaccine.

Not vaccinated: Individuals who have not received any dose of the vaccine.

Data Presentation

Findings from the study were presented using frequency distribution tables, pie charts, cross-tabulations, and descriptive summaries in prose format.

ETHICAL CONSIDERATIONS

Ethical approval and permission to carry out the study was obtained from the Ethics and Research Committee of the University of Benin Teaching Hospital. Permission was taken from the Head of Department of Public Health and Community Medicine, School of Medicine, College of Medical Sciences, University of Benin. Informed consent was also taken from the respondents before administering the questionnaires. The respondents were informed that they had the right to withdraw from the study, and that withdrawal posed no loss or harm.

STUDY LIMITATION

Self-Reported Data: The study relied on self-reported responses, which may have been subject to recall bias or social desirability bias, that is people may have given answers they thought were more acceptable or favorable rather than truthful ones.

Cross-Sectional Design: The cross-sectional nature limited the ability to establish causal relationships between knowledge, attitudes, and vaccination uptake. It only provided a snapshot at one point in time.

CHAPTER FOUR

RESULTS

A total of 543 respondents participated in the study giving a response rate of 100%. The results are presented in the following sections.

SECTION A: Respondents' Socio-Demographic Characteristics

SECTION B: Knowledge of Hepatitis B Vaccine Among Respondents

SECTION C: Level of uptake of Hepatitis B Virus (HBV) Vaccine Among Respondents

SECTION D: Factors associated with level of uptake of Hepatitis B Virus (HBV) Vaccine Among Respondents

SECTION E: Barriers to Hepatitis B Virus (HBV) Vaccination Among Respondents

SECTION A

RESPONDENTS’ SOCIODEMOGRAPHIC CHARACTERISTICS

Table 1: Socio-demographic characteristics of respondents

Variables	Frequency (n =543)	Percent
Age Group (years)		
<20	206	37.9
20–24	265	48.8
≥25	72	13.3
Mean age = 21.0 ± 2.8 years		
Sex		
Female	302	55.6
Male	241	44.4
Tribe		
Benin	165	30.4
Igbo	112	20.6
Esan	89	16.4
Yoruba	56	10.3
Urhobo	45	8.3
Hausa	16	2.9
Isoko	13	2.4
Etsako	13	2.4
Others*	34	3.6
Marital Status		
Single	521	95.9
Married	22	4.1
Religion		
Christianity	527	97.1
Islam	13	2.4
African Traditional Religion	3	0.6
Highest Level of Education		
Primary	13	2.4
Secondary	513	94.5
Tertiary	17	3.1
Employment Status		
Unemployed	413	76.1
Employed	130	23.9
Occupation		
Level 3	84	15.5
Level 4	33	6.1
Level 5	13	2.4
Level 6	413	76.0
Monthly Income Group		
<₦70,000	405	74.6
≥₦70,000	138	25.4

*Others include; Tiv, Idoma, Ibibio, Delta-Igbo, Efik, Ijaw, Ika

A total of 543 respondents participated in the study. Nearly half were aged 20–24 years 265 (48.8%), followed by those below 20 years 206 (37.9%), while 72 (13.3%) were aged 25 years or above, with a mean age of 21.0 ± 2.8 years. Females were the slight majority, accounting for 302 (55.6%) of respondents while males were 241 (44.4%). The most common tribes were Benin 165 (30.4%), Igbo 112 (20.6%), Esan 89 (16.4%), Yoruba 56 (10.3%), and Urhobo 45 (8.3%). The majority were single 521 (95.9%), Christian 527 (97.1%), had secondary education as their highest level 513 (94.5%), were unemployed 414 (76.2%), were in the occupational level 3 84 (15.1%), and earned less than ₦70,000 405 (74.6%).

SECTION B

KNOWLEDGE OF HEPATITIS B VACCINE AMONG RESPONDENTS

Table 2a: Knowledge of Hepatitis B Virus (HBV) Infection Among Respondents

Variables	Frequency	Percent
Ever heard about Hepatitis B virus (n=543)		
Yes	402	74.0
No	141	26.0
Source of information about HBV (n = 402) *		
Social media	178	44.3
Healthcare workers	166	41.3
Friends	88	21.9
Television	79	19.7
Family	70	17.4
Routes of HBV transmission (n=402) *		
Radio	40	10.0
Having sex with infected persons	240	59.7
Contact with blood of infected person	203	50.5
Using contaminated sharp objects	166	41.3
Sharing of needles	150	37.3
Mother-to-child during childbirth	149	37.1
Mother-to-child during breastfeeding	98	24.4
Sharing toothbrushes with infected persons	95	23.6
Hereditary	57	14.2
Touching infected person	48	11.9
Contaminated food/water	40	10.0
Airborne	38	9.5
Dining with infected person	22	5.5
I don’t know	58	14.4
Symptoms of HBV infection (n=402) *		
Jaundice	147	36.6
Fever	146	36.3
Abdominal pain	121	30.1
Diarrhea	70	17.4
I don't know	99	24.6
Incubation period after exposure (n=402)*		
2 months	90	22.4
1 year	57	14.2
3 months	53	13.2
5 months	8	2.0
1 week	6	1.5
I don't know	184	45.8

*Multiple Response Questions (MRQ)

Most of the respondents 402 (74.0%) had heard about HBV, while 141 (26.0%) had not. Among those who were aware, social media 178 (44.3%) was the most common source of information, with radio 40 (10.0%) being the least common source. Sexual contact with an infected person 240 (59.7%) was the most commonly identified route of transmission, 22 (5.5%) respondents identified dining with an infected person as a route of transmission while 58 (14.4%) did not know any route of transmission.

Jaundice was the most commonly recognized symptom, identified by 147 (36.6%) respondents, fever 146 (36.3%), abdominal pain 121 (30.1%), with diarrhoea 70 (17.4%) being the least recognized symptom. 99 (24.6%) respondents reported that they were not aware of any symptoms of HBV.

Concerning incubation period, 90 (22.4%) respondents selected two months, the majority, 184 (45.8%), indicated that they did not know, only 6 (1.5%) participants selected one week.

Table 2b: Knowledge of Hepatitis B Virus (HBV) Infection Among Respondents

Variables	Frequency (n = 402)	Percent
Risk factors for HBV infection*		
Multiple sexual partners	215	53.5
Blood transfusion from unscreened donors	182	45.3
Born to an HBV-infected mother	121	30.1
Working in healthcare	71	17.7
Eating undercooked meat	14	3.5
I don't know	68	16.9
HBV increases risk of liver cirrhosis, cancer and/or failure		
Yes	227	56.5
No	43	10.7
I don’t know	132	32.8
Methods of prevention of HBV infection *		
Safe sex	202	50.2
Safe disposal of used sharp objects	163	40.5
Vaccination	156	38.8
Hand hygiene	63	15.7
Antibiotics	60	14.9
Herbal supplements	26	6.5
I don't know	54	13.4
Most effective method of prevention		
Vaccination	191	47.5
Safe sex	85	21.1
Antibiotics	38	9.5
Wearing masks	15	3.7
Herbal supplements	6	1.5
I don't know	67	16.4
Cure for HBV infection		
Yes, completely curable	76	18.9
No, but it can be managed	161	40.0
Not sure	165	41.0
Overall level of knowledge of Hepatitis B virus		
Good knowledge	99	24.6
Poor knowledge	303	75.4

*MRQ

Multiple sexual partners 215 (53.5%) and unscreened blood transfusions 182 (45.3%) were the most identified risk factors. Most respondents 227 (56.5%) recognized HBV's risk for liver complications. Vaccination was identified as the single most effective prevention method by 191 (47.5%). Overall, 303 (75.4%) had poor knowledge and 99 (24.6%) had good knowledge of HBV infection.

Table 3: Knowledge of the HBV vaccine Among Respondents

Variables	Frequency	Percent
Ever heard of the Hepatitis B vaccine (n = 543)		
Yes	296	54.5
No	247	45.5
Source of information about HBV vaccine (n = 296)*		
Healthcare workers	130	43.9
Social media	121	40.9
Friends	61	20.6
Television	44	14.9
Family	42	14.2
Radio	34	11.5
Purpose of the Hepatitis B vaccine (n = 296)		
To prevent HBV infection	191	64.5
To cure HBV	48	16.2
To treat symptoms	29	9.8
Not sure	28	9.5
Number of doses needed for full protection (n = 296)		
One	17	5.7
Two	29	9.8
Three	94	31.8
Not sure	156	52.7
Who should receive the HBV vaccine (n = 296)*		
Everyone regardless of risk	134	45.3
Adults with multiple sexual partners	95	32.1
Newborn babies	81	27.4
Healthcare workers	63	21.3
Only people with liver disease	32	10.8
I don't know	48	16.2
Where to obtain the HBV vaccine (n = 296)*		
Hospitals	194	65.5
Health centres	170	57.4
Community health campaigns	60	20.3
Maternity clinics	46	15.5
Pharmacies	30	10.1
Overall knowledge of HBV vaccine (n=296)		
Good knowledge	50	16.9
Poor knowledge	246	83.1

*Multiple Response Questions

Of all 543 respondents, 296 (54.5%) had heard of the Hepatitis B vaccine while 247 (45.5%) had not. Among those aware, healthcare workers 130 (43.9%) and social media 121 (40.9%) were the leading sources, with family 42 (14.2%) and radio 34 (11.5%) being the least. The majority 191 (64.5%) correctly identified prevention as the vaccine's purpose while 28 (9.5%) were not sure of the purpose of the vaccine. Over half of those who had heard of the vaccine 156 (52.7%) were unsure of the number of doses required, with only 94 (31.8%) correctly identifying three doses as the required dosage for full protection. Majority 134 (45.3%) of the respondent agreed that everyone regardless of the risk should receive the vaccine while 35 (10.8%) of the respondents said that only individuals with liver disease should receive the vaccine. A majority of the respondents 194 (65.5%) picked hospitals as their preferred place for receiving the vaccine while 30 (10.1) chose pharmacies. Overall, 246 (83.1%) had poor knowledge and 50 (16.9%) had good knowledge of the HBV vaccine.

Table 4: Association between socio-demographic characteristics and knowledge of the HBV vaccine among respondents

Variable	Knowledge		Test Statistic (χ^2)	p-value
	Good (n=50) Freq (%)	Poor (n= 246) Freq (%)		
Age Group (years)				
<20	4 (4.1)	93 (95.9)	17.131	**<0.001**
20–24	34 (22.2)	119 (77.8)		
≥25	12 (26.1)	34 (73.9)		
Sex				
Female	38 (20.8)	145 (79.2)	5.122	**0.024**
Male	12 (10.6)	101 (89.4)		
Ethnic Group				
Edo Indigenes	27 (18.8)	117 (81.3)	0.690	0.406
Non-Edo Indigenes	23 (15.1)	129 (84.9)		
Marital Status				
Single	48 (17.1)	233 (82.9)	0.143	0.706
Married	2 (13.3)	13 (86.7)		
Religion				
Christian	49 (17.0)	240 (83.0)	0.035	0.852
Muslim	1 (14.3)	6 (85.7)		
ATR	0 (0.0)	0 (0.0)		
Employment Status				
Employed	8 (11.6)	61 (88.4)	1.799	0.180
Unemployed	42 (18.5)	185 (81.5)		
Occupation				
Level 3	5 (11.4)	39 (88.6)	3.255*	0.354
Level 4	3 (17.6)	14 (82.4)		
Level 5	0 (0)	9 (100)		
Level 6	42 (18.6)	184 (81.4)		
Monthly Income Group				
<₦70,000	32 (13.0)	177 (79.3)	14.319	**0.001**
≥₦70,000	69 (79.3)	18 (20.7)		
Level of Education				
Primary	0 (0.0)	5 (100.0)	1.567*	0.457
Secondary	49 (17.5)	231 (82.5)		
Tertiary	1 (9.1)	10 (90.9)		

*Fisher-Freeman-Halton Exact Test

Good knowledge increased progressively from 4 (3.9%) among those aged <20 years to 12 (26.1%) among those ≥25 years (p > 0 001, χ^2 = 17.131). Females 38 (20.8%) had a higher proportion of good knowledge than males 12 (10.6%) (p = 0.024, χ^2 = 5.122), Edo indigenes

27 (18.8%) demonstrated better knowledge of the vaccine than non-Edo indigenes 23 (15.1%) ($p = 0.406$, $\chi^2 = 0.690$), singles 48 (17.2%) also had a higher proportion of knowledge than respondents who were married 2 (13.3%) ($p = 0.706$, $\chi^2 = 0.143$). For income, respondents who earned ≥₦70,000 69 (79.3%) had a higher level of knowledge than those who earned <₦70,000 32 (13.0%) ($p = 0.001$, $\chi^2 = 14.319$), and respondents with secondary level of education 49 (17.5%) had better knowledge than those with primary 0 (0.0%) and tertiary levels 1 (9.1%) ($p = 0.457$, $\chi^2 = 1.567$)

Table 5: Association between knowledge of HBV infection and knowledge of the HBV vaccine among respondents

Variable	Knowledge of HBV Vaccine		Test Statistic (χ^2)	p-value
	Good (n=50) Freq (%)	Poor (n=246) Freq (%)		
Knowledge of HBV Infection				
Good	44 (50.0)	44 (50.0)	91.817	**<0.001**
Poor	5 (2.7)	181 (97.3)		

p-value from Exact Sig. (2-sided)

There was a highly significant association between knowledge of HBV infection and knowledge of the HBV vaccine (91.056, $p < 0.001$). 45 (50.0%) of respondents with good HBV infection knowledge also had good vaccine knowledge, while 5 (2.6%) of respondents with poor HBV infection knowledge had good knowledge about the vaccine.

Table 6a: Predictors of knowledge of HBV vaccine among respondents

Predictors	β (Regression Coefficient)	Odds ratio	95% CI		p-value
			Lower limit	Upper limit	
Age (years)	0.266	1.305	1.100	1.548	**0.002**
Sex					
Male*		1			
Female	0.330	1.391	0.504	3.844	0.524
Ethnic group					
Non-Edo indigenes*		1			
Edo indigenes	0.429	1.536	0.657	3.588	0.322
Marital status					
Single		1			
Married	2.352	10.502	1.292	85.345	0.028
Religion					
Christianity*		1			
Islam/ATR	-0.515	0.598	0.035	10.307	0.723
Level of Education					
Secondary*		1			
Primary	-18.592	0.000	0.000	—	0.999
Tertiary	-0.674	0.510	0.041	6.344	0.601
Employment Status					
Unemployed*		1			
Employed	0.280	1.323	0.018	96.217	0.898
Occupation					
Level 6*		1			
Level 3	-2.129	0.118	0.002	8.177	0.324
Level 4	-0.339	0.713	0.008	66.049	0.883
Level 5	-18.495	0.000		—	0.999

CI = Confidence Interval; * = Reference Category; Bold = statistically significant ($p < 0.05$)

For every one year increase in age, respondents were 1.305 times more likely to have good knowledge of Hepatitis B vaccine (OR = 1.305, 95% CI: 1.100 – 1.547, p = 0.002), females were 1.391 times more likely than males (OR = 1.391, 95% CI: 0.503 – 3.844, p = 0.524). Edo indigenes were 1.536 times more likely to have good knowledge than non-Edo indigenes (OR = 1.536, 95% CI: 0.657 – 3.588), married respondents 10.503 times more likely than the single ones (OR = 10.502, 95% CI: 1.292 – 85.345), Muslims and African traditionalists were 0.598 times less likely to have good knowledge than Christians (0R = 0.598, 95% CI: 0.035 – 10.307). Employed respondents were 1.324 times were less likely to have good vaccine knowledge (OR = 1.323, 95% CI: 0.018 – 96.217, p = 0.898). Respondents in occupation levels 3, 4, and 5 were less likely than those in the reference group to be fully vaccinated and this was not statistically significant (OR = -2.129, 95% CI = 0.002 – 8.177, p = 0.324; OR = 0.713, 95% CI = 0.008 – 66.049, p = 0.883; and OR = 0.000, p = 0.999).

Table 6b: Predictors of knowledge of HBV vaccine among respondents

Predictors	β (Regression Coefficient)	Odds ratio	95% CI		p-value
			Lower limit	Upper limit	
Monthly Income					
<₦70,000*		1			
≥₦70,000	0.903	2.467	0.909	6.698	0.076
Knowledge of HBV Infection					
Poor		1			
Good	3.816	45.414	12.092	170.561	**<0.001**

CI = Confidence Interval; * = Reference Category; Bold = statistically significant ($p < 0.05$)

Respondents who earned ≥₦70,000 were 2.467 times more likely to have good knowledge of the vaccine (OR = 2.467, 95% CI: 0.909 – 6.698, p = 0.0076), knowledge of the HBV infection was a significant predictor as respondents with good knowledge were 45.414 times more likely to have good knowledge of the vaccine than those with poor knowledge of the infection (OR = 45.414, 95% CI: 12.092 – 170.561).

SECTION C

LEVEL OF UPTAKE OF HEPATITIS B VIRUS (HBV) VACCINE AMONG RESPONDENTS

Table 7: Uptake of Hepatitis B vaccination among respondents

Variables	Frequency (n=543)	Percent
Ever received the Hepatitis B vaccine		
Yes	99	18.2
No	444	81.8
Number of doses received (n = 99)		
1 dose	44	44.4
2 doses	22	22.2
3 doses	33	33.3
Where vaccine was received? (n = 99)		
Hospital	64	64.6
Health centre	13	13.1
Private clinic	10	10.1
School campaign	7	7.1
Workplace	5	5.1
Willingness to take the vaccine if offered free (n = 444)		
Yes	148	33.3
No	120	27.1
Maybe	176	39.6
HBV vaccination be mandatory for*		
Healthcare workers	411	85.4
Medical students	394	81.9
Elderly	328	68.2
Vaccination Status (n = 543)		
Fully vaccinated	33	6.1
Partially vaccinated	66	12.2
Not vaccinated	444	81.8

*MRQ

Of the 543 respondents, 99 (18.2%) had received at least one dose of the Hepatitis B vaccine while 444 (81.8%), had not been vaccinated. Among the 99 vaccinated respondents, 44 (44.4%) had received only one dose, 22 (22.2%) two doses, and 33 (33.3%) had completed the full three-dose series. Hospitals were the most common vaccination site 64 (64.6%). Overall, only 33 (6.1%) were fully vaccinated, 66 (12.2%) were partially vaccinated and 444 (81.8%) were not vaccinated. When offered the vaccine for free, 148 (33.3%) agreed, 120 (27.1%) declined, and 176 (39.6%) were unsure.

SECTION D

FACTORS ASSOCIATED WITH LEVEL OF UPTAKE OF HEPATITIS B VIRUS (HBV) VACCINE AMONG RESPONDENTS

Table 8: Association between socio-demographic characteristics and vaccination status among respondents

Variable	Vaccination Status			Test Statistic (χ^2)	p-value
	Fully Vaccinated (n=33) Freq (%)	Partially Vaccinated (n=66) Freq (%)	Not Vaccinated (n=444) Freq (%)		
Age Group (years)					
<20	3 (1.5)	13 (6.3)	190 (92.2)	36.067	**<0.001**
20–24	18 (6.8)	40 (15.1)	207 (78.1)		
≥25	12 (16.7)	13 (18.1)	47 (65.3)		
Sex					
Female	18 (6.0)	49 (16.2)	235 (77.8)	10.591	**0.005**
Male	15 (6.2)	17 (7.1)	209 (86.7)		
Ethnic Group					
Edo indigenes	17 (6.3)	35 (13.0)	218 (80.7)	0.400	0.819
Non-Edo Indigenes	16 (5.9)	31 (11.4)	226 (82.8)		
Marital Status					
Single	32 (6.1)	63 (12.1)	426 (81.8)	0.130*	0.937
Married	1 (4.5)	3 (13.6)	18 (81.8)		
Religion					
Christianity	33 (6.3)	64 (12.1)	430 (81.6)	0.615*	0.806
Islam	0 (0.0)	2 (15.4)	11 (84.6)		
ATR*	0 (0.0)	0 (0.0)	3 (100.0)		
Employment Status					
Employed	6 (4.6)	17 (13.1)	107 (82.3)	0.727	0.695
Unemployed	27 (6.5)	49 (11.9)	337 (81.6)		
Occupation					
Level 3	3 (3.6)	9 (10.7)	72 (85.7)	3.590*	0.732
Level 4	2 (6.1)	6 (18.2)	25 (75.8)		
Level 5	0 (0.0)	2 (15.4)	11 (84.6)		
Level 6	28 (6.8)	49 (11.9)	336 (81.4)		
Monthly Income Group					
<₦70,000	26 (11.8)	47 (23.2)	332 (65.0)	0.712	0.700
≥₦70,000	7 (5.1)	19 (13.8)	112 (81.8)		
Level of Education					
Primary	0 (0.0)	0 (0.0)	13 (100.0)	3.700*	0.448
Secondary	32 (6.2)	65 (12.7)	416 (81.1)		
Tertiary	1 (5.9)	1 (5.9)	15 (88.2)		

*Fisher-Freeman-Halton Exact Test, ATR = African Traditional Religion

Respondents aged below 20 years 3 (1.5%) were fully vaccinated compared to those aged 25 years and above 12 (16.7%). In contrast, younger respondents recorded higher proportion of non-vaccination at 190 (92.2%), indicating lower vaccine uptake among younger age groups and this was statistically significant ($\chi^2 = 36.067$, $p < 0.001$). Full vaccination status was similar between males 15 (6.2%) and females 18 (6.0%), however males had a higher proportion of non-vaccination 206 (86.7%), while females 49 (16.2%) recorded a higher proportion of partial vaccination compared to males 17 (7.1%), this association was statistically significant ($\chi^2 = 10.591$, $p = 0.005$). Edo indigenes 17 (6.3%) had full vaccination status compared to Non-Edo indigenes 16 (5.9%) and this association was not statistically significant, ($\chi^2 = 0.400$*, $p = 0.819$). Married individuals 1 (4.5%) had full vaccination status compared to single individuals 32 (6.1%), but this association was not statistically significant ($\chi^2 = 0.130$*, $p = 0.937$). With increasing level of education, the proportion of not vaccinated individuals increased from 416 (81.1) with secondary level of education to 15 (88.2) with tertiary level of education, however this association was not statistically significant ($\chi^2 = 3.700$*, $p = 0.448$).

Table 9: Association between knowledge of HBV Infection and HBV vaccine with vaccination status among respondents

Variables	Vaccination Status			Test (χ^2)	p-value
	Fully Vaccinated (n=33) Freq(%)	Partially Vaccinated (n=66) Freq(%)	Not Vaccinated (n=444) Freq(%)		
Knowledge of HBV Infection					
Good	27 (27.3)	29 (29.3)	43 (43.4)	105.384	**<0.001**
Poor	5 (1.7)	26 (8.6)	272 (89.8)		
Knowledge of HBV vaccine					
Good	21 (42.0)	18 (36.0)	11 (22.0)	93.812	**<0.001**
Poor	9 (3.7)	33 (13.4)	204 (82.9)		

Respondents with good HBV knowledge, 27 (27.3%) were fully vaccinated and 29 (29.3%) were partially vaccinated, compared to only 5 (1.7%) fully and 26 (8.6%) partially vaccinated among those with poor knowledge. This association was statistically significant (χ^2=105.384, $p < 0.001$). Similarly, among those with good vaccine knowledge, 21 (42.0%) were fully vaccinated compared to only 9 (3.7%) of those with poor vaccine knowledge and this association was statistically significant (χ^2=93.812, $p < 0.001$).

Table 10a: Predictors of full vaccination status against Hepatitis B among respondents

Predictors	β (Regression Coefficient)	Odds ratio	95% CI		p-value
			Lower limit	Upper limit	
Age (in years)	0.1998	1.219	1.004	1.480	**0.046**
Sex					
Male*		1			
Female	-0.876	0.416	0.138	1.258	0.120
Tribe					
Non-Edo indigenes*		1			
Edo indigenes	-0.013	0.987	0.382	2.553	0.979
Marital Status					
Single*		1			
Married	2.017	7.518	0.598	94.547	0.118
Religion					
Christian*		1			
Muslim/ATR	-30.9754	0.000	0.000	—	>0.999
Level of Education					
Secondary*		1			
Primary	-17.216	0.000	0.000	—	0.999
Tertiary	-0.236	0.790	0.046	13.428	0.870
Employment Status					
Unemployed*		1			
Employed	0.729	2.073	0.023	184.070	0.750
Occupation					
Level 6*		1			
Level 3	-1.552	0.212	0.002	19.008	0.499
Level 4	-0.005	0.995	0.008	123.423	0.998
Level 5	-17.946	0.000	0.000	—	0.999

CI = Confidence interval; *Reference category

The odds of being fully vaccinated against Hepatitis B increased with age and this was statistically significant (OR = 1.219, 95% CI = 1.004 – 1.480, p = 0.046). Female respondents were less likely than males to be fully vaccinated, but this was not statistically significant (OR = 0.416, 95% CI = 0.138 – 1.258, p = 0.120). Respondents who were Edo indigenes were slightly less likely than non-Edo indigenes to be fully vaccinated and this was not statistically significant (OR = 0.987, 95% CI = 0.382 – 2.553, p = 0.979). Married respondents were more likely than those who were single to be fully vaccinated, but this was not statistically significant (OR = 7.518, 95% CI = 0.598 – 94.547, p = 0.118). Respondents who were Muslims/ATR were less likely than Christians to be fully vaccinated and this was not statistically significant (OR = 0.000, p = 1.000). Respondents with primary and tertiary level of education were less likely than those with secondary level of education to be fully vaccinated, and these were not statistically significant (OR = 0.000, p = 0.983 and OR = 0.790, 95% CI = 0.046 – 13.428, p = 0.870). Employed respondents were more likely than unemployed respondents to be fully vaccinated, but this was not statistically significant (OR = 2.071, 95% CI = 0.023 – 183.944, p = 0.750). Respondents in occupation levels 3, 4, and 5 were less likely than the reference group to be fully vaccinated and this was not statistically significant (OR = 0.212, 95% CI = 0.002 – 19.008, p = 0.499; OR = 0.995, 95% CI = 0.008 – 123.423, p = 0.998; and OR = 0.000, p = 0.999).

Table 10b: Predictors of full vaccination status against Hepatitis B among respondents

Predictors	β (Regression Coefficient)	Odds ratio	95% CI		p-value
			Lower limit	Upper limit	
Monthly Income Group					
<₦70,000*		1			
≥₦70,000	-0.602	0.548	0.178	1.686	0.294
Knowledge of HBV Infection					
Poor *		1			
Good	2.199	9.012	1.962	41.393	**0.005**
Knowledge of HBV Vaccine					
Poor *		1			
Good	1.726	5.618	1.813	17.410	**0.003**

CI = Confidence interval; *Reference category

Respondents with monthly income ≥₦70,000 were less likely than those earning <₦70,000 to be fully vaccinated, but this was not statistically significant (OR = 0.548, 95% CI = 0.178 – 1.686, p = 0.294). Respondents with good knowledge of Hepatitis B infection were more likely than those with poor knowledge to be fully vaccinated and this was statistically significant (OR = 9.011, 95% CI = 1.962 – 41.393, p = 0.005). Respondents with good knowledge of the Hepatitis B vaccine were also more likely than those with poor knowledge to be fully vaccinated and this was statistically significant (OR = 5.618, 95% CI = 1.813 – 17.410, p = 0.003).

SECTION E

BARRIERS TO HEPATITIS B VIRUS (HBV) VACCINATION AMONG RESPONDENTS

Table 11: Barriers to Hepatitis B vaccination among unvaccinated and incompletely vaccinated respondents

Variables	Frequency	Percent
Reasons for not taking the vaccine (n = 444)*		
Not aware of the vaccine	174	39.1
Not interested	70	15.8
Inaccessible	49	11.0
Fear	34	7.7
Cost of vaccine	15	3.4
Myths on the vaccine	12	2.7
HepB positive	11	2.5
Observed side effects in others	6	1.4
Pregnancy	5	1.1
Out of stock	4	0.9
Not sure	64	14.4
Reasons for not completing the vaccine series (n = 66)*		
Not aware of other doses	17	25.8
Out of stock / not available	12	18.2
Inaccessible	12	18.2
Myths on the vaccine	5	7.6
Fear	2	3.0
Cost of vaccine	2	3.0
Observed side effects	2	3.0

*Multiple responses questions

Among the 444 respondents who had not been vaccinated, the most prevalent barrier was lack of awareness 174 (39.2%), followed by lack of interest 70 (15.8%), not sure 64 (14.4%), inaccessibility 49 (11.0%), and fear 34 (7.7%). Among the 66 who started but did not complete the series, not being aware of the need for additional doses was the most common reason 17 (25.8%), followed by vaccine unavailability and inaccessibility at 12 (18.2%) each.

CHAPTER FIVE

DISCUSSION

This study was done to assess the knowledge and level of uptake of Hepatitis B vaccination among young adults in Benin City, as well as the factors associated with uptake, and barriers to the uptake of the vaccine. Our findings showed that knowledge about the purpose of the vaccine, doses needed for full protection, who should receive the vaccine and where to obtain it was poor, with significant associations observed between age, sex, monthly income and knowledge of the vaccine. Level of uptake of the vaccine was also found to be poor, with numerous barriers identified, highlighting the need for strategies to be put in place to tackle these barriers and improve the rate of uptake.

In this study, nearly half of the respondents were in the 20-24 age bracket, about one-third were less than 20 years, and about one-tenth were 25 years or more with a mean age of 21.0 ± 2.8 years, this is comparable to a study done in Plateau State, Nigeria, which reported a mean age of 21.2 ± 1.7.[29] This age distribution is in line with the Nigerian National Youth Policy, which defined young adults as individuals aged between 18 – 29 years.[41] More than half of the respondents were females, this is consistent with a study done in South-South Nigeria, in which more of the respondents were females.[36] The Benin tribe was the predominant tribe, this reflects the underlying ethnic distribution of the study area, where indigenes form the majority, as Benin city is the ancestral home of the Benins. Majority of the respondents were single, which may be attributable to the age distribution of the study population, as this life stage is largely characterized by ongoing education and early career development, which tend to delay marriage. This is comparable to a study done in Ekiti state, Nigeria, in which most of the respondents were single.[23] A large proportion of respondents were Christians, this may be due to early western influences and missionary activities in Southern Nigeria and is similar

to a study done in a tertiary institution in South-Eastern Nigeria, in which all respondents were Christians.[22] Most of the respondents had secondary level of education, this may be attributed to the study being conducted among young adults, a large proportion of whom are likely to be actively engaged in tertiary education, it could also be a reflection of the educational attainment pattern in the area, where secondary education is more widely accessible and commonly completed compared to tertiary education. This finding contrasts with that of a study done in Calabar, Nigeria, where most of the respondents had tertiary level of education.[30] About two-third of them were unemployed, among those employed, most of them fell in the level 3 category. The high proportion of unemployed respondents maybe attributable to the age composition of the study population, with many still undergoing tertiary education or training in various skillsets. This is similar to a study carried out in Owerri, Nigeria in which a large proportion of respondents were unemployed.[45] Majority had a monthly income less than ₦70,000, this maybe a reflection of the economic realities of Nigeria characterized by high unemployment rates, and a predominance of informal sector occupations, where earnings are usually low. This is similar to a study done in Ekiti state, Nigeria, in which most of the respondents earned less than ₦60,000.[23]

Findings from this study revealed that about three-quarter of the respondents had heard of hepatitis B virus, which may be due to increased information from media sources and possibly health campaigns by health care workers. Similarly, in a study done in the University of Ibadan, Nigeria, over three-quarter of the respondents had heard about Hepatitis B Virus with the major source of information being the media.[46] This however, is in contrast to a study done in Ekiti state, Nigeria with only about one-third of the respondents having heard about the virus.[47]

More than half of the respondents who had heard of HBV correctly identified sexual intercourse with an infected person and contact with infected blood as modes of transmission

of the virus. Additionally, over one-third recognized jaundice and fever as symptoms of HBV, identified having multiple sexual partners and receiving blood from unscreened donors as risk factors for infection, and acknowledged vaccination as the most effective means of preventing HBV infection. This is likely due to exposure to health information through mass media and interactions with healthcare workers during routine care and public health campaigns.

This is comparable to a study done among students in a public university in Southwestern Nigeria, where majority of the respondents knew that fever and jaundice were symptoms of HBV, sexual intercourse and blood transfusion were method of transmission of the virus and it significantly increases one's risk of getting infected with the virus, and that vaccination was a means of preventing HBV infection.[48] It however is in contrast to a study done in Pakistan where more than half of the respondents did not know the appropriate mode of transmission of the virus.[49]

Overall, less than one-fourth of the respondents had good knowledge of the Hepatitis B virus. This may be due to superficial exposure to information, where individuals have heard of hepatitis B but lack in-depth understanding of its transmission, symptoms, and prevention. This is in keeping with findings from a study done in Ekiti state, where over one-third of the respondents had poor knowledge of Hepatitis B infection.[47] Knowledge of symptoms such as jaundice and fever, and recognition of risk factors like multiple sexual partners and unscreened blood transfusion, indicates that a proportion of the population can potentially recognize risk and seek appropriate care when necessary. However, the fact that only about one-third demonstrated good knowledge of symptoms and risk factors points to important gaps.

This incomplete understanding may lead to delayed health-seeking behavior, continued engagement in risky practices, and missed opportunities for early diagnosis and vaccination. In an endemic setting such as Nigeria, such gaps can sustain the silent spread of infection and increase the burden of chronic liver disease and its complications. Massive enlightenment campaigns in form of health education by healthcare workers on HBV disease clinical presentation, risk factors, mode of transmission and its preventive measures is strongly recommended. Also, public health authorities should implement sustained, community-based and healthcare-integrated education programs that focus on improving comprehensive knowledge of hepatitis B, while promoting routine screening and vaccination uptake.

More than half of the respondents had heard about Hepatitis B vaccine, and less than half of them heard about the vaccine from healthcare workers and social media. This may be due to the subject not being widely or consistently discussed on social media platforms, limiting its visibility among respondents who rely on digital sources for health information. It contrasts to a study done in Southeastern Nigeria where more than three quarters of the respondents knew about Hepatitis B Vaccine from health care workers.[22] This is similar to a study done in Ghana where more than half of the respondents had heard about Hepatitis B vaccine.[50]

This study found that that about two-thirds of the respondents knew that the hepatitis B vaccine is used to prevent infection. More than one-fifth of them identified healthcare workers, newborn babies, and people with multiple sexual partners as groups that should receive the vaccine. However, more than half of the respondents did not know the number of doses required for full protection, with only one-third reporting that three doses are needed for complete protection. The poor knowledge may be due to superficial awareness of hepatitis B vaccination, particularly from social media, where respondents are familiar with the general preventive purpose but lack detailed knowledge of the vaccination schedule and target groups.

This finding is similar to a study conducted in Southeastern Nigeria, where over nine-tenths of respondents knew that the vaccine prevents infection. In contrast, that study reported better knowledge of vaccine eligibility and dosing, with more than half correctly identifying healthcare workers and infants as target groups, and about two-thirds correctly stating that three doses are required for full protection, while fewer than one-fourth did not know how many doses are needed.[22]

Overall, less than one-fifth of the respondents had good knowledge of the hepatitis B vaccine. This may be due to limited exposure to comprehensive health education, where information received is often incomplete and focuses on general awareness rather than detailed aspects such as dosage schedules and target groups. This is in contrast to a study conducted among medical students in Jos, where more than half of the respondents had good knowledge of the vaccine.[51]

Poor understanding of key details such as dosage and eligible groups can contribute to suboptimal vaccine uptake and incomplete immunization, thereby sustaining the risk of hepatitis B transmission within the population. Health authorities should intensify structured health education on hepatitis B vaccination through healthcare workers and community-based outreach, with clear emphasis on vaccination schedules, eligible populations, and the importance of completing the full dose series to improve uptake and reduce transmission.

At the bivariate level, respondents aged ≥25 years, females, those earning ≥₦70,000, and individuals with good knowledge of Hepatitis B infection were significantly more likely to have good knowledge of the vaccine ($p < 0.05$), while ethnic group, marital status, religion, employment status, occupation, and level of education showed no significant association. This pattern may reflect greater exposure to health information and stronger health-seeking behavior among older individuals, females, and higher-income groups. The observed

association between knowledge of Hepatitis B infection and vaccine awareness is consistent with findings from Cambodia, where infection knowledge significantly predicted vaccine awareness, whereas age and gender were not associated, suggesting that informational factors play a more critical role than basic socio-demographic characteristics in shaping vaccination-related knowledge.[52]

These findings point to disparities in vaccine knowledge across key demographic groups, emphasizing the need for targeted health education and outreach. Interventions should focus on underserved populations to improve awareness and promote equitable access to Hepatitis B vaccination. Addressing these gaps is critical for enhancing vaccine uptake, reducing transmission, and improving overall population health outcomes. Targeted health education and awareness campaigns by healthcare workers on Hepatitis B infection and vaccination should be strengthened across all population groups to improve vaccine knowledge.

The odds of having good knowledge of the Hepatitis B vaccine increased with age, suggesting that older individuals may have had greater exposure to health information. Married respondents also had higher odds of good vaccine knowledge, possibly reflecting the influence of spousal support on information sharing and health awareness. In addition, respondents with good knowledge of Hepatitis B infection were more likely to have good knowledge of the vaccine, indicating that understanding the disease and its transmission promotes awareness of preventive measures such as vaccination.

This contrasts with a study conducted in Cambodia, where the odds of good vaccine knowledge decreased with increasing age, although, similarly, knowledge of the infection remained a significant predictor of vaccine awareness.[52] These findings highlight the importance of improving knowledge of Hepatitis B infection as a pathway to enhancing vaccine awareness and uptake across different population groups. Health education strategies

should be intensified to improve knowledge of Hepatitis B infection across all population groups, as this can enhance vaccine awareness.

Findings from this study revealed very low levels of uptake of the Hepatitis B vaccine, as less than one-fifth of respondents had received any dose of the vaccine, with only a small fraction having completed all three doses. Of the respondents who had not received any dose of the vaccine, only about one-third expressed a willingness to take the vaccine if offered for free. This maybe be due to younger ages among respondents, as the study showed a positive increase in vaccination status with increasing age.

This is similar to a study done in North-Western Tanzania, which showed that only about 18% of the healthcare workers were fully vaccinated.[26] It contrasts with another study done in Turkey, which revealed that 59.8% had received at least one dose of the Hepatitis B vaccination.[24]

Vaccination is one of the most important strategies for the prevention of Hepatitis B infection, however, in many countries of the world, it remains widely underutilized. This underscores the need to monitor vaccine uptake data in order to identify areas of low coverage, and target interventions like conducting periodic outreach programs in schools, markets and workplaces to administer the vaccine.

Age, female sex, knowledge of Hepatitis B virus infection, and knowledge of the Hepatitis B vaccine were significantly associated with full vaccination status ($p < 0.05$), while ethnic group, marital status, religion, employment status, occupation, and level of education were not significantly associated with vaccine uptake. These associations may reflect greater exposure to healthcare services, better health-seeking behaviour, particularly among females and higher awareness of the disease and its prevention, as older individuals are more likely to understand the risks and benefits of vaccination and complete the doses. This finding is

consistent with a study conducted in Delta Central District, where age, female sex, and knowledge of the vaccine were also significantly associated with full vaccination status.[53]

The findings underscore the need for targeted interventions to improve Hepatitis B vaccination uptake among younger individuals, males, and those with limited knowledge, as enhancing awareness and access can help reduce disparities, increase full vaccination coverage, and ultimately lower the burden of Hepatitis B infection.

The odds of being fully vaccinated increased with age, suggesting that older respondents may have better health-seeking practices. Respondents with good knowledge of Hepatitis B infection and the vaccine also had higher odds of being fully vaccinated, indicating that individuals who understand the mode of transmission, associated risks, and the benefits of vaccination are more likely to complete the vaccination schedule. This is consistent with a study conducted in Delta Central District, where vaccine uptake increased with age and was higher among those with good knowledge of the vaccine.[53]

Overall, these findings emphasize that strengthening awareness and understanding of Hepatitis B infection and its vaccine is essential for improving vaccination uptake across all population groups. The government should develop and implement structured Hepatitis B education and vaccination programs by training healthcare workers to deliver routine health talks in clinics, integrating Hepatitis B education into school curricula, and running periodic media campaigns (radio, social media, and community outreach). In addition, organize regular community vaccination drives and ensure vaccines are readily available and affordable at primary healthcare centers to encourage completion of the full vaccination schedule, especially among younger and less-informed populations.

Of the respondents who had not taken any dose of the vaccine, two-fifth of them reported lack of awareness of the vaccine as their reason for not taking it, with other barriers to uptake

being lack of interest, inaccessibility of the vaccine, fear, cost of the vaccine, myths about the vaccine, being Hepatitis B positive, myths about the vaccine, observed side effects in others, pregnancy and the vaccine being out of stock. Among the respondents who had started but not completed the doses, the most commonly reported reason was that they were not aware of the other doses. Other barriers included: vaccine being out of stock, inaccessibility of vaccine, myths on the vaccine, fear and cost of the vaccine.

These findings are comparable to that of a study done in Rivers State, Nigeria, that reported the barriers to uptake of the vaccine to be: unavailability of the vaccine, cost of the vaccine, misconception on vaccines and safety concerns.[36] Similarly, another study done in Gulu, Northern Uganda, identified the barriers to vaccine uptake to be: inadequate knowledge about the disease, lack of access to vaccination sites, myths about the vaccine, and inadequate community engagement.[27]

The barriers to the uptake of the vaccine contribute to ongoing transmission of the disease, and worsen disease burden. The complications like liver cirrhosis and liver cancer are expensive to treat and often diagnosed late, this results in increased hospital admissions, loss of income due to poor health and financial strain on families.[7] The economic burden also affects the country's health system which struggles with limited resources and poor access to vaccines and antiviral drugs.[8,15]

There is a need to address barriers by subsidizing or providing free vaccination to high risk individuals (healthcare workers, pregnant women, sexually active adults); using mass media to raise awareness on the virus, educate people on its effects, the importance of the vaccine, and to correct misconceptions about the vaccine; integration of Hepatitis B vaccination into already existing programs like antenatal care, HIV clinics, and outpatient services; and

strengthening of vaccine supply chains to prevent stock-outs especially in rural and underserved areas.

CONCLUSION

The study showed poor levels of knowledge about the HBV infection and HBV vaccine as well as low levels of HBV vaccine. Increasing age, good knowledge of HBV infection and good HBV vaccine knowledge were significant predictors of full uptake of the vaccine. It also identified the major barrier to vaccination as a lack of awareness of the virus and its vaccine, with other barriers being a lack of interest, inaccessibility of the vaccine, fear and myths about the vaccine.

RECOMMENDATIONS

To the Federal Ministry of Health:

1.Subsidize or make the vaccine free for high risk individuals like healthcare workers, students, and pregnant women through federal funding or health schemes like the National Health Insurance Authority.

2.Ensure consistent supply of the vaccine through strengthening of cold chain systems.

3.Increase national awareness on the Hepatitis B virus transmission and prevention, debunk myths on the vaccine through campaigns on televisions, radios and social media.

4.Enforce mandatory pre-employment or pre-school entry vaccination, especially for healthcare workers and trainees.

To the Local Government:

1.Community mobilization through ward development committees and local leaders, in order to increase trust and acceptance of the vaccine.

2.Use of community health extension workers for door to door education and follow up.

3.Create systems for tracking individuals who receive initial doses, and ensure they complete all three doses.

4.Routine vaccination outreaches especially in remote locations and hard to reach community, to increase awareness and level of uptake.

To the Healthcare Workers:

1.Proper education of routine patients on the Hepatitis B virus, its mode of transmission, symptoms, and methods of prevention including vaccination.

2.Routine patients visits to outpatient clinics should be used to assess vaccination status and offer the vaccine.

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APPENDIX 1

QUESTIONNAIRE

KNOWLEDGE AND UPTAKE OF HEPATITIS B VACCINATION AMONG YOUNG ADULTS IN BENIN CITY, EDO STATE.

We are 600 level students of the University of Benin City, and this study aims to assess the knowledge and uptake of young adults in Benin City of the Hepatitis B vaccine. All information given will be treated as confidential. Please mark and fill all areas as appropriate. Thank you.

SECTION A: SOCIODEMOGRAPHIC CHARACTERISTICS

1. Age (in years at last birthday)………..

2.Gender: Male [ ] Female[ ]

3.What is your highest level of education: Primary [ ] Secondary[ ] Tertiary[ ]

Postgraduate [ ]

4.Tribe: Hausa [ ] Yoruba [ ] Igbo[ ] Benin [ ] Esan [ ] Others[specify]...............

5.Marital Status: Single [ ] Married [ ] Widowed [ ] Divorced [ ] Cohabiting [ ]

6. Religion: Christian [ ] Muslim [ ] African Traditional Religion [ ] Others[specify]...............

7. Employment status: Employed [ ] Not employed [ ]

8. Occupation: (specify)...........

9. Estimated monthly income …………………

SECTION B: GENERAL KNOWLEDGE OF HEPATITIS B VIRUS INFECTION

Select all that apply**:**

1. Have you ever heard about Hepatitis B virus: Yes [ ] No [ ]

2. Source of information: Friends [ ] Family [ ] Television [ ] Radio [ ] Healthcare workers [ ] Social media [ ] Others specify____

3. How can someone get infected with Hepatitis B virus?

a. Airborne: [ ]

b. Hereditary: [ ]

c. Touching an infected person: [ ]

d. Dining with infected person: [ ]

e. Through contaminated food or water: [ ]

f. Having sex with infected persons: [ ]

g. Through contact with blood of an infected person: [ ]

h. Using contaminated sharp objects: [ ]

i. Sharing of needles with other people: [ ]

j. Mother-to-child transmission during childbirth: [ ]

k. Mother to child transmission during breastfeeding: [ ]

l. Sharing toothbrushes with infected persons: [ ]

m. I don't know: [ ]

Others (specify)____

4. Which of these are symptoms of Hepatitis B infection: Jaundice [ ] Fever [ ] Abdominal pain [ ] Diarrhea [ ] Don't know [ ] Others (specify)____

5. How soon after exposure can symptoms of acute Hepatitis B usually appear: 1 week [ ] 2 months [ ] 3 months [ ] 5 months [ ] 1 year [ ] I don't know [ ]

6. Which of the following increases a person's risk of contracting Hepatitis B? Multiple sexual partners [ ] Blood transfusion from unscreened donors [ ] Eating undercooked meat [ ] Working in healthcare [ ] Being born to a Hepatitis B infected mother [ ] I don't know [ ]Others (specify)____

7. Does Hepatitis B virus increase the risk of contracting liver cirrhosis, cancer, and/or failure: Yes [ ] No [ ] I don't know [ ]

8. What are the ways by which Hepatitis B virus can be prevented: Safe sex [ ] Hand hygiene [ ] Safe disposal of used sharp objects [ ] Vaccination [ ] Herbal supplements [ ] Antibiotics [ ] I don't know [ ] Others specify____

9. What is the most effective way to prevent Hepatitis B infection: Antibiotics [ ] Vaccination [ ] Herbal supplements [ ] Wearing masks [ ] Safe sex [ ] I don't know [ ] Others specify_____

10.Is there a cure for Hepatitis B infection: Yes, completely curable [ ] No, but it can be managed [ ] Not sure [ ]

SECTION C: KNOWLEDGE OF HEPATITIS B VIRUS VACCINE

Select all that apply:

1. Have you ever heard of Hepatitis B vaccine before: No [ ] Yes [ ]

2. Source of information: Friends [ ] Family [ ] Television [ ] Radio [ ] Healthcare workers [ ] Social media [ ] Others specify____

3. What is the purpose of the Hepatitis B vaccine: To cure Hepatitis B [ ] To prevent Hepatitis B infection [ ] To treat symptoms [ ] Not sure [ ]

4. How many doses of the Hepatitis B vaccine are typically needed for full protection: One [ ] Two [ ] Three [ ] Not sure [ ]

5.Who should receive the Hepatitis B vaccine? Newborn babies [ ] Healthcare workers [ ] Adults with multiple sexual partners [ ] Everyone regardless of risk [ ] Only people with liver disease [ ] I don't know [ ]

6. Where can an individual get the Hepatitis B vaccine: Health centres [ ] Hospitals [ ] Pharmacies [ ] Community health campaigns [ ] Maternity clinics [ ] Others specify_____

SECTION D: UPTAKE OF HEPATITIS B VIRUS VACCINE

1. Have you ever received the Hepatitis B vaccine?

Yes [ ] No [ ] Not sure [ ]

If no skip to question 4

2. How many doses of the vaccine have you taken: ____

3.Where did you receive your Hepatitis B vaccine: Government hospital [ ] Private clinic [ ] Workplace [ ] School campaign [ ] Others specify____

4.Would you be willing to take the Hepatitis B vaccine if offered for free? Yes [ ] No [ ] Maybe [ ]

5.Do you think the Hepatitis B vaccination should be mandatory for:

Healthcare workers: Yes [ ] No [ ]

Medical students: Yes [ ] No [ ]

Elderly: Yes [ ] No [ ]

SECTION E: BARRIERS OF HEPATITIS B VACCINATION

Answer question 1 if you have not taken any dose of the vaccine, answer question 2 if you have started but not completed the vaccine doses.

1. Reasons for not taking the vaccine? Not aware of the vaccine [ ] Myths on the vaccine [ ] Inaccessible [ ] Fear[ ] Out of stock [ ] Not interested [ ] Hep B positive [ ] Cost of vaccine [ ] Observed side effects in other people [ ] Pregnancy [ ]

2. Reasons for not completing the vaccine? Myths on the vaccine [ ] Inaccessible [ ] Fear [ ] Out of stock [ ] Not aware of other doses [ ] Hepatitis B positive [ ] Cost of vaccine [ ] Observed side effects [ ]

APPENDIX II

INFORMED CONSENT FORM

TITLE OF STUDY

Knowledge and Uptake of Hepatitis B Vaccine among Young Adults in Benin City, Edo State.

INSTITUTION

Department of Public Health and Community Medicine, College of Medical Sciences, University of Benin, Benin City.

PRINCIPAL INVESTIGATORS

Oluwafunmibi Grace Abiona

Perfect Elohor Akudo

SUPERVISOR

Prof. Vivian Omuemu

FINANCIAL SPONSORSHIP

This research work is financially sponsored by the principal investigators.

PURPOSE OF RESEARCH

The purpose of this research work is to assess the Knowledge and Uptake of Hepatitis B Vaccine among Young Adults In Benin City.

PROCEDURES

You are kindly requested to complete a questionnaire designed to assess the Knowledge and Uptake of Hepatitis B Vaccine among Young Adults In Benin City. This questionnaire is for research purposes only.

CONFIDENTIALITY

All information collected would be kept confidential and stored securely. Data collected would he anonymized and only accessible to the research team.

COMPENSATION

Participants will not receive any compensation for their participation.

VOLUNTARY PARTICIPATION

Your participation in this study is voluntary. You may withdraw from the study at any time without any consequences.

RISKS

There are no risks associated with participation in this study.

BENEFITS

The information you provide will help us better understand how economic abuse affects women in marriage. This can help raise awareness and may inform future policies, support services, and community education efforts aimed at preventing economic abuse and supporting affected women.

CONTACT INFORMATION

If you have any questions or concerns regarding this research work please contact:

Oluwafunmibi Grace Abiona

Email: funabi10@gmail.com

Phone Number: 08139149691

Perfect Elohor Akudo

Email: eloho69akudo@gmail.com

Phone Number: 09031924945

OR

Ethics and Research Committee,

University of Benin Teaching Hospital,

Benin City.

Email: ubthresearchethics@gmail.com

Phone number: 07063331337

IF THERE IS ANY PORTION OF THIS CONSENT AGREEMENT THAT YOU DO NOT UNDERSTAND, ASK THE FIELD WORKER OR INVESTIGATOR BEFORE SIGNING.

Please, sign below if you have agreed to participate in the study.

CERTIFICATION OF CONSENT

I,_______________________________ having full capacity to consent for myself do thereby consent to my participation in the research study.

The methods and means by which the study will be conducted have been explained to me by Ethical Committee. I have been given the opportunity to ask questions concerning this investigational study, and any such questions have been answered to my full and complete satisfaction.

I understand that I may at any time during the course of this study revoke this consent and withdraw myself from the study without prejudice.

Participant's Signature:__________________

Date:____________

APPENDIX III

	Jan-Feb 2025	Mar 2025	Apr 2025	May 2025	Jun-Oct 2025	Nov 2025	Dec 2025	Jan 2026	Feb 2026	Mar 2026	Apr 2026
Decision on project topics											
Concept Paper											
Introduction											
Literature review											
Materials and methods											
Pretesting											
Data collection											
Data analysis											
Results/ Discussion											
Final submission											

Figure 1: Gantt chart showing the work plan of the one-year project

APPENDIX IV

ETHICAL CLEARANCE

HEALTH RESEARCH ETHICS COMMITTEE (HREC)

UNIVERSITY OF BENIN TEACHING HOSPITAL

P.M.B. 1111 BENIN CITY NIGERIA Telephone: 052-600418 Website: ubth.org

CHIEF MEDICAL DIRECTOR	DIRECTOR OF ADMINISTRATION	CHAIRMAN
Prof.Darlington E. Obaseki E-mail: darlobaseki@gmail.com	Jim Uwadie, Esq	Prof. (Mrs.) Antoinette N. Ofili

HREC OFFICE:
Committee email: ubthresearchethics@gmail.com
Registration Number:
NHREC-UBTH-HREC/24/12/2022B

PROTOCOL NUMBER: **ADM/E 22/A/VOL. VII/148654912607**

PROPOSAL TITLE: **"KNOWLEDGE AND UPTAKE OF HEPATITIS B VACCINATION AMONG YOUNG ADULTS IN BENIN CITY, EDO STATE"**

PRINCIPAL INVESTIGATOR(S): **OLUWAFUNMIBI GRACE ABIONA, PERFECT ELOHOR AKUDO**

DEPARTMENT/INSTITUTION: **DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE, SCHOOL OF MEDICINE, UNIVERSITY OF BENIN, BENIN CITY, EDO STATE, NIGERIA**

DATE CONSIDERED: AUGUST 11TH, 2025

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 11/8/2025 TO 10/8/2026. 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** 11/8/2025

SUPERVISOR (S): PROF. VIVIAN 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. 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 re-port 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

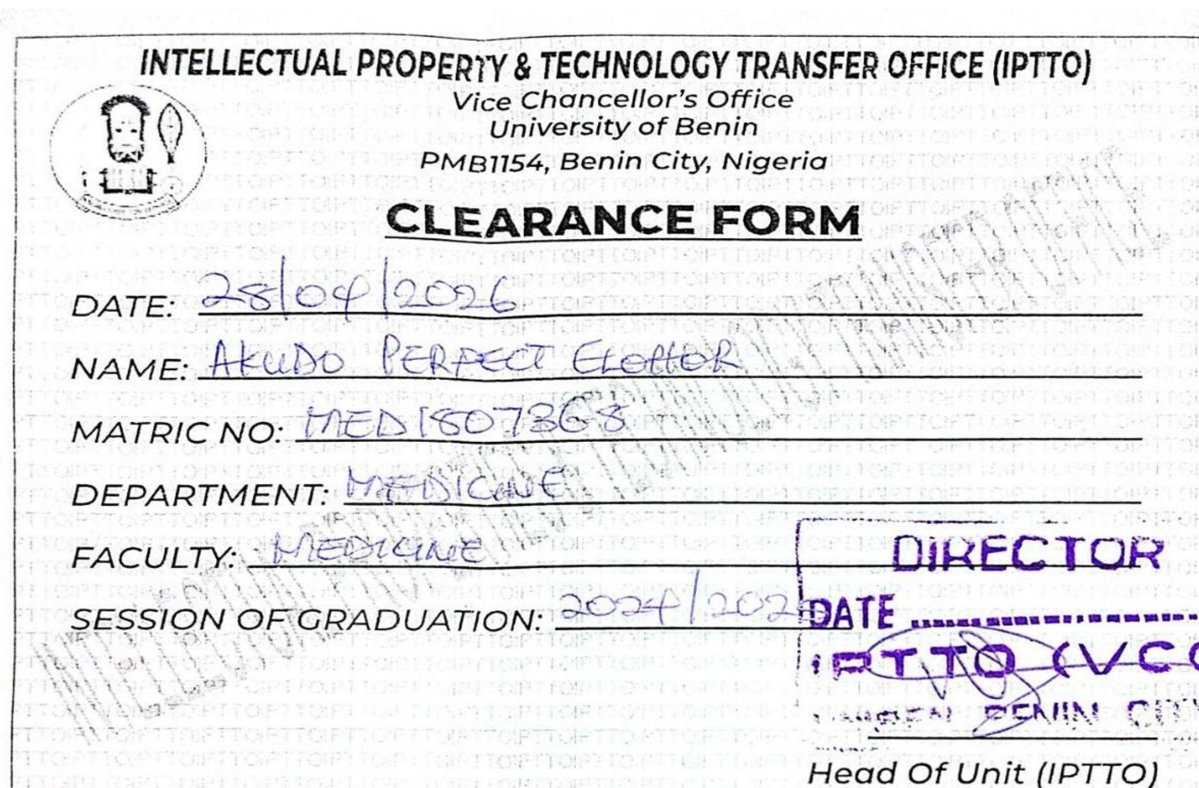
Signature & Date.... 22/8/2025

ubthresearchethics@gmail.com

Registration Number: NHREC/24/01/202

APPENDIX V

PLAGIARISM TEST CERTIFICATE



INTELLECTUAL PROPERTY & TECHNOLOGY TRANSFER OFFICE (IPTTO)
Vice Chancellor's Office
University of Benin
PMB1154, Benin City, Nigeria

CLEARANCE FORM

DATE: 28/04/2026

NAME: AKUDO PERFECT ELOHOR

MATRIC NO: MED1807368

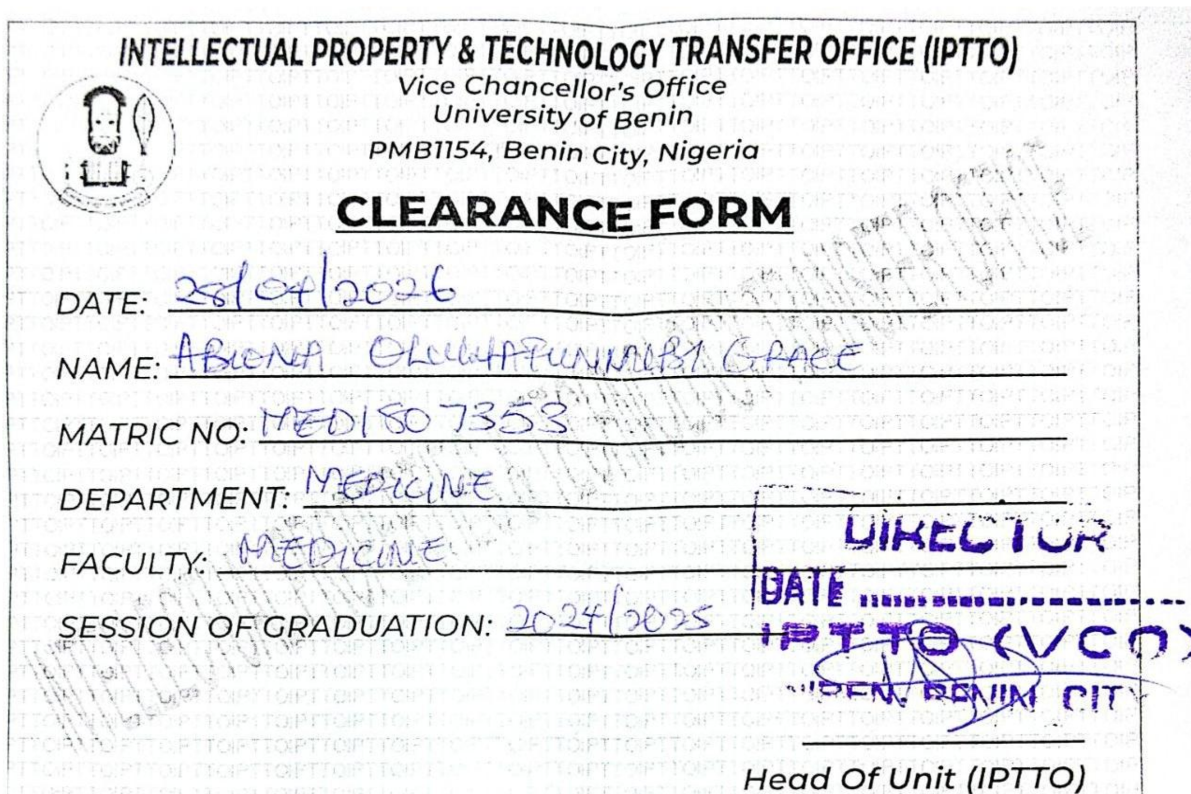
DEPARTMENT: MEDICINE

FACULTY: MEDICINE

SESSION OF GRADUATION: 2024/2025

DIRECTOR
DATE ....
IPTTO (VCO)
UNIBEN, BENIN CITY

Head Of Unit (IPTTO)



INTELLECTUAL PROPERTY & TECHNOLOGY TRANSFER OFFICE (IPTTO)
Vice Chancellor's Office
University of Benin
PMB1154, Benin City, Nigeria

CLEARANCE FORM

DATE: 28/04/2026

NAME: ABIONA OLUWAFUNMIBI GRACE

MATRIC NO: MED1807353

DEPARTMENT: MEDICINE

FACULTY: MEDICINE

SESSION OF GRADUATION: 2024/2025

DIRECTOR
DATE ....
IPTTO (VCO)
UBEN, BENIN CITY

Head Of Unit (IPTTO)