KNOWLEDGE, ATTITUDE, AND UPTAKE OF HEPATITIS B VACCINATION AND ITS DETERMINANTS AMONG MEDICAL AND NURSING STUDENTS IN A NIGERIAN UNIVERSITY – A COMPARATIVE STUDY

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A ONE-YEAR PROJECT PRESENTED TO THE DEPARTMENT OF COMMUNITY HEALTH IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF A BACHELOR OF MEDICINE AND BACHELOR OF SURGERY (MBBS) DEGREE.

SUPERVISOR

Prof. A.N Ofili

APRIL, 2026

DECLARATION

We hereby declare that this research project titled **"KNOWLEDGE, ATTITUDE, AND UPTAKE OF HEPATITIS B VACCINATION AND ITS DETERMINANTS AMONG MEDICAL AND NURSING STUDENTS IN A NIGERIAN UNIVERSITY – A COMPARATIVE STUDY"** is an original work conducted under supervision and has not been submitted—in part or in full—for any other purpose. All sources of information used in this study have been duly acknowledged through proper citations and references. This work has not been previously submitted for any degree or award at this or any other institution.

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CERTIFICATION

This is to certify that the research project titled: **"KNOWLEDGE, ATTITUDE, AND UPTAKE OF HEPATITIS B VACCINATION AND ITS DETERMINANTS AMONG MEDICAL AND NURSING STUDENTS IN A NIGERIAN UNIVERSITY – A COMPARATIVE STUDY"** will be conducted by **IGBINOBA ETINOSA GABRIEL** with matriculation number **MED1807413** and **IGBINOMWANHIA DELIGHT OSAMUDIAMEN** with matriculation number **MED1807314** under the supervision of Prof. A.N. Ofili 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.

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DEDICATION

This project is dedicated to God Almighty, the source of strength, wisdom, and perseverance throughout our academic journey.

We also appreciate our families and friends for their love, unconditional support, and countless sacrifices in helping us reach this milestone.

Our heartfelt gratitude also goes to our teachers, whose invaluable mentorship and guidance were essential in navigating the complexities of this endeavour. Finally, this work is dedicated to frontline healthcare workers and students striving for a safer clinical environment, and we hope this research contributes to better health policies and improved preventive care for all.

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Additionally, I extend my heartfelt appreciation to my project partner for her cooperation, patience, and high work rate.

Finally, I extend my appreciation to my other siblings and everyone else who contributed in one way or another to the successful completion of this project.

Thank you all.

IGBINOBA ETINOSA GABRIEL

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IGBINOMWANHIA DELIGHT OSAMUDIAMEN

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LIST OF ABBREVIATIONS

ATR: African Traditional Religion

Anti-HBs: Hepatitis B surface Antibody

CI: Confidence Interval

ESUCOM: Enugu State University College Of Medicine

HBsAg: Hepatitis B surface Antigen

HBV: Hepatitis B Virus

HIV: Human Immunodeficiency Virus

KAP: Knowledge, Attitude and Practice

MBBS: Bachelor of Medicine, Bachelor of Surgery

MTCT: Mother-To-Child Transmission

NTC: Nurses Training College

OR: Odds Ratio

SD: Standard Deviation

SPSS: Statistical Package for the Social Sciences

UBTH: University of Benin Teaching Hospital

LIST OF ABBREVIATIONS

UNIBEN: University of Benin

WHO: World Health Organisation

DEFINITION OF TERMS

Anti-HBs (Hepatitis B surface antibody): the protective neutralising antibody produced by the immune system in response to the hepatitis B vaccine or past infection, used to clinically verify immune status and seroprotection.

HBsAg: a protein on the surface of HBV that can be detected in high levels in serum during acute or chronic HBV infection.

Hepatitis B Virus (HBV): a partially double-stranded DNA virus belonging to the family Hepadnaviridae, which primarily infects the liver and causes both acute and chronic hepatitis that may progress to cirrhosis and hepatocellular carcinoma.

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

ABSTRACT

Background: Hepatitis B Virus (HBV) infection is a potential occupational biological hazard to medical and nursing students who are frequently exposed to blood and bodily fluids during clinical rotations, and the Hepatitis B vaccine is one of the most effective and safest prevention measures.

Objectives: This study aimed to assess and compare the knowledge, attitude, and uptake of the Hepatitis B vaccination, including its determinants, among medical and nursing students at the University of Benin, Edo State, Nigeria.

Methodology: A comparative cross-sectional study was conducted from December 2024 to March 2026, among 646 respondents, comprising 324 medical students and 322 nursing students. A multistage sampling technique was used to select students across preclinical and clinical levels. Data was collected using a pretested, structured, self-administered questionnaire and analysed using SPSS version 25. Bivariate (Chi-square) and multivariate (Binary Logistic Regression) analyses were utilised, with statistical significance set at $p < 0.05$.

Results: The mean age of the respondents was 22.47 ± 2.72 years. Overall, 83.0% of respondents demonstrated good knowledge of Hepatitis B and its vaccination, while 17.0% had poor knowledge. Most respondents (91.0%) exhibited a positive attitude, which was strongly predicted by good knowledge (OR = 4.078; $p < 0.001$). However, actual vaccination uptake was critically low, with 73.8% of students remaining completely unvaccinated and only 10.7% having completed the three-dose series. Logistic regression showed that clinical exposure significantly predicted good knowledge ($p < 0.001$), while course of study predicted vaccination uptake, with medical students significantly more likely to be vaccinated than nursing students

(OR = 2.035; p = 0.022). Lack of awareness of vaccination centres (42.1%), vaccine cost (28.9%), and lack of time (26.4%) were reported as the major barriers to vaccination.

Conclusion: Despite possessing high theoretical knowledge and a positive attitude towards the HBV vaccine, the actual vaccination practice among medical and nursing students is critically inadequate. Systemic barriers, specifically cost and logistical challenges, are the primary barriers preventing positive attitudes from translating into practice. Strengthening targeted awareness campaigns, subsidising vaccine costs, and integrating proactive vaccination policies into the curriculum will enhance uptake and optimise occupational safety during clinical training.

Keywords: Hepatitis B, Vaccination, Medical students, Nursing students, Knowledge, Attitude, Practice

CHAPTER 1

INTRODUCTION

1.1 Background

Hepatitis is a condition characterised by inflammation of the liver, and it can arise from several factors, including viruses (viral hepatitis), chemicals, drugs, alcohol, genetic disorders, or autoimmune responses where the immune system attacks the liver.[1] Hepatitis can be classified as acute, which manifests suddenly and resolves promptly, or chronic, a long-term condition that leads to subtle symptoms and progressive liver damage.[1]

There are five distinct viruses responsible for causing different forms of viral hepatitis: Hepatitis A, Hepatitis B, Hepatitis C, Hepatitis D, and Hepatitis E.[1] Among the five main types of viral hepatitis, Hepatitis B Virus (HBV) infection remains a major global public health concern due to its potential to cause chronic liver disease, liver cirrhosis, and hepatocellular carcinoma.[2,3]

Hepatitis B infections are categorised into two types: acute and chronic.[4] Acute hepatitis B occurs during the initial infection, with symptoms ranging from none to severe liver failure, including fever, joint pain, fatigue, nausea, dark urine, and jaundice.[4] Most adults recover fully without long-term issues.[4] Chronic hepatitis B, defined by the virus persisting in the blood for over six months, often presents with no symptoms initially but can lead to fatigue or, in advanced stages, symptoms resembling acute hepatitis.[4] If left untreated, chronic hepatitis B may progress to cirrhosis, causing jaundice, fluid retention, confusion, and an increased risk of liver cancer.[4]

Hepatitis B spreads through contact with infected blood or bodily fluids, with transmission patterns varying by geographic prevalence and age.[5] In regions where the disease is widespread, the virus often passes from mother to child during delivery (perinatal transmission) or through close contact among young children, particularly those under five. Chronic infection is far more

likely to develop in infants and young children exposed to the virus, occurring in about 95% of cases, compared to less than 5% in adults.[5] Beyond perinatal and childhood exposure, hepatitis B can also be transmitted through unsafe medical practices, such as the reuse of contaminated needles or syringes, needlestick injuries, and procedures like tattooing or piercing.[5] Additionally, the virus spreads via contact with infected bodily fluids, including saliva, vaginal secretions, and semen, with sexual transmission being more common among unvaccinated individuals with multiple partners. [5]

Hepatitis B management focuses on both treatment and prevention, with vaccination as the most effective and essential strategy to combat the virus.[6] For acute hepatitis B, there is no specific cure, so care focuses on relieving symptoms, maintaining hydration, and supporting overall health. Chronic hepatitis B, on the other hand, can be managed with antiviral medications like tenofovir or entecavir, which help slow liver damage, reduce the risk of liver cancer, and improve long-term survival.[6] However, treatment is often lifelong, and not everyone has access to these therapies, especially in low-resource settings. [6]

Hepatitis B control lies in prevention, particularly through vaccination.[7,8] The hepatitis B vaccine is highly effective, safe, and provides long-lasting protection, potentially for life, when administered in a series of doses starting within 24 hours of birth.[7,8] This early vaccination, combined with antiviral prophylaxis for at-risk pregnant women, is critical in preventing mother-to-child transmission, which is a major route of infection in highly endemic areas. Beyond infancy, vaccination is also recommended as a three-dose series (for full protection) for previously unvaccinated adults, particularly those in high-risk occupational groups such as healthcare workers and students undertaking clinical training.[7,8] Alongside vaccination, other preventive measures such as practising safe sex, avoiding shared needles, and maintaining proper

hygiene further reduce the spread of the virus.[7,8] The World Health Organisation (WHO) recommends that people at risk, including all healthcare workers and students, receive the HBV vaccine before engaging in clinical activities.[9]

The burden of hepatitis B virus infection is disproportionately distributed across different regions and populations, with low- and middle-income countries, particularly numerous nations across the African continent, bearing a higher share of the impact.[8,10]

Globally, over 300 million people are living with chronic HBV infection, with the African region accounting for a significant proportion.[3] Nigeria, the most populous African country, has one of the highest HBV endemicity rates in the world, with an estimated prevalence of >8%.[11] This high prevalence has been attributed to inadequate awareness, suboptimal vaccination coverage, and limited adherence to infection prevention practices among at-risk populations, including healthcare students.[11]

The extent to which medical and nursing students in Nigeria are adequately knowledgeable about HBV, their disposition toward its vaccine, and their full immunisation against infection, therefore, remains an important area of inquiry.

1.2 Problem Statement

Hepatitis B virus (HBV) infection remains one of the most critical public health challenges of our time, with its impact being particularly profound in sub-Saharan Africa.[11] Nigeria is classified as hyperendemic for HBV, with seroprevalence rates of up to 12.2% reported in some regions.[11] Despite the availability of a highly effective and safe vaccine that offers up to 95% protection when the complete dose series is administered, uptake remains disappointingly low among populations at risk.[9]

Among these high-risk groups are medical and nursing students, the future healthcare workforce, who, due to their frequent exposure to blood, bodily fluids, and sharp instruments during clinical rotations, are at elevated risk of occupational exposure to HBV.[9] Notably, the World Health Organisation (WHO) recommends that all healthcare personnel, including students, receive full immunisation before the commencement of clinical duties to minimise the risk of transmission.[9] However, there are significant gaps in both the knowledge and practices regarding HBV prevention within these groups. Several studies have documented that levels of awareness of HBV infection, its modes of transmission, potential complications, and the importance of complete vaccination vary considerably across healthcare disciplines. For example, research conducted among medical students in eastern Ethiopia revealed suboptimal knowledge of HBV and a very low rate of complete vaccination among students.[12] Similar findings have been reported in Nigeria, where knowledge levels among medical students differ substantially between preclinical and clinical cohorts.[13] This raises the question of whether knowledge disparities exist between medical and nursing students at Nigerian universities and, if so, what drives them.

It is hypothesised that the more rigorous and comprehensive infectious disease curriculum received by medical students might contribute to better understanding and, potentially, higher vaccination rates compared to their nursing counterparts.[14,15] While various studies have explored HBV vaccination uptake among healthcare workers in general, there is a notable paucity of research directly comparing vaccination status, knowledge, and attitudes between medical and nursing students.

Furthermore, attitudes toward HBV vaccination have been shown to vary with the level of clinical exposure.[16] Preclinical students, who are primarily engaged in theoretical learning and

have limited direct contact with patients, often underestimate the risks associated with HBV infection, resulting in a complacent attitude and vaccine hesitancy.[16] In contrast, clinical students, through direct patient care, might develop a heightened awareness of the dangers posed by HBV.[16,17] Nonetheless, even among these students, several barriers persist that prevent the completion of the recommended three-dose vaccination series.[16,17]

Among students who initiate the vaccination process, there remains a concerning trend where many do not complete the recommended three-dose series, thereby remaining inadequately protected.[15,17] This is due to a range of barriers, including vaccine unavailability, high cost, fear of side effects, low perceived personal risk, and lack of institutional support.[15,17] Incomplete vaccination regimens not only jeopardise the health of these individuals but also pose a broader public health risk by increasing the likelihood of HBV transmission in healthcare settings.[18] These barriers have been shown to vary across student groups and training contexts, yet how they differ specifically between medical and nursing students in Nigerian universities remains poorly understood.

Evidence suggests that many healthcare students in Nigeria receive only one or two doses, leaving them inadequately protected and at continued risk of infection.[17] Evaluating the proportion of students who have received all required doses and understanding the factors influencing vaccine adherence is critical for assessing the effectiveness of current institutional vaccination policies and for recommending necessary modifications.

1.3 Justification of Study

The imperative to improve HBV vaccination coverage among future healthcare professionals in Nigeria is underpinned by both the high endemicity of HBV and the heightened risk faced by medical and nursing students. These students serve as the cornerstone of the healthcare system,

and their protection against HBV is crucial not only for their own well-being but also for the safety of the patients they will serve. In Nigeria, where HBV prevalence is high, ensuring that future healthcare providers are fully vaccinated is a public health priority.

A primary justification for this study lies in the need to assess and compare the level of knowledge regarding HBV and its vaccination among medical and nursing students. Numerous studies have indicated that knowledge about HBV transmission, its severe complications, and the protective benefits of vaccination is often incomplete or inconsistent among healthcare trainees.[12,17] Also demonstrated is that a well-informed student body is more likely to adhere to vaccination schedules, yet evidence indicates that significant knowledge gaps persist among healthcare students in various settings.[12,17]

A lack of knowledge can lead to misunderstandings about the risks associated with infections, which ultimately impacts students' choices when it comes to getting vaccinated. This study will explore the differences in knowledge between medical and nursing students to see if varying educational content and clinical experiences contribute to these gaps in understanding. By analyzing the results, we hope to offer practical recommendations for improving the curriculum, ensuring that both knowledge and practice gaps are effectively addressed. Additionally, it's important to recognize that attitudes toward vaccination, shaped by personal beliefs and the clinical environment, play a significant role in influencing whether students choose to get vaccinated.

The contrasting experiences of preclinical and clinical students offer a unique opportunity to examine how exposure to clinical practice influences perceptions of risk and subsequent decision-making regarding vaccination. In settings where clinical exposure is minimal, such as

during the early stages of medical or nursing education, students may not understand the necessity of vaccination, leading to delayed or incomplete immunisation. Conversely, clinical students might experience higher levels of anxiety or concern regarding vaccine side effects despite being more aware of HBV risks. Exploring these attitudinal nuances will provide invaluable insights into the behavioural determinants of vaccine adherence and inform the development of stage-specific interventions. Notably, a review of the existing literature reveals a striking absence of Nigerian studies that have directly compared attitudes toward hepatitis B vaccination between preclinical and clinical students across both medical and nursing disciplines simultaneously. This is a gap that is particularly concerning given Nigeria's hyperendemic HBV status. While some studies have examined attitudes among students in different medical professions, none of them incorporated a preclinical-versus-clinical comparison, nor did they include nursing students as a comparator group. This study, therefore, addresses a critical and unexplored gap in the Nigerian literature, providing a direct comparative analysis of hepatitis B vaccination attitudes across training stages and across medical and nursing disciplines within a single Nigerian institution.

In addition to knowledge and attitudes, identifying the barriers to HBV vaccination is of paramount importance. Previous research has highlighted a range of obstacles, including financial constraints, lack of access to vaccination services, fear of adverse reactions, and insufficient institutional support.[19] However, these studies often do not differentiate how these barriers manifest among medical versus nursing students or between different stages of training. This study will provide a detailed exploration of these obstacles, enabling the development of targeted interventions, such as subsidised vaccination programs or enhanced on-campus vaccination drives, that address the specific needs of each subgroup.

Finally, the evaluation of vaccine uptake and completion rates is crucial. Many students, despite receiving an initial dose, do not complete the three-dose series recommended for full protection.[17,18] This incomplete vaccination not only leaves individuals at risk but also undermines broader public health efforts to control HBV transmission. By comparing the proportion of medical and nursing students who complete the full vaccination regimen, this study will assess the effectiveness of current vaccination policies and practices within Nigerian universities. Such an evaluation is critical for informing policy decisions and initiating changes that could lead to higher vaccine adherence rates.

This study is also aligned with national and global health priorities. Nigeria's National Strategic Framework for Viral Hepatitis (2022-2030) explicitly calls for increased vaccination coverage among high-risk populations, including healthcare students(framework).[20] The data derived from this study will not only contribute to the academic literature but also provide actionable recommendations for university administrators, policymakers, and public health officials. Ultimately, by examining and addressing the gaps in knowledge, attitudes, and vaccine uptake, between medical and nursing students, as well as between preclinical and clinical cohorts, this study aims to provide a nuanced understanding of the factors that impede effective HBV prevention and the enhance HBV prevention strategies, thereby reducing the burden of HBV transmission in healthcare settings and safeguarding the health of Nigeria's future healthcare workforce.

1.4 Objectives

1.4.1 General Objectives

To compare the knowledge, attitudes, and uptake of hepatitis B vaccination and its determinants among medical and nursing students at the University of Benin.

1.4.2 Specific Objectives

1. To assess the knowledge of hepatitis B and its vaccination amongst medical and nursing students.
2. To compare the attitudes towards hepatitis B vaccination between preclinical and clinical students in medicine and nursing.
3. To identify and compare barriers/determinants to hepatitis B vaccination uptake between medical and nursing students.
4. To determine and compare the proportion of medical and nursing students who have completed all required doses of the hepatitis B vaccine.

1.5 Research questions

1. What is the level of knowledge of hepatitis B and its vaccination among medical and nursing students?
2. How do attitudes about hepatitis B vaccination differ between preclinical and clinical students in medicine and nursing?
3. What are the barriers to hepatitis B vaccination uptake, and do they differ between medical and nursing students?
4. What proportion of medical and nursing students have completed all required doses of the hepatitis B vaccine, and how do they differ between medicine and nursing students?

CHAPTER 2

LITERATURE REVIEW

2.1 Knowledge of hepatitis B and its vaccination among medical and nursing students

The level of knowledge about HBV infection and vaccination among medical and nursing students has been assessed in multiple studies worldwide, and the findings consistently reveal gaps in understanding despite general awareness of the disease.[17] Generally, proper knowledge of the virus is necessary to improve attitudes toward the Hepatitis Virus and its vaccination.[17] Healthcare students must be abreast with correct information concerning the transmission and prevention of the Hepatitis B virus, with an emphasis on the importance of being vaccinated, as they are at risk of exposure.[17]

A cross-sectional study was conducted among 335 students across medical, dental, nursing, and physiotherapy disciplines in Palakkad, Kerala, India, in 2024, to investigate the knowledge, attitude, and practice regarding hepatitis B vaccination. [14] Their finding showed that while good awareness of HBV was present, many students demonstrated only a superficial understanding of the virus's transmission routes, the clinical implications of chronic infection, and the importance of adhering to the full vaccination schedule.[14] Out of the 335 students who responded, a total of 40.29% were aware of Hepatitis B vaccination through awareness programs, 41.9% through lectures, 8.95% through social media, and the remaining 9.87% through other sources, only 30.7% had good knowledge.[14]

The study suggested that differences in curriculum emphasis might account for variations in knowledge levels across disciplines.[14] For instance, medical students, who typically receive more extensive education in infectious diseases, tended to have a deeper understanding compared to

students in allied health fields. However, even within this relatively informed group, misconceptions and incomplete information regarding vaccine efficacy and the need for a complete three-dose regimen were evident. This international perspective highlights the universal challenge of ensuring that all healthcare students attain a comprehensive understanding of HBV, regardless of their specific training program[14].

Another cross-sectional study conducted in Duhok province, the Kurdistan Region of Iraq, in 2023, among 511 medical sciences students, further underscored the variability in knowledge levels.[21] The study was conducted to assess vaccination status and knowledge, attitudes, and practices regarding the hepatitis B virus among medical sciences students.[21] Their research revealed that while a significant number of students were aware of the HBV vaccine, many lacked detailed knowledge of its long-term protective benefits and the importance of completing the vaccination series.[21] Most respondents agreed that Hepatitis B is caused by a virus (67.5% strongly agreed, 24.1% agreed) and can lead to liver cancer (35.6% strongly agreed, 38.6% agreed).[21] Regarding the knowledge of the participants on the mode of transmission, the majority of the students agreed that Hepatitis B can be transmitted by contaminated blood, body fluids, and unprotected sex (62.2% strongly agreed, 25.4% agreed).[21] Similarly, most students disagreed that Hepatitis B can be transmitted by shaking hands, coughing/sneezing, and contaminated food/water (48.7% strongly disagreed, 27.2% disagreed), with 11% neutral.[21] About four-fifths of the participants agreed that healthcare workers are at increased risk of contracting Hepatitis B than the general population (50.9% strongly agreed, [28].2% agreed).[21] In terms of knowledge about prevention, the majority of students agreed that Hepatitis B can be prevented by vaccination, using gloves, and avoiding sharp needle/syringe injury (55.8% strongly agreed, 34.2% agreed).[21] The authors argued that such gaps in knowledge could lead to suboptimal

vaccination practices and, ultimately, leave students vulnerable to infection.[21] It was also emphasised that the role of continuous education and periodic reinforcement of HBV-related information throughout the medical curriculum.[21] This study contributes to the global discourse by suggesting that even in settings where basic awareness exists, a deeper and more detailed understanding of HBV is essential for achieving high vaccination uptake.

Turning to the African context, a descriptive cross-sectional study was done in 2017 on the Nurses Training College (NTC) campus in the Ho Municipality of the Volta Region of Ghana.[22] In this research, 358 nursing students were assessed for their knowledge, attitude, and vaccination status regarding hepatitis B.[22] The study found that although most students were aware that a vaccine was available, there was a notable deficiency in their understanding of the virus's transmission dynamics and the rationale behind the need for a complete vaccine series.[22] For the distribution of knowledge on hepatitis B, 97.8% of participants had heard about hepatitis B.[22] The majority of participants (78.2%) knew that the disease is caused by a virus.[22] Participants also reported that hepatitis B can be transmitted through a number of ways, 65.6% said it can be transmitted through sex and 79.6% through blood transfusion.[22] Also, 69.8% were aware that the disease can be contracted through needle stick injuries, and 57.8% said through childbirth.[22] Furthermore, 76.3% knew the disease was more infectious than HIV/AIDS, and 51.4% said it was curable.[22] About 70.4% reported that the hepatitis B virus causes liver inflammation, and as low as 46.9% reported jaundice to be a symptom of the disease. The overall mean knowledge score of participants is 29.6 (SD ± 6.98)[22].

The authors pointed out that this incomplete knowledge not only jeopardises the personal health of the students but also undermines their potential role as educators and advocates for HBV

prevention in the community.[22] The study in Ghana, therefore, illustrates a regional pattern in which limited educational resources and insufficient emphasis on HBV in the curriculum may contribute to suboptimal knowledge among healthcare students.

Within Nigeria itself, local studies further elaborate on these challenges. A 2020 descriptive cross-sectional study involving students of Enugu State University College of Medicine (ESUCOM) investigated the knowledge of hepatitis B infection and the vaccination status among College of Medicine students in Enugu State.[17] A total of 437 students participated, and knowledge of HBV was computed and graded, 68.2% of the participants had a good knowledge of HBV.[17]

Their research provided a focused examination of the Nigerian educational context, revealing that while general awareness of HBV was evident among students, many lacked in-depth knowledge about the detailed aspects of the disease.[17] Specifically, there were gaps in understanding the modes of transmission, the potential long-term consequences of chronic HBV infection, and the necessity of completing the full vaccination series for optimal protection.[17] The authors highlighted that these knowledge gaps might stem from variations in curriculum content and the lack of robust clinical exposure during the early years of training.[17] Such findings are critical as they suggest that even within a single country, disparities exist that could hinder effective HBV prevention strategies among future healthcare professionals.

From these studies, it becomes clear that while a foundational awareness of hepatitis B exists among healthcare students globally, the depth and completeness of that knowledge vary significantly by region and discipline. International studies underscore that even in well-resourced educational systems, there can be gaps in the detailed understanding necessary for

complete vaccine adherence. African studies, such as those from Ghana, highlight additional challenges posed by resource limitations and curricular deficits. Local Nigerian studies illustrate that these issues are particularly pronounced in regions where HBV is hyperendemic, and where educational institutions may struggle to provide comprehensive training on infectious diseases.

2.2 Attitudes toward hepatitis B vaccination between preclinical and clinical students in medicine and nursing

Attitudes toward the hepatitis B virus and its vaccination refer to the evaluative beliefs, feelings, and predispositions that individuals hold regarding the vaccine and the disease. This includes perceptions of vaccine efficacy, safety, and the seriousness of HBV infection, which collectively influence one's intention to get vaccinated.[23] Positive vaccination attitudes are a critical determinant of higher vaccination uptake, as favourable beliefs about vaccine benefits and lower concerns about risks are associated with increased immunisation behaviours.[23]

As preclinical and clinical students in medicine and nursing transition from theoretical learning to practical application, their understanding and attitudes towards vaccination can significantly influence their future practice and public health advocacy. The preclinical phase focuses on foundational knowledge, while the clinical phase involves direct patient interaction. Recognising these differences is crucial for creating targeted educational interventions to enhance vaccination uptake among future healthcare providers.

For instance, a descriptive study was conducted among preclinical students of a medical college in Kathmandu, Nepal, in 2020.[24] A total of 181 students participated in the study. The study found that although most were aware of the hepatitis B vaccine, many had only a superficial understanding of key aspects, such as the virus's transmission routes and the importance of

completing the full vaccination series.[24] Around half of the respondents, 50.8% (n = 92), agreed that hepatitis B vaccination is safe and effective, whereas 2.8% (n = 5) strongly disagreed.[24] Most respondents, 65.7% (n = 119), strongly agreed that healthcare workers should receive hepatitis B vaccination, and 55.8% (n = 101) strongly agreed that they need Hepatitis B vaccination because they are at risk.[24] This study highlighted that theoretical instruction alone might be insufficient to foster a deep understanding necessary for effective vaccine advocacy and personal protection.[24]

In contrast, a 2020 study assessed the knowledge, attitudes, and Practices of hepatitis B vaccination among 204 clinical medical students at a Medical College in Nepal.[25] The majority (198, 97.1%) of respondents had a positive attitude towards Hepatitis B infection and vaccination.[25]

Among nursing students internationally, a cross-sectional study conducted among 1,261 nursing students across two universities in Athens, Greece, found that year of study was a significant predictor of attitudes and vaccination behaviour toward HBV, with second-year students demonstrating more appropriate attitudes than first-year students, and third-year students being 1.69 times more likely to be fully vaccinated than first-year students ($p = 0.011$).[26] This indicates that as nursing students advance through their training and gain greater clinical exposure, their attitudes toward HBV vaccination improve progressively.[26] Although convenience sampling was used, limiting generalisability, this study provides important evidence that clinical progression shapes vaccination attitudes in nursing students.[26]

In the African context, a cross-sectional study among medical and health sciences students at Wolkite University, Southwest Ethiopia found that being enrolled in the medicine department and being in higher years of study were independently associated with full HBV vaccination

completion, with the odds of full vaccination increasing substantially with each advancing year, from an adjusted odds ratio of 11.7 in second-year students to 27.0 in fourth-year students compared to first-year students.[27] This striking gradient suggests that clinical progression is a strong driver of vaccination-related attitudes and behaviour among medical students in an African setting, with students gaining a greater appreciation of their occupational risk as they advance through training.[27]

Among nursing students in Africa, the same cross-sectional study conducted among 358 nursing students at a Nurses Training College in Ho, Ghana, found that despite satisfactory knowledge of HBV, the majority of students demonstrated poor attitudes toward hepatitis B vaccination.[22] This disconnect between knowledge and attitude is particularly notable, as it suggests that possessing factual information about HBV does not automatically translate into positive vaccination intentions, pointing to deeper attitudinal barriers that knowledge-based interventions alone may be insufficient to address.

Within Nigeria, a cross-sectional study among clinical medical and dental students at Obafemi Awolowo University, Ile-Ife found that level of study was significantly associated with HBV vaccine uptake among clinical students ($p < 0.05$), with higher clinical years demonstrating better vaccination behaviour, suggesting that attitudinal differences persist even within the clinical phase of training.[28] However, this study was limited to clinical students and did not include preclinical students or nursing students, leaving the question of attitudinal differences across training stages and disciplines unaddressed in the Nigerian literature.

Collectively, these studies illustrate that while preclinical students internationally often exhibit moderate baseline awareness of hepatitis B vaccination, significant gaps persist in a detailed understanding that could be ameliorated with enhanced, structured educational interventions.

This is of particular concern because clinical exposure has been shown in other contexts to significantly enhance understanding and correct misconceptions; however, the transition from preclinical to clinical training remains under-examined in the available literature. The literature indicates that improved educational strategies, especially those that transition seamlessly into clinical training, are essential to bridge these gaps and promote a positive, informed attitude toward hepatitis B vaccination.

2.3 Identification and comparison of barriers to hepatitis B vaccination uptake among medical and nursing students

Several barriers and determinants can significantly affect hepatitis B vaccination rates among medical and nursing students. These barriers are present in several research studies that relate to the uptake of Hepatitis B vaccination among medical and nursing students. They include lack of awareness about the virus and its risks, misconceptions about the vaccine's efficacy and safety, perceived low risk, inadequate access to vaccination services, cost concerns, fear of needles, time constraints, lack of mandatory vaccination policies within the institution, and inadequate education regarding infection control practices.[14,24,26]

A 2022-2023 cross-sectional study was conducted among nursing students at the University of West Attica and the National and Kapodistrian University of Athens in Greece.[26] The study aimed to evaluate the vaccination coverage for the Hepatitis B virus (HBV) among nursing students, as well as their knowledge, attitudes, and practices regarding HBV.[26] Findings revealed that vaccine refusal was not linked to participants' level of knowledge or attitudes ($p > 0.05$), suggesting that other factors may act as barriers to vaccine uptake.[26] Knowledge scores varied between 0% and 96.9%, with an average of 62.2% (SD = 17.0%).[26] Additionally, multivariate linear regression indicated that longer years of nursing education were associated with improved practices and more positive attitudes towards HBV vaccination ($p < 0.05$).[26] This highlights the

role of educational background in shaping vaccination behaviour, while other barriers beyond knowledge and attitudes may influence uptake.[26]

Similarly, but preceding, another cross-sectional, multi-centre study was conducted in 2014 among medical, nursing, and paramedical students in Greece, involving 2119 students from six major institutions, including the University of Athens, the University of Thessaloniki, and the University of Thessaly.[29] The study aimed to evaluate Hepatitis B virus (HBV) vaccination coverage, assess students' attitudes toward vaccination, and identify reasons for non-vaccination.[29] The findings indicated that the main reasons for non-vaccination were complacency (60%) and concerns about vaccine safety (30%).[29] These findings underscore the significant role of complacency and vaccine safety concerns as key barriers to HBV vaccine uptake among healthcare students.[29]

In a different context, a 2021 cross-sectional study conducted among medical students at four universities in Bosaso, Somalia; East Africa University, University of Health Sciences, Red Sea University, and University of Bosaso sought to evaluate HBV vaccination coverage and associated factors.[30] The study included 247 participants selected through stratified and simple random sampling techniques from a target population of 683 clinical-level students.[30] The findings revealed barriers such as vaccine unavailability (32.8%), high cost (26.7%), fear of side effects (12.6%), and lack of trust in vaccine quality (8.5%), which hindered vaccination uptake among medical students in these institutions.[30]

Furthermore, A comparative cross-sectional study aimed at assessing the level of risk perception of HBV infection and vaccine uptake among medical and other students while identifying factors impeding vaccination was published in 2017.[15] The study was conducted among students at the University of Jos, Plateau State, Nigeria, involving 1,200 students from the departments of

Medicine, Nursing Sciences, and Public Administration, with 400 students from each. The study found that of 1200 students, 597 did not receive full doses of the HB vaccine.[15] Among these 597 students, 253 (42%) attributed their non-uptake to poor geographical access, 95 (15.9%) cited a lack of awareness, 108 (18.1%) had a negative screening result, which they believed made vaccination unnecessary, 103 (17.3%) had positive screening results, and 38 (6.4%) associated their non-uptake with a fear of needles.[15]

Collectively, these studies demonstrate that barriers to HBV vaccination among healthcare students are multifaceted and context-dependent, ranging from attitudinal barriers, such as complacency in higher-resource settings, to structural barriers, such as cost and vaccine unavailability in lower-resource African settings. The Nigerian evidence particularly suggests that barriers may differ across student disciplines.

2.4 Determination and comparison of the proportion of medical and nursing students who have completed doses of the hepatitis B vaccine

Multiple studies have examined the proportion of medical and nursing students who have completed all required doses of the HBV vaccine.

A cross-sectional study conducted in 2014 at King Khalid University Hospital in Riyadh, Saudi Arabia, assessed medical students' awareness of and compliance with the HBV vaccine.[31] The study surveyed 444 second to fifth-year students using a self-administered questionnaire. The findings revealed that while 93.9% of the participants had received at least one dose of the vaccine, only 59.5% had completed all three required doses.[31] The study identified forgetfulness and busy schedules as the leading reasons for non-compliance.[31] The study emphasised the need for a mandatory vaccination policy and better post-vaccination follow-up strategies.[31]

Similarly, a more recent cross-sectional survey conducted in 2024 at a tertiary healthcare facility in Kerala, India, to evaluate the knowledge, attitude, and practice of HBV vaccination among 335 students from medical, dental, nursing, and physiotherapy disciplines via structured, self-administered questionnaires indicated that 76.4% of students had received at least one dose of the vaccine, but only 56.25% had completed all three doses with a positive correlation identified between knowledge levels and vaccination completion rates.[14]

A study was conducted among nursing students at the University of West Attica and the National and Kapodistrian University of Athens in Greece.[26] The study aimed to evaluate the vaccination coverage for the Hepatitis B virus (HBV) among nursing students. The study reported that only 27.7% of nursing students were fully vaccinated.[26]

In 2020, a study was carried out at Kenya Medical Training College to investigate factors influencing HBV vaccination among medical students.[32] The study included 487 students, of whom 85.8% had received at least one dose, while only 20.2% had completed all three doses.[32] A structured questionnaire was used to collect quantitative data, while focus group discussions provided qualitative insights into barriers to vaccine uptake.[32] The most commonly cited barrier was the unavailability of the vaccine at campus clinics at the time of administration, causing many students to miss doses.[32] Additionally, logistical challenges, misinformation, and competing academic demands hindered full vaccination. The study stressed the importance of structured vaccination programs and better accessibility to HBV vaccines within training institutions.[32]

A descriptive cross-sectional study was conducted in October 2013 at the University of Port Harcourt Teaching Hospital among first- to third-year clinical medical students.[33] The study aimed to determine the hepatitis B vaccination rate and assess students' knowledge of hepatitis B

infection.[33] A total of 316 medical students participated, responding to self-administered questionnaires.[33] The findings showed that 85.4% of students had received at least one dose of the vaccine, but only 34.8% had completed the full three-dose regimen.[33]

Also within Nigeria, the comparative cross-sectional study at the University of Jos found a striking disparity in full vaccination completion rates between medical and nursing students, with 60.2% of medical students completing the full three-dose series compared to only 20.6% of nursing students.[15] This discipline-based difference in completion rates is particularly significant, as it suggests that nursing students face greater challenges in completing the vaccination series than their medical counterparts do, even within the same institution.[15]

The reviewed studies reveal a global trend of high HBV vaccine awareness but suboptimal completion rates among medical and nursing students.

CHAPTER 3

METHODOLOGY

3.1 Study Area

The study was conducted at the University of Benin (UNIBEN) in Benin City, Edo State, Nigeria. Benin City is a key economic, educational, and cultural hub in the South-South geopolitical zone. It is known for its rich cultural heritage as the centre of the ancient Benin Kingdom. The city hosts several tertiary institutions, including the University of Benin.

The University of Benin (UNIBEN) was established in 1970 and has since grown into one of Nigeria's foremost institutions of higher learning. The university is a federally owned institution with a mission to provide high-quality education, research, and professional training across various disciplines. UNIBEN has a student population of over 75,000, with a diverse range of academic programs spanning undergraduate, postgraduate, and professional levels[34].

Academic Structure[34]

A. The university is structured into multiple faculties, which include:

1. Faculty of Arts
2. Faculty of Education
3. Faculty of Engineering
4. Faculty of Environmental Sciences
5. Faculty of Law
6. Faculty of Life Sciences
7. Faculty of Management Sciences

8. Faculty of Pharmacy
9. Faculty of Physical Sciences
10. Faculty of Social Sciences
11. Faculty of Veterinary Medicine
12. Faculty of Agriculture

Each faculty offers a variety of academic programs tailored to different professional fields.

B. Autonomous Institutes: The university has institutes for specialised training. These include;

1. Institute of Education: Focuses on enhancing educational practices and policies.
2. Institute of Public Administration: Dedicated to the study and improvement of public sector management

C. Academic Centres: The University also has centres dedicated to specialised research. They include;

1. Centre for Maritime Studies: Offers specialised programs in maritime education and research.
2. Centre of Excellence in Reproductive Health Innovation (CERHI): A World Bank-supported project aiming to implement high-quality training and applied research for professionals tackling reproductive health challenges in the region.
3. Centre for Educational Technology
4. Centre for Entrepreneurial Studies
5. Centre for Gender Studies

6. Centre for Part-Time Studies
7. Centre for Forensic and DNA Studies
8. Centre for Excellence in Geosciences
9. Centre for Sustainable Procurement, Environmental and Social Standards Enhancements
10. National Centre for Energy & Environment (NCEE): Responsible for research in energy and environmental studies, this centre operates under the Energy Commission of Nigeria.

D. Unit; This includes the General Studies Unit, which is now ranked in the Times Higher Education 2023 World University Rankings.
E. School of Postgraduate Studies (now College of Postgraduate Studies)
F. College of Medicine

The College of Medicine is a prestigious faculty within the University of Benin, responsible for training healthcare professionals in Medical Sciences. The college consists of three schools and 1 Institute, with an estimated student population of over 3,000. They include;

1. School of Basic Medical Sciences
2. School of Dentistry
3. School of Medicine
4. Institute of Child Health
5. School of Basic Clinical Science (Newly added)

Each school in the college have specialised departments and academic programs:

1. School of Basic Medical Sciences (BMS)

The School of Basic Medical Sciences provides foundational medical education and research in the biomedical sciences. It includes departments such as:

a) Anatomy
b) Physiology
c) Biochemistry
d) Medical Laboratory Science
e) Radiography
f) Veterinary medicine
g) Nursing
h) Physiotherapy

The Department of Nursing, situated within the School of Basic Medical Sciences, offers a four-year Bachelor of Science in Nursing (BSc Nursing) program. The curriculum integrates theoretical and practical training, preparing students for roles in clinical nursing, community health, and hospital management. The nursing program emphasises evidence-based practice, patient-centred care, and hands-on clinical exposure. The curriculum is structured to include a blend of lectures, laboratory work, and supervised clinical practice, ensuring that students are well-versed in modern healthcare practices at UBTH and other healthcare institutions.

2. School of Medicine

The School of Medicine has only one department that offers the Bachelor of Medicine, Bachelor of Surgery (MBBS) program, which lasts six years. The curriculum is structured into preclinical

(basic medical sciences) and clinical phases, with hands-on training at the University of Benin Teaching Hospital (UBTH). Medical students gain experience in various specialities, including Internal Medicine, Surgery, Paediatrics, Obstetrics & Gynaecology, and Public Health & Community Medicine.

The School of Medicine currently has a population of over 1200 students, with over 600 in the pre-clinical class and over 600 in the clinical class.

3.2 Study Design

A comparative cross-sectional study design was used to assess the knowledge, attitudes, and uptake of Hepatitis B vaccination and its determinants among medical and nursing students at the University of Benin.

A cross-sectional study involves collecting data from participants at a single point in time, making it an efficient and cost-effective method for studying prevalence, patterns, and associations between variables. This design was particularly useful for understanding current knowledge, attitudes, and uptake of Hepatitis B vaccination among students without requiring prolonged follow-up periods.

A comparative study enabled the identification of differences and similarities between two or more groups. Medical and nursing students were compared to determine whether disparities existed in their knowledge levels, attitudes towards Hepatitis B vaccination, and actual vaccine uptake.

The study adopted a quantitative research approach, with structured questionnaires administered to collect numerical data from participants. The questionnaire was designed to assess key

variables, including students' knowledge of Hepatitis B, their attitudes towards vaccination, and their personal vaccination uptake.

Although primarily quantitative, this study incorporated limited qualitative elements through open-ended survey questions, which provided additional insights into students' perceptions, concerns, and motivations regarding Hepatitis B vaccination.

From an epidemiological perspective, this research falls under **observational study designs**, specifically a **descriptive-analytical study**. The descriptive component summarised the knowledge, attitudes, and vaccination status of respondents, while the analytical component compared attitudes toward Hepatitis B vaccination between preclinical and clinical students across medical and nursing disciplines. Barriers and determinants influencing vaccination uptake were also identified and compared between medical and nursing students.

3.3 Study Duration

The study was conducted over a period of one year from January 2025 to February 2026, covering proposal approval, ethical clearance, data collection, data analysis, and report writing.

3.4 Scope of the Study

The study focused on the knowledge, attitudes, and uptake of hepatitis B vaccination among medical and nursing students at the University of Benin. Specifically, it will also compare preclinical and clinical students in both disciplines regarding:

1. Their knowledge of hepatitis B and its vaccination.
2. Their attitudes toward vaccination.
3. The determinants influencing their vaccination uptake.
4. The proportion of students who have completed the required hepatitis B vaccine doses.

The study did not assess other viral hepatitis infections or immunisation, nor did it extend to non-medical students.

3.5 Study Population

The study population comprised medical and nursing students at the University of Benin, Edo State, Nigeria, enrolled at various levels, categorised as preclinical and clinical students.

3.3.1 Inclusion Criteria

1. Medical and nursing students currently enrolled at the University of Benin.
2. Students who have provided informed consent to participate in the study.
3. Students who have attended at least one academic session in their respective programs.

3.3.2 Exclusion Criteria

1. Students who do not consent to participate in the study.
2. Students not present during data collection periods.

3.6 Sample Size Determination

Determining an appropriate sample size was crucial to this study, as it ensured that the findings were statistically significant and representative of the target population.

For this study, a formula for comparing two proportions was utilised.[35];

$$n = \frac{2\left(\frac{Z_{\alpha}}{2}+Z_{\beta}\right)^{2} P(1-P)}{(P_1-P_2)^2}$$

Where:

n = Minimum sample size

$Z_{\alpha/2} = Z_{0.05/2} = Z_{0.025}$, Z = 1.96 (From Z table) at type 1 error of 5%

$Z_{\beta} = Z_{0.20}$ = 0.842 (From Z table) at 80% power

P_1 = Prevalence among medical students based on findings from previous studies or pilot surveys

P_2 = Prevalence among nursing students based on findings from previous studies or pilot surveys.

$P_1 - P_2$ = Difference in proportion of events in two groups

P = Pooled prevalence = [prevalence in case group (P_1) + prevalence in control group (P_2)]/2

For medical students, a prevalence (P) of 62.4% and for nursing students, a prevalence (P) of 49.2% was employed, reflecting previous findings indicating that 62.4% of medical students and 49.4% of nursing students demonstrated a good attitude towards hepatitis B vaccination, evidenced by completing the three-dose vaccination schedule.[36]

With the following values:

- Z =1.96
- P_1 =62.4% = 0.624
- P_2 =49.2% = 0.492
- $P_1 - P_2 = 0.624 - 0.492 = 0.132 \cong 0.13$
- $P = \frac{0.624+0.492}{2} = 0.558 \cong 0.56$

We calculate:

1. First, compute $2\left(Z_{\frac{\alpha}{2}} + Z_{\beta}\right)^2 P(1-P) = 2(1.96+0.84)^2 \, x \, 0.56(1-0.56)$

= 3.86

2. Next, compute $(P_1 - P_2)^2 = 0.13^2 = 0.0169 \cong 0.02$

3. $n = \frac{2\left(Z_{\frac{\alpha}{2}}+Z_{\beta}\right)^2 P(1-P)}{(P_1-P_2)^2} = \frac{3.86}{0.02} = 193$

The required sample size was **193 participants** per group, resulting in a total of **386 participants.**

A design effect (DE) of 1.5 was applied to account for the use of a multi-stage sampling design.

Adjusted n = n x 1.5 = 193 x 1.5 = 289.5 ≅ 290

To account for non-response, a 10% non-response rate was added to the adjusted minimum sample size, using the formula for non-response rate.

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

n = Adjusted n = 290

nr = Non-response rate = 10% = 0.10

n_f = Final minimum sample size

$nf = \frac{290}{1-0.10}$ =322.2

Thus, approximately **322 participants per group** were required to account for a 10% non-response rate, giving a total of **644 participants**.

3.7 Sampling Technique

A stratified Sampling technique was used to ensure adequate representation of both medical and nursing students. Each class within the Medicine and Nursing program, except the first year, was treated as a distinct stratum. The study population was stratified based on two primary variables:

1. Field of Study:

   i. Medical students
   ii. Nursing students

2. Academic Level:

   i. Preclinical students (200 level-300 level for medicine, 200 level for nursing)
   ii. Clinical students (400 level-600 level for medicine, 300-500 level for nursing)

This created a total of four strata:

1. Preclinical medical students

   i. 200 level: 184
   ii. 300 level: 155

2. Clinical medical students

   i. 400 level B: 159
   ii. 400 level A: 186

iii. 500 level: 132

iv. 600 level B: 165

v. 600 level A: 145

3. Preclinical nursing students

i. 200 level: 208

4. Clinical nursing students

ii. 300 level: 200

iii. 400 level: 170

iv. 500 level: 163

The total sample size was allocated across strata based on the number of students in each class. Within each stratum, participants were randomly selected to minimise selection bias.

Sampling Fraction = n/N

Where; n = sample size for each group = 322

N = total population

For Medical Students;

Sampling fraction = $\frac{322}{1126}$ = 0.2860 ≅ 0.3

For Nursing students;

Sample fraction = $\frac{322}{741}$ = 0.4345 ≅ 0.43

The sample size of each stratum will be calculated using the formula:

Sample size = sampling fraction x population of students in each stratum

Proportional allocation for each level;

Medical Students;

Class Level	Population (N)	0.2860 × N	≅
200 level	184	52.62	53
300 level	155	44.33	44
400 level B	159	45.47	45
400 level A	186	53.20	53
500 level	132	37.75	38
600 level B	165	47.19	47
600 level A	145	41.47	42
Total	**1126**	—	**322**

Nursing Students;

Class Level	Population (N)	0.4345 × N	≅
200 level	208	90.38	90
300 level	200	86.90	87
400 level	170	73.87	74
500 level	163	70.82	71
Total	**741**	—	**322**

3.8 Data Management

Effective data management was essential to ensure the reliability, validity, and integrity of the data collected during this study.

3.8.1 Methods of Data Collection

Data were collected using a structured, self-administered questionnaire. The questionnaire would be adapted from validated instruments used in previous studies on hepatitis B vaccination among healthcare students. The questionnaire comprised multiple sections covering socio-demographic information, knowledge of hepatitis B and its vaccination, attitudes toward the vaccine, vaccination uptake (including the number of doses received), and perceived barriers/determinants affecting vaccination behaviour.

Data collection was conducted during scheduled class sessions and clinical postings to maximise participation. A student from each level (excluding the medical 600 level) in each stratum (9 in total) was briefed on how to collect the data. These students were present during data collection to clarify questions and retrieve completed questionnaires.

In addition to the paper-based approach, an online version of the questionnaire was made available to facilitate data collection and reach students who were off-campus during the data collection period.

3.8.2 Tools for Data Collection

The primary tool for data collection was a questionnaire adapted from studies done by Dahal et. al.[37], Anaiku et al.[22], and Paul et al.[33]. The questionnaire is divided into the following sections:

1. Section A: Socio-Demographic Information: This section collected data on age, gender, department, academic level (preclinical vs clinical), and other relevant background information.
2. Section B: Knowledge of Hepatitis B and Its Vaccination: This section was designed to assess the respondents' understanding of HBV transmission routes, complications, and the recommended vaccination regimen.
3. Section C: Attitudes toward Hepatitis B Vaccination: This section captured the respondents' perceptions and feelings about the importance, efficacy, and safety of the HBV vaccine.
4. Section D: Barriers/determinants of hepatitis B vaccination uptake: This section identified barriers or facilitators to completing the vaccination series, such as accessibility, cost, or institutional support.
5. Section E: Vaccination Uptake: This section collected data on the vaccination status of the students (e.g. number of doses received).

3.8.3 Data Analysis

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 25. The analysis included both descriptive and inferential statistics, aligned with the study's objectives. A significance level of $p < 0.05$ was used to determine statistical significance.

3.8.3.1 Socio-demographic Characteristics

Data collected in this section were analysed descriptively. Variables such as age, gender, level of study, and program were summarised using frequency distributions, percentages, means, and standard deviations. No specific scoring system is applied in this section; rather, it provides background information and serves as a basis for subgroup comparisons.

3.8.3.2 Knowledge of Hepatitis B Virus and Vaccination

A structured set of 11 multiple-choice and Yes/No questions was used to assess knowledge.

1. Scoring System:
    i. Each correct answer was awarded 1 point, while incorrect answers received 0 points.
    ii. The total knowledge score was computed for each respondent.
2. Categorisation of Scores: The scoring system used in a study done by Bhattarai et. al[25] was adopted for this study, and is as follows;
    i. Poor Knowledge: Score < 50% of the maximum. (maximum score of 14)
    ii. Good or adequate Knowledge: Score ≥50% of the maximum (maximum score of 14).
3. Analysis: Descriptive statistics (mean, standard deviation, frequency tables, and percentages) were used to summarise the overall knowledge levels. Comparative analyses using the Chi-Square test assessed differences in knowledge scores between medical and nursing students, and between preclinical and clinical cohorts.

3.8.3.3 Attitudes Toward Hepatitis B Vaccination

Attitudes were assessed using a Likert scale and Yes/No questions for a series of statements regarding hepatitis B vaccination. Two open-ended questions were also included to capture qualitative reasons behind students' willingness or unwillingness to attend HBV educational programmes, providing additional context to the quantitative attitude scores.

1. Scoring System:

    i. On the Likert scale, each response was assigned a numerical value: 5 for "strongly agree" down to 1 for "strongly disagree"

    ii. An overall attitude score was calculated by summing the scores for all statements.

2. Categorisation of Scores: The scoring system used in a study done by Bhattarai et. al[25] The method adopted for this study is as follows;

    i. Positive Attitude: Higher overall score (maximum score of 40)

    ii. Negative Attitude: Score < 50% of the maximum (maximum score of 40).

2. Analysis: Mean scores and standard deviations were reported, and comparisons between groups were conducted using the Chi-Square test. The analysis explored correlations between attitude scores and knowledge or vaccination status.

3.8.3.4 Barriers/Determinants of Hepatitis B Vaccination Uptake

This section included multiple-choice questions on potential barriers. The respondents were also allowed to mention potential barriers/determinants on a personal basis.

1. Analysis: Descriptive statistics (frequency and percentage) were used to summarise the perceived barriers selected. Chi-square test was used to assess whether the distribution of barriers differed significantly between medical and nursing students.

3.8.3.5 Vaccination Status and Completion of Doses

This section captured whether students had ever received the HBV vaccine, the number of doses received, where they obtained the vaccine, and the motivation for vaccination.

1. Scoring System:

i. Vaccination status will be coded numerically as unvaccinated, partially vaccinated, and fully vaccinated.

2. Analysis: Frequency and percentage distributions were used to summarise vaccination status across the sample. Chi-square tests compared proportions of vaccinated students across subgroups, including medical versus nursing students and preclinical versus clinical students.

3.8.4 Data Presentation

The results of the data analysis were presented using a combination of tables, graphs, and charts. Frequency distributions and percentages were shown in tabular form, while bar charts and pie charts illustrated key findings on knowledge levels, attitudes, and vaccination uptake. Associations between variables were presented in tables accompanied by p-values and confidence intervals.

3.9 Ethical Considerations

Approval was obtained from the Ethics Committee of the University of Benin before the commencement of the study. Informed consent was secured from all participants, ensuring they understood the purpose and scope of the research. To maintain confidentiality and anonymity, responses were coded, safeguarding the identities of those involved. All data collected was stored securely and utilised strictly for research purposes. Participation in this study was entirely voluntary, and participants were informed of their right to withdraw at any time without negative consequences or impact on their academic standing.

3.10 Limitations of the Study

There was potential for recall bias in self-reported vaccination status, which could affect data accuracy. Non-response or incomplete responses from some students also limited the findings. Moreover, the results may lack generalizability beyond the specific population of medical and nursing students involved. The cross-sectional design meant that data were collected at a single point in time, making it difficult to draw causal inferences or observe changes over time.

CHAPTER 4

RESULTS

A total of 646 respondents participated in the study, comprising 324 medical students and 322 nursing students. The response rate was 100%. The results are presented in the following sections in line with the specific objectives of the study.

SECTION A: Sociodemographic characteristics of respondents

SECTION B: Knowledge of Hepatitis B and its vaccination

SECTION C: Attitudes towards Hepatitis B vaccination

SECTION D: Hepatitis B vaccination uptake

SECTION E: Barriers/determinants to Hepatitis B vaccination uptake

SECTION F: Factors associated with knowledge, attitude, and vaccination practice

SECTION A

SOCIODEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Table 1: Socio-demographic characteristics of respondents

Variables	Frequency (n=646)	Percent (%)
Age Group		
15-19 years	95	14.7
20-24 years	406	62.9
25-29 years	137	21.2
≥ 30 years	7	1.1
Mean Age ± SD	**22.47 ± 2.72**	
Sex		
Male	228	35.3
Female	418	64.7
Course of Study		
Medicine	323	50.1
Nursing	322	49.9
Level of Study		
200 Level	143	22.1
300 Level	132	20.4
400 Level	172	26.6
500 Level	110	17.0
600 Level	89	13.8
Started Clinical Postings		
No (Pre-clinical)	188	29.1
Yes (Clinical)	458	70.9
Relationship Status		
Single	622	96.6
Married	18	2.8
Cohabiting	4	0.6

Table 1 presents the sociodemographic profile of the 646 Medicine and Nursing students who participated in the study. The mean age of the respondents was 22.47 ± 2.72 years. Among the respondents, 406 (62.9%) were aged 20–24 years, 137 (21.2%) were aged 25–29 years, 95 (14.7%) were aged 15–19 years, and 7 (1.1%) were aged ≥30 years.

Regarding gender distribution, the study population was predominantly female, accounting for 418 (64.7%) of the respondents, while males comprised 228 (35.3%). The distribution by course of study showed that Medical students constituted 323 (50.1%) of the sample, and Nursing students made up 322 (49.8%).

When analysed by level of study, students in the 400 Level formed the largest group of participants, 172 (26.6%), followed by those in the 200 Level, 143 (22.1%) and the 300 Level, 132 (20.4%). The 500 Level and 600 Level had the fewest participants, accounting for 110 (17.0%) and 89 (13.8%), respectively.

A key variable in this study was clinical exposure. The results show that the majority of the respondents, 458 (70.9%), had commenced their clinical postings (Clinical students), while 188 (29.1%) were still in the pre-clinical phase of their training.

In terms of relationship status, the vast majority of the students were single 622 (96.6%), with a small minority being married 18 (2.8%) or cohabiting 4 (0.6%).

Table 1b: Socio-demographic characteristics of respondents (continued)

Variables	Frequency (n=646)	Percent (%)
Religion		
Christianity	619	96.6
Islam	17	2.7
ATR	1	0.2
Others	4	0.6
Ethnicity		
Benin	227	35.2
Esan	91	14.1
Igbo	84	13.0
Yoruba	77	11.9
Urhobo	59	9.1
Hausa	19	2.9
Etsako	15	2.3
Isoko	9	1.4
Owan	9	1.4
Ijaw	7	1.1
Others*	48	7.4

**Others include: Idoma, Itsekiri, Efik, Ika, Afemai, Igbanke, Agbor, Ibibio, Uneme, Tiv, Higgi, Ukwani, Jukun, Akoko Edo, Oro, Okpela, Nke, Igede, Annang, Delta, Edo.*

The religious distribution showed a strong predominance of Christianity, practised by 619 (96.6%) of respondents, Muslims constituted 17 (2.7%), while practitioners of African Traditional Religion (ATR) and other faiths were 5 (0.8%).

Ethnically, the Benin ethnic group was the most represented, accounting for 227 (35.2%) of the sample. This was followed by the Esan 91 (14.1%), Igbo 84 (13.0%), and Yoruba 77 (11.9%) groups. The Urhobo had 59 (9.1%), Hausa 19 (2.9%), Etsako 15 (2.3%), Isoko 9 (1.4%), Owan 9 (1.4%), and Ijaw 7 (1.1%). At the same time, 48 (7.4%) of respondents belonged to other minority ethnic groups.

SECTION B

KNOWLEDGE OF HEPATITIS B AND ITS VACCINATION

Table 2: Specific Knowledge of Hepatitis B and its vaccination

Variables	Correct Answer	Frequency (n=646)	Percent (%)
General Knowledge			
Causative agent is a Virus	Yes	586	90.7
Modes of Transmission			
Unprotected Sexual Intercourse	Yes	490	75.9
Sharing Needles/Sharps	Yes	485	75.1
Blood Transfusion	Yes	404	62.5
Mother-to-Child Transmission	Yes	379	58.7
Prevention & Treatment			
Preventable by Vaccine	Yes	592	91.6
Correct Doses (Three)	Yes	361	55.9
First dose at birth	Yes	427	66.1
Infection is NOT Curable	No	442	68.4
More infectious than HIV	Yes	385	59.6
Complications			
Can cause Liver Cirrhosis	Yes	518	80.2
Can cause Liver Cancer	Yes	442	68.4
Can cause Jaundice	Yes	321	49.7
Can cause Death	Yes	301	46.6

**Multiple responses were allowed*

Table 2 provides a detailed breakdown of the respondents' knowledge regarding specific aspects of Hepatitis B, including aetiology, transmission, vaccination, and complications, revealing both areas of strength and significant gaps.

Among the respondents, 586 (90.7%) correctly identified the disease's causative agent as a virus. Regarding the modes of transmission, unprotected sexual intercourse and sharing of needles/sharps were correctly identified as risk factors by 490 (75.9%) and 485 (75.1%) of respondents, respectively. However, only 404 (62.5%) identified blood transfusion as a mode of transmission, and 379 (58.7%) of respondents identified Mother-to-Child Transmission (MTCT) as a mode of transmission.

Furthermore, 592 (91.6%) correctly affirmed that the infection is vaccine-preventable and only 361 (55.9%) correctly stated that three doses are required to complete the schedule. 427 (66.1%) of students knew that the first dose should ideally be administered at birth. However, only 442 (68.4%) of respondents correctly identified that Hepatitis B is not curable. Additionally, only 385 (59.6%) were aware that Hepatitis B is significantly more infectious than HIV.

Liver Cirrhosis was correctly identified as a potential complication by 518 (80.2%), while 442 (68.4%) identified the risk of Liver Cancer. However, only 321 (49.7%) of respondents identified Jaundice as a complication, and 301 (46.6%) identified death as a complication.

Table 3: Course of study and Knowledge of Hepatitis B

Department	Good Knowledge n (%)	Poor Knowledge n (%)	χ2 Value	df	p-value
Medicine	278 (85.8%)	46 (14.2%)	**3.686**	**1**	**0.055**
Nursing	258 (80.1%)	64 (19.9%)			

**Significant at $p < 0.05$*

Table 3 presents a comparative analysis of Hepatitis B knowledge between Medical and Nursing students using a Chi-square test of independence. The results show that Medical students had a slightly higher proportion of respondents with good knowledge, 278 (85.8%), compared to their Nursing counterparts, 258 (80.1%), and 46 (14.2%) Medicine students had poor knowledge compared to Nursing, 64 (19.9%).

However, despite this numerical difference, the statistical analysis yielded a Chi-square value of 3.686 and a p-value of 0.055. The observed difference is not statistically significant. Therefore, the null hypothesis is accepted.

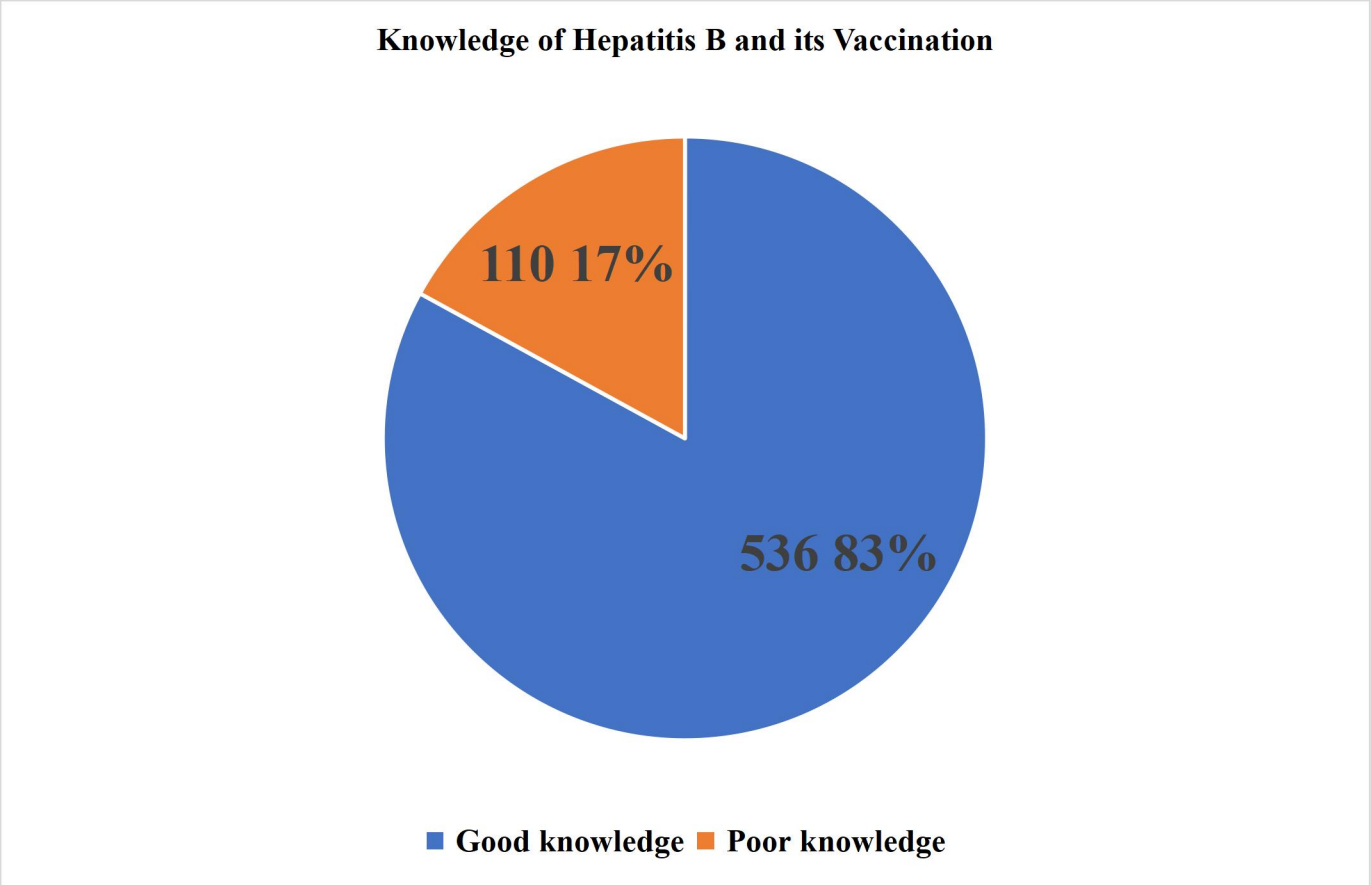

Figure 1: Overall Knowledge Levels

Figure 1 illustrates the aggregate knowledge scores of the 646 respondents regarding Hepatitis B infection and its vaccination. 536 (83.0%) of the students had a "Good Knowledge" score (≥ 7 out of 14).

Conversely, only 110 (17.0%) of the respondents were classified as having "Poor Knowledge" (score < 7).

Table 4: Sociodemographic characteristics and Knowledge of Hepatitis B

Variables	Good Knowledge n (%)	Poor Knowledge n (%)	Chi-Square ($\chi 2$)	p-value
Age Group			**60.097**	**<0.001***
15-19 years	54 (56.8%)	41 (43.2%)		
20-24 years	347 (85.5%)	59 (14.5%)		
25-29 years	128 (93.4%)	9 (6.6%)		
≥ 30 years	7 (100.0%)	0 (0.0%)		
Sex			**0.701**	**0.402**
Male	193 (84.6%)	35 (15.4%)		
Female	343 (82.1%)	75 (17.9%)		
Course of Study			**3.686**	**0.055**
Medicine	278 (85.8%)	46 (14.2%)		
Nursing	258 (80.1%)	64 (19.9%)		
Level of Study			**124.339**	**<0.001***
200 Level	76 (53.1%)	67 (46.9%)		
300 Level	112 (84.8%)	20 (15.2%)		
400 Level	158 (91.9%)	14 (8.1%)		
500 Level	101 (91.8%)	9 (8.2%)		
600 Level	89 (100.0%)	0 (0.0%)		
Clinical Status			**127.435**	**<0.001***
Pre-clinical	107 (56.9%)	81 (43.1%)		
Clinical	429 (93.7%)	29 (6.3%)		

**Significant at $p < 0.05$*

Table 4 presents the bivariate analysis examining the relationship between respondents' sociodemographic characteristics and their level of knowledge of Hepatitis B. A Chi-square test of independence was utilised to determine the statistical significance of these associations.

Sex showed no statistically significant association with knowledge categories ($p = 0.402$). On the other hand, Age Group was found to be a highly significant factor ($p < 0.001$). The proportion of respondents with good knowledge steadily increased with age, moving from 54 (56.8%) in the youngest cohort (15-19 years) to 347 (85.5%) in 20-24 years to 128 (93.4%) among those aged 25-29 years, and reaching 7 (100.0%) for those aged 30 and above.

While Medical students demonstrated a slightly higher rate of good knowledge, 278 (85.8%), compared to Nursing students, 258 (80.1%), this difference was only of borderline significance ($p = 0.055$) and did not meet the strict $p < 0.05$ threshold.

Clinical Status showed a profound association ($p < 0.001$), with 93.7% of students in their clinical years demonstrating good knowledge, compared to only 56.9% of their pre-clinical counterparts. The findings for Level of Study also proved highly significant ($p < 0.001$). Only 53.1% of 200-level students demonstrated good knowledge, but this proportion surged to 84.8% by the 300 level. Both the 400-level and 500-level had similar results of 91.9% and 91.8%, respectively, and peaked at an absolute 100.0% among the final year (600-level) students.

Table 4b: Sociodemographics and Knowledge of Hepatitis B (continued)

Variables	Good Knowledge n (%)	Poor Knowledge n (%)	Chi-Square ($\chi 2$)	p-value
Relationship Status			**2.598**	**0.273**
Single	513 (82.5%)	109 (17.5%)		
Married	17 (94.4%)	1 (5.6%)		
Cohabiting	4 (100.0%)	0 (0.0%)		
Religion			**1.390**	**0.708**
Christianity	512 (82.7%)	107 (17.3%)		
Islam	15 (88.2%)	2 (11.8%)		
ATR & Others	5 (100.0%)	0 (0.0%)		
Ethnicity			**2.952**	**0.983**
Benin	188 (82.8%)	39 (17.2%)		
Esan	77 (84.6%)	14 (15.4%)		
Igbo	70 (83.3%)	14 (16.7%)		
Yoruba	63 (81.8%)	14 (18.2%)		
Urhobo	47 (79.7%)	12 (20.3%)		
Hausa	16 (84.2%)	3 (15.8%)		
Etsako	13 (86.7%)	2 (13.3%)		
Owan	9 (100.0%)	0 (0.0%)		
Isoko	7 (77.8%)	2 (22.2%)		
Ijaw	6 (85.7%)	1 (14.3%)		
Others	40 (83.3%)	8 (16.7%)		

**Others include: Idoma, Itsekiri, Efik, Ika, Afemai, Igbanke, Agbor, Ibibio, Uneme, Tiv, Higgi, Ukwani, Jukun, Akoko Edo, Oro, Okpela, Nke, Igede, Annang, Delta, Edo.*

Furthermore, the analysis showed that personal, social, and cultural factors do not dictate knowledge levels. Variables such as Relationship Status ($p = 0.273$), Religion ($p = 0.708$), and Ethnicity ($p = 0.983$) showed no statistically significant association with knowledge categories.

Table 5: Predictors of knowledge of Hepatitis B

Variables	β	p-value	Odds ratio	95% C.I. for Odds ratio
Age categories	0.377	0.110	1.457	0.919 – 2.312
Gender				
Male*			1	
Female	0.031	0.913	1.031	0.593 – 1.793
Course of Study				
Nursing*			1	
Medicine	0.604	**0.025**	1.829	1.077 – 3.105
Clinical Status				
Clinical*			1	
Pre-clinical	-2.195	**<0.001**	0.111	0.064 – 0.195

*β: Coefficient of regression; OR: Odds ratio; CI: Confidence interval; * Reference category*

The multivariate model revealed that basic sociodemographic factors, specifically Gender ($p = 0.913$) and Age ($p = 0.110$), were not statistically significant predictors of Hepatitis B knowledge, even after controlling for other variables.

However, the academic variables emerged as highly significant, independent predictors. Course of study was significant ($\beta = 0.604$; OR = 1.829; 95% CI: 1.077–3.105; $p = 0.025$), with the Odds Ratio indicating that Medical students are 1.829 times more likely to have good knowledge than their Nursing counterparts, even when controlling for age and clinical exposure.

The strongest predictor of Hepatitis B knowledge in the model was clinical exposure ($\beta = -2.195$; OR = 0.111; 95% CI: 0.064–0.195; $p = <0.001$), The Odds Ratio for pre-clinical status was 0.111. Students who have not yet started their clinical postings have roughly one-ninth the odds (approximately 89% less likely) of having good knowledge compared to students who are actively in clinical rotations.

SECTION C

ATTITUDES TOWARDS HEPATITIS B VACCINATION

Table 6: Attitude towards Hepatitis B Vaccination (Likert scale)

Attitude Statement	Strongly Agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly Disagree n (%)
Hepatitis B is a serious health problem	378 (58.5%)	214 (33.1%)	30 (4.6%)	1 (0.2%)	23 (3.6%)
Vaccination is effective to prevent Hepatitis B	331 (51.2%)	253 (39.2%)	39 (6.0%)	7 (1.1%)	16 (2.5%)
Healthcare students are at risk	284 (44.0%)	265 (41.0%)	63 (9.8%)	19 (2.9%)	15 (2.3%)
Hepatitis B Vaccine is safe	298 (46.1%)	266 (41.2%)	59 (9.1%)	10 (1.5%)	13 (2.0%)
Healthcare students & professionals should be vaccinated	355 (55.0%)	230 (35.6%)	36 (5.6%)	7 (1.1%)	18 (2.8%)
Screening should be compulsory in medical clearance	316 (48.9%)	258 (39.9%)	47 (7.3%)	12 (1.9%)	13 (2.0%)
Students should be vaccinated within 1 year of joining school	299 (46.3%)	246 (38.1%)	74 (11.5%)	12 (1.9%)	15 (2.3%)
Regular campaigns should be conducted	329 (50.9%)	258 (39.9%)	35 (5.4%)	9 (1.4%)	15 (2.3%)

**Multiple responses were allowed*

Table 6 illustrates the respondents' baseline attitudes towards Hepatitis B on the Likert scale and their associated vaccination protocols.

A majority recognised the severity of the disease, with 619 (91.6%) strongly agreeing or agreeing that Hepatitis B is a serious health problem; 24 (3.8%) disagreed or strongly disagreed; and 30 (4.6%) were neutral. Similarly, 584 (90.4%) strongly agreed or agreed that vaccination is an effective preventive measure; 23 (3.6%) disagreed or strongly disagreed; and 39 (6.0%) were neutral.549 (85.0%) strongly agreed or agreed that Healthcare students are at risk; 34 (5.2%) disagreed or strongly disagreed; and 63 (9.8%) were neutral. 564 (87.3%) strongly agreed or agreed that the vaccine is safe; 23 (3.5%) disagreed or strongly disagreed; and 59 (9.1%) were neutral. 580 (90.6%) agreed that all healthcare students and professionals should be vaccinated, 25 (3.9%) disagreed, and 36 (5.6%) were neutral. 574 (88.8%) also agreed that screening should be a compulsory part of medical clearance, 25 (3.9%) disagreed, 12 (1.9%) were neutral. 545 (84.4%) agreed that students should be vaccinated within 1 year of joining school, 27 (4.2%) disagreed, and 74 (11.5%) were neutral. 587 (90.8%) also agreed that regular campaigns should be conducted, 24 (3.7%) disagreed, 35 (5.4%) were neutral.

Table 6b: Attitude towards Hepatitis B Vaccination (Contined)

Variable	Response	Frequency (n=646)	Percent (%)
Would recommend the vaccine to friends/classmates	Yes	554	85.8
	No	20	3.1
	Maybe	69	10.7
Feel the need for protection against Hepatitis B	Yes	545	84.4
	No	42	6.5
	Maybe	57	8.8
Willing to take vaccine immediately if free	Yes	512	79.3
	No	41	6.3
	Maybe	92	14.2
Willing to receive vaccination	Yes	527	81.6
	No	37	5.7
	Maybe	82	12.7
Participated in educational program on Hep B	Yes	301	46.6
	No	340	52.6
Willing to attend educational program on Hep B	Yes	531	82.2
	No	29	4.5
	Maybe	81	12.5

Table 6b further elaborates on the respondents' practical attitudes, exploring their behavioural intentions regarding vaccine uptake, peer advocacy, and engagement with health education.

From the analysis, 554 (85.8%) stated they would recommend the Hepatitis B vaccine to their friends and classmates, and a negligible fraction, 20 (3.1%), definitely refused to recommend it, with 69 (10.7%) indicating that they may recommend it.

A majority of respondents, 545 (84.4%), acknowledged a personal need for protection against Hepatitis B, 42 (6.5%) did not feel the need to be protected, and 57 (8.8%) were undecided as regards the need for protection. 527 (81.6%) expressed a general willingness to receive the vaccination,37 (5.7%) did not, and 82 (12.7%) were undecided. As regards willingness to receive the vaccine if made free, 512 (79.3%) were willing, 41 (6.3%) still refused, and 92 (14.2%) were undecided.

Less than half of the respondents, 301 (46.6%), had previously participated in an educational program specifically focused on Hepatitis B, and 340 (52.6%) had not. However, 531 (82.2%) of the students expressed a willingness to attend future educational campaigns, 29 (4.5%) were not, and 81 (12.5%) were undecided.

Table 7: Clinical Exposure and Attitude towards Vaccination

Department	Clinical Status	Positive Attitude n (%)	Negative Attitude n (%)	χ2 Value	df	p-value
Medicine	**Pre-clinical**	80 (81.6%)	18 (18.4%)	**16.831**	**1**	**<0.001***
	Clinical	216 (95.6%)	10 (4.4%)			
Nursing	**Pre-clinical**	78 (86.7%)	12 (13.3%)	**2.385**	**1**	**0.122**
	Clinical	214 (92.2%)	18 (7.8%)			

**Significant at $p < 0.05$*

Table 7 presents a layered Chi-square analysis comparing attitudes between preclinical and clinical students within each department to test the hypothesis that clinical exposure influences attitude.

A statistically significant difference was observed among Medical students (chi-square value = 16.831, $p < 0.001$). Clinical medical students demonstrated a significantly higher proportion of positive attitudes, 216 (95.6%), compared to their preclinical counterparts, 80 (81.6%). 10 (4.4%) of clinical Medical students had negative attitudes, compared to 18 (18.4%) of their preclinical counterparts.

Nursing students in the clinical years exhibited a more positive attitude, with 214 students (92.2%) demonstrating this compared to 78 students (86.7%) in the preclinical years. However, this difference was not statistically significant, with a chi-square value of 2.385 and a p-value of 0.122. Additionally, 18 (7.8%) of clinical Nursing students had negative attitudes, compared to 12 (13.3%) of their preclinical counterparts.

Consequently, the null hypothesis is rejected for Medical students but accepted for Nursing students.

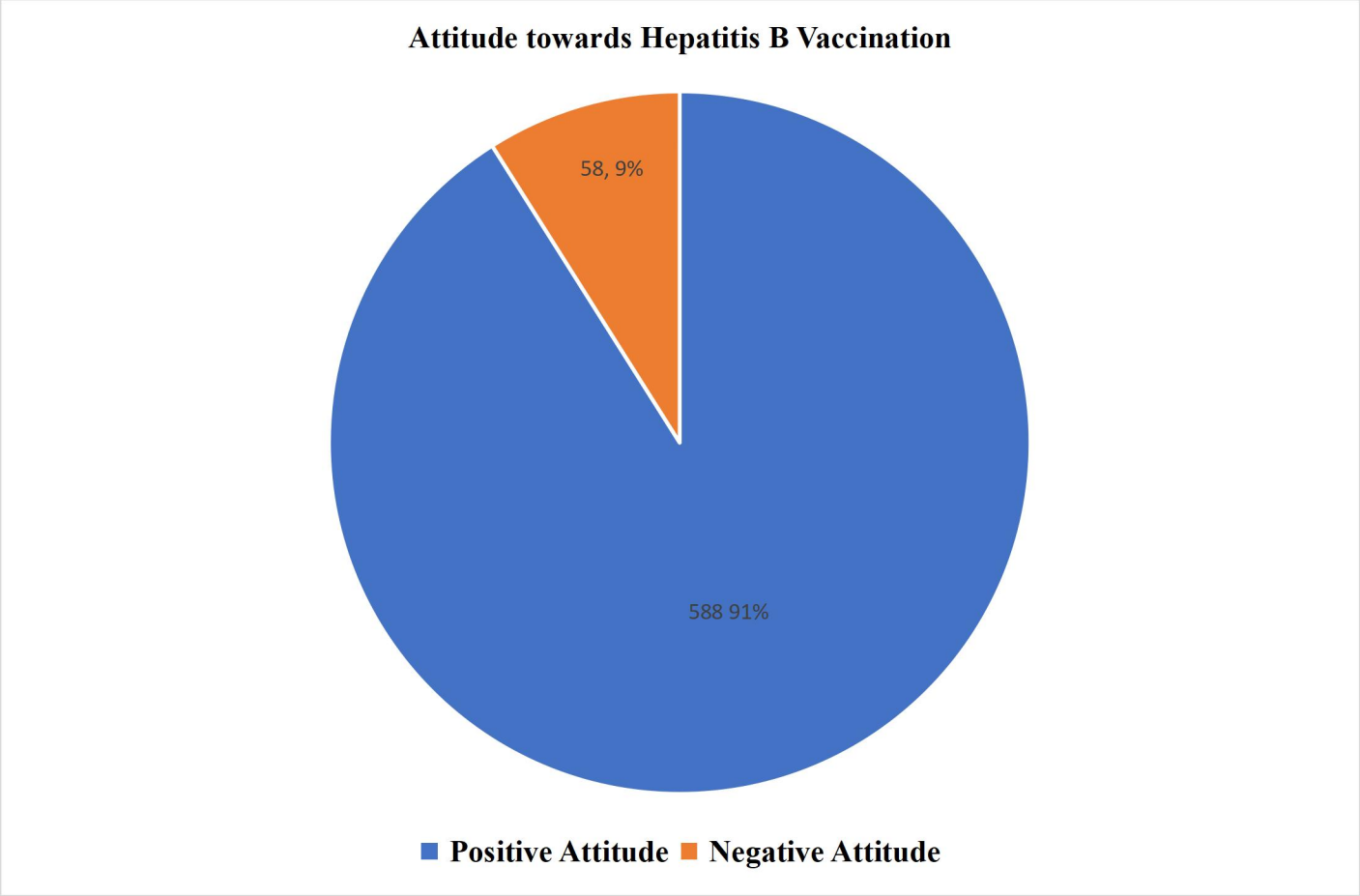

Figure 2: Overall Attitude towards Hepatitis B vaccination

Figure 2 illustrates the overall distribution of attitudes towards Hepatitis B vaccination among the respondents. The vast majority of respondents (91.0%, n=588) demonstrated a Positive Attitude towards vaccination, while only a small minority (9.0%, n=58) held a Negative Attitude.

Table 8: Sociodemographic Characteristics and Attitude towards Hepatitis B Vaccination

Variables	Positive Attitude n (%)	Negative Attitude n (%)	Chi-Square ($\chi 2$)	p-value
Age Group			**23.939**	**<0.001***
15-19 years	75 (78.9%)	20 (21.1%)		
20-24 years	372 (91.6%)	34 (8.4%)		
25-29 years	133 (97.1%)	4 (2.9%)		
≥ 30 years	7 (100.0%)	0 (0.0%)		
Sex			**0.023**	**0.879**
Male	207 (90.8%)	21 (9.2%)		
Female	381 (91.1%)	37 (8.9%)		
Course of Study			**0.090**	**0.764**
Medicine	296 (91.4%)	28 (8.6%)		
Nursing	292 (90.7%)	30 (9.3%)		
Level of Study			**29.846**	**<0.001***
200 Level	119 (83.2%)	24 (16.8%)		
300 Level	112 (84.8%)	20 (15.2%)		
400 Level	164 (95.3%)	8 (4.7%)		
500 Level	108 (98.2%)	2 (1.8%)		
600 Level	85 (95.5%)	4 (4.5%)		
Relationship Status			**0.676**	**0.713**
Single	565 (90.8%)	57 (9.2%)		
Married	17 (94.4%)	1 (5.6%)		
Cohabiting	4 (100.0%)	0 (0.0%)		
Religion			**0.696**	**0.874**
Christianity	563 (91.0%)	56 (9.0%)		
Islam	16 (94.1%)	1 (5.9%)		
ATR & Others	5 (100.0%)	0 (0.0%)		

**Significant at $p < 0.05$*

Table 8 explores the association between respondents' sociodemographic characteristics and their overall attitude towards Hepatitis B.

The Age Group analysis reveals a highly significant positive association ($p < 0.001$). The proportion of respondents with a positive attitude increased steadily with age, while the proportion with a negative attitude decreased. Starting at 75 (78.9%) with positive attitudes and 20 (2.1%) with negative attitude among 5-19-year-olds, 372 (91.6%) with positive attitude and 34 (8.4%) with negative attitude among 20-24-year-olds, 133 (97.1%) with positive attitude and 4 (2.9%) with negative attitude among 25-29-year-olds, and 7 (100.0%) with positive attitudes and 0 (0.0%) with negative attitude among those aged 30 and above.

Sex showed no statistically significant impact on attitude ($p = 0.87$), with male students, 207 (90.8%) and female students, 381 (91.1%) having nearly identical levels of positive attitudes. Similarly, the Course of Study did not significantly influence attitudes ($p = 0.764$); among Medical students, 296 (91.4%) and among Nursing students, 292 (90.7%) had positive attitudes.

Moving to the Level of Study, the data again shows a highly significant association ($p < 0.001$). A clear, progressive trend is observable as students advance through their academic training. While 119 (83.2%) of 200-level students exhibited a positive attitude, this proportion surged as students entered their clinical years, with 112 (84.8%) in 300-level, 164 (95.3%) in 400-level, 108 (98.2%) in 500-level, and peaking as high as 85 (95.5%) in the 600-level.

Table 8b: Sociodemographic Characteristics and Attitude towards Hepatitis B Vaccination (continued)

Variables	Positive Attitude n (%)	Negative Attitude n (%)	Chi-Square ($\chi 2$)	p-value
Ethnicity			**10.071**	**0.434**
Benin	204 (89.9%)	23 (10.1%)		
Esan	83 (91.2%)	8 (8.8%)		
Igbo	72 (85.7%)	12 (14.3%)		
Yoruba	70 (90.9%)	7 (9.1%)		
Urhobo	57 (96.6%)	2 (3.4%)		
Hausa	19 (100.0%)	0 (0.0%)		
Etsako	14 (93.3%)	1(6.7%)		
Isoko	9 (100.0%)	0 (0.0%)		
Owan	9 (100.0%)	0 (0.0%)		
Ijaw	7 (100.0%)	0 (0.0%)		
Others	43 (89.6%)	5 (10.4%)		

**Others include: Idoma, Itsekiri, Efik, Ika, Afemai, Igbanke, Agbor, Ibibio, Uneme, Tiv, Higgi, Ukwani, Jukun, Akoko Edo, Oro, Okpela, Nke, Igede, Annang, Delta, Edo.*

Relationship Status (p = 0.713), Religion (p = 0.874), and Ethnicity (p = 0.434) all showed no statistically significant associations.

Table 9: Predictors of attitudes towards Hepatitis B vaccination

Variables	β	p-value	Odds ratio	95% C.I. for Odds ratio
Gender				
Male*			1	
Female	0.220	0.511	1.247	0.646 – 2.406
Course of Study				
Nursing*			1	
Medicine	-0.147	0.647	0.863	0.460 – 1.619
Clinical Status				
Clinical*			1	
Pre-clinical	-0.117	0.768	0.890	0.410 – 1.932
Hepatitis B knowledge				
Poor Knowledge*			1	
Good Knowledge	1.406	**<0.001**	4.078	2.070 – 8.036

*β: Coefficient of regression; OR: Odds ratio; CI: Confidence interval; * Reference category.*

The multivariate analysis revealed that neither basic demographics nor academic placement significantly influenced student attitudes. When controlling for other variables, Gender ($p = 0.511$), Course of Study ($p = 0.647$), and Clinical Status ($p = 0.768$) were not statistically significant.

Knowledge was the sole significant driver of positive attitudes ($\beta = 1.406$; OR = 4.078; 95% CI: 2.070–8.036; $p < 0.001$). Students who demonstrated "Good Knowledge" of Hepatitis B were 4.078 times more likely to hold a positive attitude towards vaccination compared to those with poor knowledge.

SECTION D

HEPATITIS B VACCINATION UPTAKE

Table 10: Screening and Uptake of Hepatitis B vaccination

Variable	Frequency (n)	Percent (%)
Checked Hepatitis B Status (via test) (n=646)		
Yes	177	27.4
No	469	72.6
Received Hepatitis B Vaccine (excluding dose at birth) (n=646)		
Yes	169	26.2
No	477	73.8
Among those who received the vaccine:		
Number of Doses Received (n=169)		
One Dose	45	26.6
Two Doses	37	21.9
Three Doses (Fully Vaccinated)	69	40.8
Don't know/ Unsure	18	10.7
Location of Vaccination (n=163)*		
University Health Centre	112	68.7
Government Hospital	34	20.9
Private Hospital	10	6.1
Outreach/Campaign	7	4.3
Screened for Hepatitis B just before vaccination (n=167)*		
Yes	128	76.6
No	31	18.6
Not sure	8	4.8
Completed the Vaccination Series (n=159)*		
Yes	77	48.4
No	82	51.6
Checked immune status (Anti-HbS) after vaccination (n=167)*		
Yes	54	32.3
No	113	67.7

**Denominators for subset questions vary slightly from 169 due to a few non-responses (missing data) among vaccinated individuals*.

Table 10 presents the baseline practices regarding Hepatitis B screening and vaccination uptake among the study population.

Overall, only 177 (27.4%) of the total respondents have ever checked their Hepatitis B status. Similarly, only 169 (26.2%) of the students had initiated the Hepatitis B vaccination process (excluding routine childhood immunisations).

Among the 169 students who started the vaccine, only 69 (40.8%) successfully completed all three required doses for full protection. 45 (26.6%) had already taken a single dose, 37 (21.9%) had two doses, and 18 (10.7%) were unsure of how many doses they had received.

For the location of Vaccination, 112 (68.7%) students utilised the University Health Centre, 34 (20.9%) utilised Government hospitals, 10 (6.1%) utilised a private hospital, and 7 (4.3%) received vaccination in an outreach/campaign.

Furthermore, 128 (76.6%) confirmed they were screened for the virus immediately prior to receiving the vaccine, 31 (18.6%) were not screened prior and and 8 (4.8%) were unsure.

Of the students who initiated vaccination, 77 (48.4%) had completed the Vaccination series, and 82 (51.6%) had not. However, only 54 (32.3%) of the vaccinated students followed up to check their immune status after vaccination, and 113 (67.7%) did not.

Table 11: Course of study and uptake of Hepatitis B Vaccination

Variables	Medicine (n=324) n (%)	Nursing (n=322) n (%)	Chi-Square ($\chi 2$)	p-value
Received at least one dose			**31.280**	**<0.001***
Yes	116 (35.8%)	53 (16.5%)		
No	208 (64.2%)	269 (83.5%)		
Among those who received the vaccine:				
Number of Doses Received	**(n=116)**	**(n=53)**	**2.546**	**0.467**
One Dose	33 (28.4%)	12 (22.6%)		
Two Doses	28 (24.1%)	9 (17.0%)		
Three Doses (Fully Vaccinated)	44 (37.9%)	25 (47.2%)		
Don't Know / Unsure	11 (9.5%)	7 (13.2%)		
Checked Immune Status (Anti-HbS)	**(n=114)**	**(n=53)**	**14.905**	**<0.001***
Yes	26 (22.8%)	28 (52.8%)		
No	88 (77.2%)	25 (47.2%)		

**Statistically significant at $p < 0.05$.*

Table 11 provides a comparative analysis of the Hepatitis B vaccination between Medical and Nursing students.

Medical students were significantly more proactive in initiating the vaccination process ($p < 0.001$). 116 (35.8%) of the medical students had received at least one dose of the Hepatitis B vaccine, compared to 53 (16.5%) among nursing students, with 269 (83.5%) of the nursing students unvaccinated.

However, the rate of dose completion was not statistically significant ($p = 0.467$). Regarding vaccine completion, 25 (47.2%) of nursing students who initiated the vaccine completed all three doses, compared with 44 (37.9%) of their medical counterparts, though this difference was not statistically significant.

A statistically significant difference was observed in post-vaccination behaviour regarding the verification of immunity ($p < 0.001$). Among the vaccinated cohorts, 28 (52.8%) of Nursing students checked their immune status, compared to only 26 (22.8%) of Medical students.

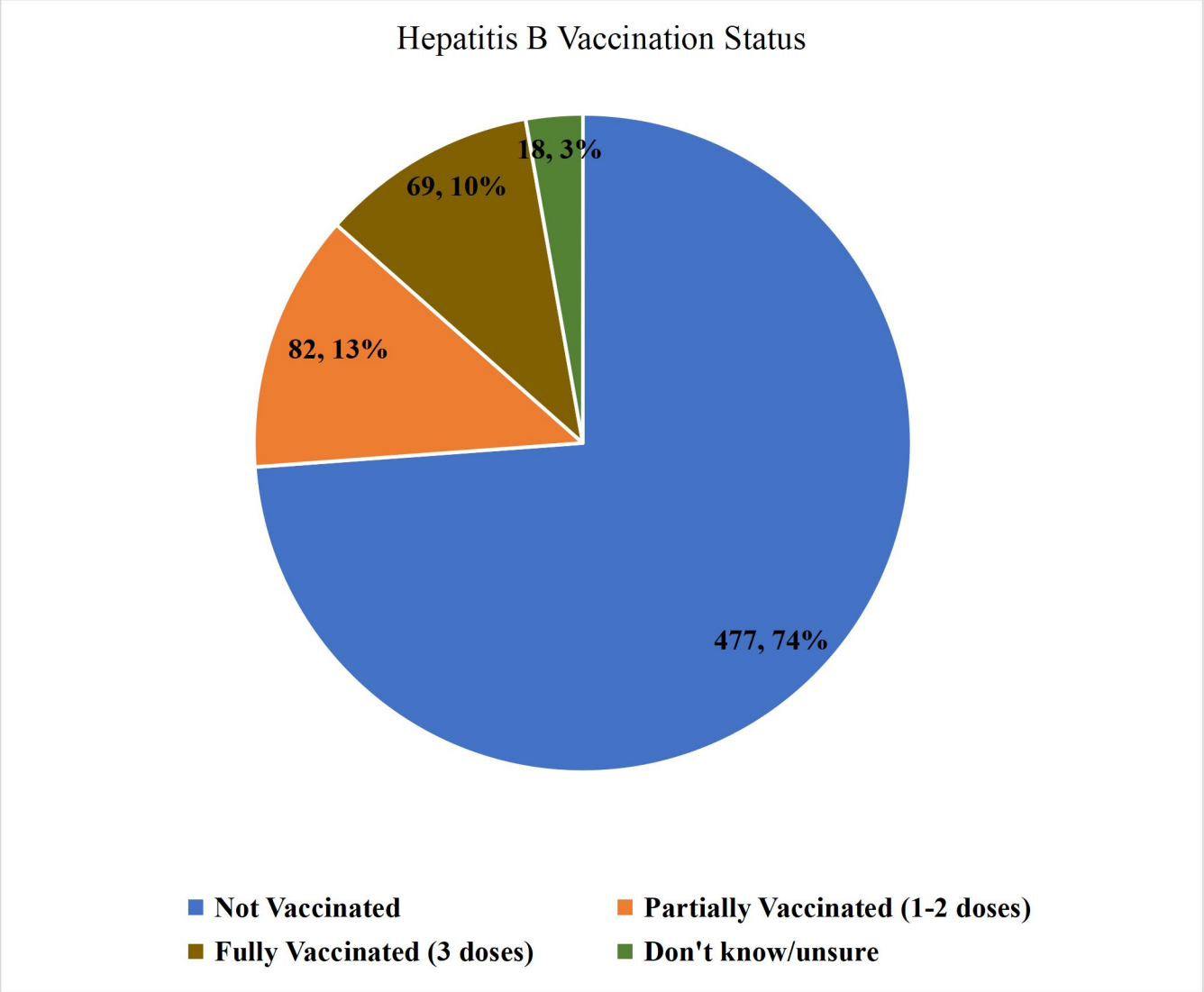

Figure 3: Overall Hepatitis B Vaccination Uptake

Figure 3 presents the overall Hepatitis B vaccination status among the students. The majority of respondents (73.8%, n=477) reported being completely unvaccinated against Hepatitis B. Only 10.7% (n=69) had completed the full three-dose vaccination series required for effective immunity. In comparison, 12.7% (n=82) were partially vaccinated, having received only one or two doses.

Table 12: Sociodemographic Characteristics and Uptake of Hepatitis B Vaccination

Variables	Unvaccinated n (%)	Partially Vaccinated n (%)	Fully Vaccinated n (%)	Chi-Square ($\chi 2$)	p-value
Age Group				**44.608**	**<0.001***
15-19 years	85 (95.5%)	1 (1.1%)	3 (3.4%)		
20-24 years	305 (77.2%)	52 (13.2%)	38 (9.6%)		
25-29 years	84 (61.8%)	27 (19.9%)	25 (18.4%)		
≥ 30 years	2 (28.6%)	2 (28.6%)	3 (42.9%)		
Sex				**6.653**	**0.036***
Male	151 (69.9%)	36 (16.7%)	29 (13.4%)		
Female	326 (79.1%)	46 (11.2%)	40 (9.7%)		
Clinical Status				**44.905**	**<0.001***
Pre-clinical	165 (94.3%)	4 (2.3%)	6 (3.4%)		
Clinical	312 (68.9%)	78 (17.2%)	63 (13.9%)		
Level of Study				**196.906**	**<0.001***
200 Level	121 (93.1%)	4 (3.1%)	5 (3.8%)		
300 Level	121 (91.7%)	1 (0.8%)	10 (7.6%)		
400 Level	133 (77.8%)	34 (19.9%)	4 (2.3%)		
500 Level	77 (70.6%)	22 (20.2%)	10 (9.2%)		
600 Level	25 (29.1%)	21 (24.4%)	40 (46.5%)		
Relationship Status				**16.009**	**0.003***
Single	463 (76.5%)	79 (13.1%)	63 (10.4%)		
Married/Cohabiting	12 (57.1%)	3 (14.3%)	6 (28.6%)		
Religion				**2.229**	**0.897**
Christianity	456 (75.9%)	79 (13.1%)	66 (11.0%)		
Islam & Others	17 (77.3%)	3 (13.6%)	2 (9.1%)		

**Statistically significant at $p < 0.05$.*

Table 12 presents the bivariate analysis examining the relationship between sociodemographic characteristics and overall Hepatitis B vaccination status.

Beginning with Age Group, the analysis reveals a highly significant association ($p < 0.001$). 85 (95.5%) of the respondents aged 15-19 years, 305 (77.2%) of those aged 20-24 years, 84 (61.8%) of those aged 25-29, and 2 (28.6%) of those aged 30 and above remain completely unvaccinated. However, full vaccination rates rise steadily, climbing from 3 (3.4%) in the 15-19 years group to 38 (9.6%) in the 20-24 years group to 25 (18.4%) among 25-29-year-olds, and peaking at 3 (42.9%) among students aged 30 and above.

Moving to Sex, the data shows a statistically significant difference ($p = 0.036$) in vaccination behaviour between genders. Male students exhibited a slightly higher full vaccination rate, 29 (13.4%), compared to female students, 40 (9.7%). The female cohort had a higher proportion of completely unvaccinated individuals, 326 (79.1%), compared to their male counterparts, 151 (69.9%).

Regarding Clinical Status, the analysis demonstrates a highly significant disparity ($p < 0.001$). 165 (94.3%) of pre-clinical students were entirely unvaccinated, while 4 (2.3%) and 6 (3.4%) were partially and fully vaccinated, respectively. Among students in clinical classes, the proportion of unvaccinated students was 312 (68.9%), and those who had received partial or full vaccination increased to 78 (17.2%) and 63 (13.9%), respectively.

Similarly, the Level of Study proved to be a highly significant determinant ($p < 0.001$). 121 (93.1%) of 200-level, 121 (91.7%) of 300-level, 133 (77.8%) of 400-level, 77 (70.6%) of 500-

level, 25 (29.1%) of 600-level students were unvaccinated. Full vaccination completion, however, increases to 40 (46.5%) among 600-level students from 5 (3.8%) among 200-level students.

Looking at Relationship Status, a statistically significant association was also observed ($p = 0.003$). Students who were married or Cohabiting demonstrated much higher rates of full vaccination, 6 (28.6%), compared to Single students, 63 (10.4%).

In contrast, Religion was the only variable that showed no statistical significance on a student's likelihood of getting vaccinated ($p = 0.897$). The unvaccinated rates remained uniformly high across faiths, with Christianity at 456 (75.9%) and Islam/Others at 17 (77.3%).

Table 12b: Sociodemographic Characteristics and Uptake of Hepatitis B Vaccination (continued)

Variables	Unvaccinated n (%)	Partially Vaccinated n (%)	Fully Vaccinated n (%)	Chi-Square ($\chi 2$)	p-value
Ethnicity				**32.698**	**0.036***
Benin	172 (77.8%)	29 (13.1%)	20 (9.0%)		
Igbo	61 (74.4%)	9 (11.0%)	12 (14.6%)		
Esan	72 (82.8%)	8 (9.2%)	7 (8.0%)		
Urhobo	41 (70.7%)	13 (22.4%)	4 (6.9%)		
Yoruba	62 (83.8%)	5 (6.8%)	7 (9.5%)		
Hausa	13 (68.4%)	5 (26.3%)	1 (5.3%)		
Etsako	11 (73.3%)	2 (13.3%)	2 (13.3%)		
Isoko	7 (77.8%)	0 (0.0%)	2 (22.2%)		
Owan	4 (50.0%)	2 (25.0%)	2 (25.0%)		
Ijaw	3 (42.9%)	1 (14.3%)	3 (42.9%)		
Others*	30 (63.8%)	8 (17.0%)	9 (19.1%)		

**Statistically significant at $p < 0.05$; *Others include: Idoma, Itsekiri, Efik, Ika, Afemai, Igbanke, Agbor, Ibibio, Uneme, Tiv, Higgi, Ukwani, Jukun, Akoko Edo, Oro, Okpela, Nke, Igede, Annang, Delta, Edo.*

Finally, Ethnicity demonstrated a statistically significant association ($p = 0.036$), revealing varying rates of uptake across cultural groups. The Yoruba (62, 83.8%) and Esan (72, 82.8%) groups reported the highest rates of non-vaccination, closely followed by Benin at 172 (77.8%). The highest rates of partial and full vaccination were observed among the Ijaw 4 (57.2%) and Hausa 6 (31.6%) groups, followed closely by the Owan 4 (50.0%) and Igbo 21 (25.6%) groups.

Table 13: Predictors of Uptake of Hepatitis B Vaccination

Variables	β	p-value	Odds ratio	95% C.I. for Odds ratio
Age categories		**0.029**		
≥30*			1	
15-19	-1.952	0.066	0.142	0.018 – 1.137
20-24	-1.600	**0.046**	0.202	0.042 – 0.972
25-29	-0.889	0.274	0.411	0.084 – 2.021
Gender				
Male*			1	
Female	-0.111	0.718	0.895	0.490 – 1.634
Course of Study				
Nursing*			1	
Medicine	0.711	**0.022**	2.035	1.110 – 3.734
Clinical Status				
Clinical*			1	
Pre-clinical	-0.831	0.106	0.436	0.159 – 1.193
Hepatitis B Knowledge				
Good Knowledge*			1	
Poor Knowledge	-2.146	**0.039**	0.117	0.015 – 0.896
Attitude				
Negative Attitude*			1	
Positive Attitude	-0.291	0.611	0.747	0.244 – 2.293

*β:Coefficient of regression; OR: Odds ratio; CI: confidence interval; *Reference category*

When examining baseline demographics, Gender was not a statistically significant predictor of vaccination uptake ($p = 0.718$). However, Age emerged as a statistically significant predictor of vaccination practice ($p = 0.029$). Specifically, younger students in the 20-24 age bracket had significantly lower odds of vaccine uptake than the oldest cohort of students aged 30 and above ($\beta = -1.600$; OR = 0.202; 95% CI: 0.042–0.972; $p = 0.046$).

Course of Study was a highly significant, independent predictor of actual vaccination ($\beta = 0.711$; OR = 2.035; 95% CI: 1.110-3.734; $p = 0.022$). The data shows that medical students have 2.035 times the odds of receiving the vaccine compared to Nursing students. Although Clinical Status itself was not a significant independent predictor of final vaccination uptake ($p = 0.106$).

Students with "Poor Knowledge" of Hepatitis B had significantly lower odds of vaccination than those with good knowledge ($\beta = -2.146$; OR = 0.117; 95% CI: 0.015–0.896; $p = 0.039$). While foundational knowledge is essential, a "Positive Attitude" toward the vaccine did not significantly predict actual vaccination uptake ($p = 0.611$).

SECTION E:

BARRIERS/DETERMINANTS TO HEPATITIS B VACCINATION UPTAKE

Table 14: Barriers/determinants of Hepatitis B vaccination uptake

Variables	Frequency (n)	Percentage (%)*
Knowledge of Vaccination Center (n=646)		
Knows where to get vaccinated on/near campus		
Yes	143	22.1
No	503	77.9
Motivation to get Vaccinated**		
Personal decision	112	17.3
Family/friend influence	33	5.1
Awareness campaign	32	4.9
Doctor's recommendation	31	4.8
School requirement	14	2.1
Reasons for Complete Non-Uptake (n=477)*		
Lack of awareness	201	42.1
High cost of vaccine	138	28.9
Lack of time / Busy schedule	126	26.4
Fear of side effects	104	21.8
Not perceived as necessary / Don't deem important	96	20.1
Unavailability of the vaccine	88	18.4
Not yet offered	87	18.2
Have plans to take it later	67	14.0
Fear of needles	33	6.9
No at risk of HBV (Perceived low risk)	14	2.9
Negative screening result	13	2.7
Positive screening result	13	2.7

**Multiple responses were allowed, so percentages for barriers do not add up; **Motivation to get vaccinated include proportion of students who initiated vaccination*

Table 14 presents a comprehensive overview of the behavioural determinants, barriers to uptake, and enabling factors related to Hepatitis B vaccination among respondents.

The data revealed that 503 (77.9%) of the students do not know where to access the vaccine on or near the university campus, while only 143 (22.1%) know where to access it. For students who initiated vaccination, 112 (17.3%) cited a "Personal decision," followed closely by family/friend influence 33 (5.1%), awareness campaigns 32 (4.9%), Doctor's recommendation 31 (4.8%), and school requirements 14 (2.1%) as the least.

For students who remained completely unvaccinated, a "Lack of awareness" was the leading obstacle, cited by 201 (42.1%) of this subgroup. The high cost of the vaccine, 138 (28.9%) and Lack of time/Busy schedule, 126 (26.4%), were the second and third most significant barriers, followed by 104 (21.8%) expressing a fear of side effects and 20.1% perceiving the vaccine as unnecessary. Other notable reasons include the vaccine being unavailable, 88 (18.4%), not yet offered, 87 (18.2%), and plans to take it later, 67 (14.0%). The minority fell amongst those who had a fear of needles, 33 (6.9%), perceived low risk, 14 (2.9%), and negative screening result and positive screening result, 13 (2.7%), respectively.

Table 14b: Barriers/determinants of Hepatitis B vaccination uptake (continued)

Variables	Frequency (n)	Percentage (%)*
Reasons for Incomplete Vaccination (n=87)* **		
Not yet time for next dose	31	35.6
Busy schedule	26	29.9
Forgot	17	19.5
Vaccine not available	7	8.0
Not perceived as necessary	5	5.7
Travelled	1	1.1
Factors that would Encourage Vaccination (n=646)*		
Awareness campaigns	275	42.6
Free vaccination	233	36.1
Peer encouragement	174	26.9
Compulsory school policy	174	26.9
Doctor's recommendation	153	23.7

** Multiple responses were allowed, so percentages for barriers do not add up*

Among the 87 students who initiated the vaccine but did not complete the three-dose series, 31 (35.6%) indicated that it was simply "Not yet time for the next dose", 26 (29.9%) abandoned the series due to a "Busy schedule" or simply because they "Forgot" 17 (19.5%). Others were due to the unavailability of the vaccine, 7 (8.0%), not perceiving completion as necessary, 5 (5.7%), and travelling from the vaccination initiation place, 1 (1.1%).

Awareness campaigns 275 (42.6%) and the provision of Free vaccination 233 (36.1%) were the highest encouraging factors for vaccination. Peer encouragement 174 (26.9%), compulsory school policy 174 (26.9%) and doctors' recommendation 153 (23.7%) were also selected as factors.

Table 15: Course of Study and Barriers/determinants of Hepatitis B vaccination uptake

Variable	Medicine (n=324)	Nursing (n=322)	Chi-Square ($\chi 2$)	p-value
Knows Vaccination Center Location			**5.810**	**0.016***
Yes	75 (23.1%)	68 (21.1%)		
No	249 (76.9%)	254 (78.9%)		
Motivations				
Personal Decision	76 (23.5%)	36 (11.2%)	16.984	**<0.001***
Awareness Campaign	24 (7.4%)	8 (2.5%)	8.313	**0.004***
School Requirement	11 (3.4%)	3 (0.9%)	4.622	**0.032***
Family/Friend Influence	16 (4.9%)	17 (5.3%)	0.039	0.844
Doctor's Recommendation	16 (4.9%)	15 (4.7%)	0.028	0.868
Reasons for Complete Non-Uptake				
Lack of awareness	61 (18.8%)	140 (43.5%)	45.788	**<0.001***
High cost of vaccine	29 (9.0%)	109 (33.9%)	59.607	**<0.001***
Lack of time	64 (19.8%)	62 (19.3%)	0.026	0.873
Fear of side effects	45 (13.9%)	59 (18.3%)	2.351	0.125
Not perceived as necessary	49 (15.1%)	47 (14.6%)	0.035	0.851
Unavailability of vaccine	55 (17.0%)	33 (10.2%)	6.211	**0.013***
Not yet offered	57 (17.6%)	30 (9.3%)	9.491	**0.002***
Have plans to take later	49 (15.1%)	18 (5.6%)	15.790	**<0.001***
Fear of needles	17 (5.2%)	16 (5.0%)	0.026	0.873
Not at risk of HBV	13 (4.0%)	1 (0.3%)	10.438	**0.001***
Negative screening result	2 (0.6%)	11 (3.4%)	6.416	**0.011***
Positive screening result	2 (0.6%)	11 (3.4%)	6.416	**0.011***

**Statistically significant at $p < 0.05$.*

Table 15 addresses the specific objective by comparing the complete set of vaccination determinants and barriers between departments. The null hypothesis states that there is no significant difference in the reported barriers and determinants to Hepatitis B vaccination between medical and nursing students.

The analysis reveals highly significant disparities, leading to the rejection of the null hypothesis for several key variables. Medical students demonstrated a slightly higher, statistically significant level of knowledge about where to access the vaccine compared to Nursing students 75 (23.1%) vs 68 (21.1%) , ($p = 0.016$). Furthermore, Medical students were significantly more driven by motivations such as "Personal Decision" than Nursing students 76 (23.5%) vs 36 (11.2%),($p < 0.001$).

When examining the barriers to complete non-uptake, "Lack of awareness" was cited by 140 (43.5%) of unvaccinated Nursing students, compared to only 61 (18.8%) of Medical students ($p < 0.001$). Similarly, the "High cost of the vaccine" was a major barrier for 109 (33.9%) of Nursing students, but affected only 29 (9.0%) of Medical students ($p < 0.001$). Nursing students also attributed non-vaccination to positive or negative screening results more often than their medicine counterparts, 11 (3.4%) vs 2 (0.6%), ($p = 0.011$).

Unvaccinated Medical students were more likely to report "Unavailability of the vaccine" than nursing students, 55 (17.0%) vs 33 (10.2%), ($p = 0.013$). Medical students also cited "Have plans to take it later", 49 (15.1%) vs 18 (5.6%), ($p < 0.001$) and "Not at risk of HBV", 13 (4.0%) vs 1 (0.3%), ($p = 0.001$) more than Nursing students. Hence, the null hypothesis is also rejected.

Table 15b: Course of Study and Barriers/determinants of Hepatitis B vaccination uptake (continued)

Variable	Medicine (n=324)	Nursing (n=322)	Chi-Square ($\chi 2$)	p-value
Reasons for Incomplete Vaccination				
Not yet time for next dose	28 (45.9%)	3 (11.5%)	0.249	0.883
Busy schedule	14 (23.0%)	12 (46.2%)	3.113	0.211
Forgot	11 (18.0%)	6 (23.1%)	----	----
Vaccine not available	6 (9.8%)	1 (3.8%)	----	----
Not perceived as necessary	1 (1.6%)	4 (15.4%)	----	----
Travelled	1 (1.6%)	0 (0.0%)	----	----
Encouraging Factors				
Awareness Campaigns	93 (28.7%)	182 (56.5%)	51.119	**<0.001***
Free Vaccination	140 (43.2%)	93 (28.9%)	14.378	**<0.001***
Doctor's Recommendation	111 (34.3%)	42 (13.0%)	40.217	**<0.001***
Compulsory school policy	103 (31.8%)	71 (22.0%)	7.786	**0.005***
Peer Encouragement	71 (21.9%)	103 (32.0%)	8.328	**0.004***

**Statistically significant at $p < 0.05$.*

When examining the subset of students who failed to complete the full three-dose series, Medical reported "Not yet time for the next dose" 28 (45.9%) vs 3 (11.5%) for Nursing. In contrast, Nursing students were far more likely to cite a "Busy schedule" (12, 46.2%) than Medicine students (14, 23.0%).

Nursing students indicated they would be most strongly encouraged by "Awareness Campaigns" 182 (56.5%) vs 93 (28.7%) for Medicine, ($p < 0.001$) and "Peer Encouragement" 103 (32.0%) vs 71 (21.9%), ($p = 0.004$). Free Vaccination" 140 (43.2%) vs. 93 (28.9%), ($p < 0.001$), "Doctor's Recommendations" 111 (34.3%) vs 42 (13.0%), ($p < 0.001$), and "Compulsory school policies" 103 (31.8%) vs 71(22.0%), ($p = 0.005$).

SECTION F:

FACTORS ASSOCIATED WITH KNOWLEDGE, ATTITUDE AND VACCINATION PRACTICE

Table 16: Knowledge and Attitude towards Hepatitis B Vaccination

Knowledge Category	Negative Attitude N (%)	Positive Attitude N (%)	Total N (%)	Chi-Square ($\chi 2$)	p-value
Poor Knowledge (<50%)	83 (75.5%)	27 (24.5%)	110 (100.0%)	39.313	**<0.001***
Good Knowledge (≥50%)	505 (94.2%)	31 (5.8%)	536 (100.0%)		
Total	**588 (91.0%)**	**58 (9.0%)**	**646 (100.0%)**		

**Statistically significant at $p < 0.05$.*

A Pearson Chi-Square test of independence was conducted to determine if a significant association exists between a student's baseline knowledge of Hepatitis B and their overarching attitude towards the vaccine.

The analysis revealed a highly statistically significant relationship between the two variables (chi-square = 39.313, $p < 0.001$), thereby rejecting the null hypothesis.

Among respondents with poor knowledge, 27 (24.5%) had a positive attitude, and 83 (75.5%) had a negative attitude; among respondents with good knowledge, 31 (3.8%) had a positive attitude, and 505 (94.2%) had a negative attitude.

Table 17: Knowledge of Hepatitis B and Vaccination Status

Variable	Unvaccinated n (%)	Partially Vaccinated n (%)	Fully Vaccinated n (%)	χ2 Value	p-value
Poor Knowledge (<50%)	101 (96.2%)	3 (2.9%)	1 (1.0%)	**28.398**	**<0.001***
Good Knowledge (≥50%)	376 (71.9%)	79 (15.1%)	68 (13.0%)		

**Significant at p < 0.05*

Table 17 illustrates the relationship between students' knowledge levels and vaccination uptake. A statistically significant association was observed (chi-square = 28.398, p < 0.001).

Among students with good knowledge, 68 (13.0%) had been fully vaccinated, 79 (15.1%) had received at least one dose, and 376 (71.9%) had not received any vaccination. In contrast, among students with Poor Knowledge, 101 (96.2%) remained completely unvaccinated, 3 (2.9%) had received at least one dose, and only 1 (1.0%) had completed the series.

Table 18: Attitude towards Hepatitis B and Vaccination Status

Variable	Unvaccinated n (%)	Partially Vaccinated n (%)	Fully Vaccinated n (%)	$\chi 2$ Value	p-value
Positive Attitude	428 (75.0%)	78 (13.7%)	65 (11.4%)	**3.477**	**0.176**
Negative Attitude	49 (86.0%)	4 (7.0%)	4 (7.0%)		

**Significant at $p < 0.05$*

Table 14 examines the relationship between student attitudes and vaccination uptake. No statistically significant association was observed between attitude and vaccination status in the overall population (chi-square = 3.477, p = 0.176).

Although students with a Positive Attitude had a slightly higher full vaccination rate (11.4%) compared to those with a Negative Attitude (7.0%), this difference did not reach statistical significance.

However, a department-specific analysis (layered Chi-square) revealed that among Medical students specifically, attitude was significantly associated with uptake (p=0.035), with positive attitude holders being more likely to be vaccinated (15.0%) than those with negative attitudes (3.7%). No such association was found among Nursing students (p=0.907).

CHAPTER 5

DISCUSSION

The findings of this study showed that the majority of the respondents (83.0%) demonstrated good knowledge of hepatitis B infection and its vaccination. This is similar to findings from a tertiary healthcare facility in Kerala, India, where medical and nursing students also demonstrated strong foundational knowledge of the infection and its prevention.[14]

However, a notable misconception was observed regarding the curability of the disease: only 68.4% of respondents correctly identified that Hepatitis B is not curable (31.6% incorrectly believed it was, or were unsure). Only 59.6% were aware that Hepatitis B is significantly more infectious than HIV. These findings align closely with a 2020 study conducted among healthcare students at the Enugu State University College of Medicine, which reported that 68.2% of participants had good knowledge of HBV, 66.8% identified that the disease is not curable, and 41.9% were aware that Hepatitis is more infectious than HIV.[17]

Unprotected sexual intercourse and sharing of needles/sharps were correctly identified as modes of transmission by 75.9% and 75.1% of respondents, respectively. However, knowledge regarding other critical transmission routes was less optimal. Only 62.5% identified blood transfusion as a mode of transmission, and even fewer respondents (58.7%) were aware of the risk of Mother-to-Child Transmission (MTCT), highlighting a gap in understanding the high transmissibility of the virus. A study done from 2022 to 2023 in Greece also had similar findings, as 86.5% also identified sexual intercourse as a mode of transmission, but in contrast, 84.9% identified MTCT.[26]

This high level of knowledge among both medical and nursing students may be attributed to their exposure to health-related education during their training. Medical and nursing curricula include courses in Microbiology, Pathology, Community Medicine and Infectious Diseases, which likely contribute to improved awareness and understanding of hepatitis B infection and its prevention.

The multivariate logistic regression model in this study mathematically validated this, demonstrating that clinical exposure is the strongest predictor of knowledge ($p < 0.001$), with pre-clinical students having roughly 89% lower odds of having good knowledge than their clinical counterparts. This highlights the critical role of hands-on hospital-based experience in shaping students' understanding of the disease, suggesting that practical exposure contributes substantially more than classroom-based learning alone.

The public health implications of this finding are highly encouraging. It indicates that the current medical and nursing curricula are effectively communicating the severity of the disease and the necessity of prevention, laying a solid theoretical foundation for occupational safety.

Attitude is another major factor that determines the uptake of the hepatitis B vaccine. In this study, most students agreed that vaccination is necessary and expressed willingness to receive the vaccine if it were available and accessible (81.6%). This is similar to a study done at a Medical college in Nepal in 2020, which showed that 95.1% were willing to receive or complete vaccination.[25]

Clinical medical students were found to have a more positive attitude than their preclinical counterparts (95.6% vs 81.6%, respectively). This finding is similar to a 2020 study conducted in India, in which clinical medical students demonstrated a positive attitude towards Hepatitis B vaccination.[25] In contrast, among Nursing students, those in the clinical years showed a higher

rate of a positive attitude (92.2%) than preclinical students (86.7%), but the difference did not reach statistical significance. This is also similar to a study conducted in Greece from 2022 to 2023, which reported that, although there is a trend toward improved attitude scores with increasing year of study, this association is not consistently statistically significant, as only second-year students demonstrated a significantly better attitude compared to the reference group.[26] This indicates that clinical exposure has a more profound and statistically significant impact on improving the attitudes of medical students compared to nursing students.

This positive attitude may be explained by increased exposure to hospital environments, patient interactions, and infection control training during clinical postings. As students progress into clinical years, their perception of personal risk tends to increase, which may influence their attitude towards preventive measures such as vaccination.

However, this significant difference between clinical and preclinical students was not observed among nursing students. This could be due to differences in training structure or earlier exposure of nursing students to clinical settings compared to medical students. In many nursing programmes, students begin clinical postings earlier in their training, which may reduce the observable differences between preclinical and clinical stages.

The Age Group analysis reveals a highly significant positive association ($p < 0.001$). The proportion of respondents with a positive attitude increased steadily with age. The multivariate analysis identified baseline knowledge as the sole, highly significant driver of positive attitudes ($p < 0.001$). Students who demonstrated "Good Knowledge" of Hepatitis B were 4.078 times more likely to hold a positive attitude towards vaccination compared to those with poor knowledge.

This profound finding suggests that clinical exposure and departmental affiliation shape attitudes only indirectly, through the acquisition of knowledge, making educational interventions the most critical pathway to improving vaccination acceptance.

This finding suggests that early clinical exposure and infection-prevention training may play an important role in shaping students' attitudes towards occupational health measures.

Despite the high level of knowledge and positive attitude observed in this study, the uptake of hepatitis B vaccination among respondents was low. The massive disconnect between high knowledge and poor practice observed here is similar to findings from a Nurses Training College in Ho, Ghana.[22]

A large proportion of students (73.8%) had not received any dose of the vaccine, while only a small percentage (10.7%) had completed the full recommended vaccination schedule. This finding is consistent with a 2023 study conducted in Nnewi, which found that vaccination coverage remains suboptimal despite high HBV awareness among healthcare students in Nigeria.[38] It is also similar to a study at the University of Port Harcourt Teaching Hospital, which showed that 85.4% of students had received at least one dose, and 34.8% had completed the full regimen.[33]. This finding highlights a significant gap between knowledge, attitude and vaccine uptake.

Age was also a significant factor, with younger students in the 20-24 age bracket having significantly lower odds of vaccine uptake than older student cohorts. The age disparity mirrors a study at Wolkite University, Ethiopia, in which the odds of vaccination increased substantially with advancing academic years and maturity.[27]

Furthermore, a significant comparative disparity was found: medical students had 2.035 times the odds of receiving the vaccine compared to nursing students. Over one-third (35.8%) of the medical students had received at least one dose of the Hepatitis B vaccine, compared to a critically low 16.5% among nursing students. This is similar to findings from a study conducted in Greece to assess Hepatitis B virus vaccination coverage in Medical, Nursing, and paramedical students, which showed that Medical students were more likely (OR=1.71) to report vaccination than their colleagues in Nursing.[29]

Nursing students who initiated the vaccine were slightly more likely to complete all three doses (47.2%) than their medical counterparts (37.9%), though this difference was not statistically significant ($p = 0.467$). This study is contrasted by a comparative study at the University of Jos, which also found a striking gap, with 60.2% of medical students completing the series compared to only 20.6% of nursing students.[15]

Level of Study proved to be a highly significant determinant ($p < 0.001$), reinforcing the impact of clinical progression, with an increase in full dose vaccination from 3.8% to 46.5% in the 200-level to the 600-level and a concurrent decrease in unvaccination from 93.1% to 29.1% in the 200-level to the 600-level. This is similar to a study done in Wolkite University, Ethiopia, where full-dose vaccination increased from 4.7% to 22.9%.

Clinical Status itself was not a significant independent predictor of final vaccination uptake ($p = 0.106$). This implies that simply sending a student to the hospital does not guarantee they will actually receive the vaccine.

Students with "Poor Knowledge" of Hepatitis B had significantly lower odds of vaccination than those with good knowledge (Odds Ratio = 0.117, $p = 0.039$). Stated differently, students with

poor knowledge are roughly 88% less likely to take the vaccine. A study conducted in Greece also found that participants' knowledge was positively associated with vaccination acceptance ($p < 0.001$).[26]

A striking and statistically significant reversal was observed in post-vaccination behaviour regarding the verification of immunity ($p < 0.001$). Only 32.3% had checked anti-HBsAg after vaccination, and 67.7% had not. In a study done in Greece, 81.8% of the study population had also never performed an antibody test for hepatitis B[26].

This suggests low awareness of post-vaccination testing and weak adherence to recommended occupational health practices in medical and allied health settings.

The low vaccination uptake observed in this study may be attributed to several factors, including a lack of institutional vaccination programmes, vaccine costs, limited access to vaccination services, and competing academic demands among students. An important observation from this study was that vaccination uptake was higher among medical students compared to nursing students, which may be related to differences in access to information, perceived risk, or opportunities for vaccination during clinical training.

Another notable finding was that a very high proportion of preclinical students were unvaccinated. This suggests that vaccination is often delayed until students begin clinical exposure, which may place them at risk during early clinical training. Ideally, healthcare students should receive complete hepatitis B vaccination before commencing clinical postings.

The low vaccination completion rate observed in this study has important implications for occupational health and patient safety. Unvaccinated healthcare workers remain vulnerable to infection and may also pose a risk of transmission in healthcare settings.

Several barriers that influenced hepatitis B vaccination uptake among respondents were also identified in this study. The primary barriers reported were a lack of awareness of on-campus vaccination centres (42.1%), the high cost of the vaccine (28.9%), and a lack of time due to busy academic schedules (26.4%). Departmentally, nursing students were predominantly hindered by systemic issues ("lack of awareness" and "high cost"), whereas medical students were hindered by complacency ("plans to take later" and "busy schedules").

These specific barriers are closely aligned with the findings of the University of Jos study, in which 42% of unvaccinated students attributed their non-uptake to poor geographical access, and 15.9% cited a lack of awareness.[15] Similar barriers have been reported in a 2023 study conducted among healthcare students in Nnewi, which revealed that Hepatitis B vaccine uptake among healthcare trainees in Nigeria is hindered by lack of knowledge, lack of interest, busy schedules, and cost, despite good awareness of the vaccine.[38]

Cost, identified as an important barrier, may be due to students' financial constraints, as hepatitis B vaccination often requires multiple doses. In the absence of subsidised vaccination programmes, students may be unable or unwilling to complete the vaccination schedule. The probable reasons for these barriers stem from a lack of proactive institutional frameworks. The university does not currently integrate the vaccine into the mandatory clearance process, forcing students to independently seek out an expensive, poorly advertised service amid rigorous academic demands. Fear of side effects and perceived low susceptibility to infection were also reported as barriers. These findings highlight the role of risk perception and misinformation in influencing vaccination decisions.

The public health implications emphasise the urgent need for targeted, institutional interventions. Financial constraints and communication gaps heavily disadvantage nursing students, whereas

logistical time management is a hurdle for medical students. Removing these specific barriers through subsidised, on-campus vaccination drives is the only way to convert their positive attitudes into actual practice.

The study further assessed factors associated with hepatitis B vaccination uptake among respondents. The analysis revealed that knowledge of hepatitis B infection was significantly associated with vaccination uptake. Students with better knowledge were more likely to initiate or complete hepatitis B vaccination.

This finding suggests that knowledge remains an important determinant of preventive health behaviour among healthcare students. Individuals who understand the risks associated with hepatitis B infection and the benefits of vaccination are more likely to adopt protective measures.

However, a 2019 study conducted in India reported that although knowledge was high among medical and nursing students, vaccination uptake and completion were lower, indicating that other contextual factors may play a significant role in determining uptake.[36]

Attitude towards vaccination was not significantly associated with vaccination uptake in this study ($p = 0.611$). Findings from a study conducted in Greece also revealed that vaccine refusal was not linked to participants' level of knowledge or attitude ($p > 0.05$).[26]

This indicates that although students may express positive attitudes towards vaccination, such attitudes do not always translate into actual vaccination behaviour. This further supports the existence of a knowledge-attitude-practice gap observed in this study.

These findings highlight the importance of implementing structured vaccination programmes within universities, as reliance on individual initiative alone may not be sufficient to achieve adequate vaccination coverage among healthcare students.

CONCLUSION

This study demonstrated that medical and nursing students had generally good knowledge of hepatitis B infection and its vaccination, with a largely positive attitude towards hepatitis B vaccination. Despite this high level of knowledge and a favourable attitude, the uptake of hepatitis B vaccination among respondents was low, and only a small proportion had completed the recommended vaccination schedule.

The study also identified several barriers to vaccination, including cost, lack of awareness, time constraints and perceived low risk of infection. Knowledge was found to be a significant determinant of vaccination uptake, while attitude alone did not significantly influence vaccination behaviour.

Overall, the findings indicate a gap in knowledge, attitudes, and practices regarding hepatitis B vaccination among healthcare students. This suggests the need for improved institutional strategies to ensure adequate protection of future healthcare workers against hepatitis B infection.

RECOMMENDATIONS

TO INDIVIDUAL MEDICAL AND NURSING STUDENTS

1. Students who have completed hepatitis B vaccination should share their experiences with colleagues to reduce misconceptions and encourage others to receive the vaccine.
2. Students, especially those about to begin clinical training, should schedule and complete all recommended doses of the hepatitis B vaccine before exposure to patients and clinical procedures.
3. Vaccinated students should confirm their immunity status through post-vaccination antibody testing, where available.

TO STUDENT ASSOCIATIONS (MEDICAL AND NURSING STUDENTS' ASSOCIATIONS)

1. Student bodies should continue organising periodic awareness programmes focusing on the occupational risk of hepatitis B infection and the importance of vaccination among healthcare students.
2. Trained student volunteers should conduct peer education sessions to address knowledge gaps identified in this study.
3. Student leaders should coordinate group vaccination initiatives to improve vaccination uptake and completion rates.

TO THE UNIVERSITY HEALTH SERVICES / UNIVERSITY CLINIC

1. The university clinic should schedule regular vaccination services targeted at healthcare students.
2. The clinic should maintain records of vaccination status to ensure students complete all required doses.
3. Hepatitis B education and vaccination information should be included during student orientation and clinical training briefings.

TO THE FACULTIES OF MEDICINE AND NURSING

1. Hepatitis B vaccination should be required before students commence clinical postings.
2. Early curriculum integration of occupational health, infection prevention and vaccination education should be emphasised.
3. Faculties should monitor the vaccination status of students to ensure adequate protection during clinical training.

TO THE UNIVERSITY ADMINISTRATION

1. The university should collaborate with health authorities to provide hepatitis B vaccines at subsidised or no cost for healthcare students.
2. Policies requiring proof of hepatitis B vaccination before clinical exposure should be implemented.
3. Vaccination services should be made readily available within the university health system.

TO THE EDO STATE MINISTRY OF HEALTH

1. The Ministry should collaborate with tertiary institutions in Edo State to ensure hepatitis B vaccination for healthcare students.
2. Adequate supply of hepatitis B vaccines should be provided to university health facilities.
3. The Ministry should intensify hepatitis B awareness campaigns among healthcare trainees.

TO THE EDO STATE PRIMARY HEALTH CARE DEVELOPMENT AGENCY

1. Hepatitis B vaccination for healthcare students should be incorporated into existing immunisation programmes in Edo State.
2. Training should be provided to frontline health workers to support vaccination delivery and student education.
3. Periodic outreach programmes should be organised within tertiary institutions to increase vaccine accessibility.

TO THE NATIONAL PRIMARY HEALTH CARE DEVELOPMENT AGENCY

1. Hepatitis B vaccination should be strengthened within national immunisation and occupational health policies for healthcare trainees.
2. The agency should provide technical and programmatic support to states and institutions implementing vaccination programmes.

3. A national monitoring system should be established to assess vaccination coverage among healthcare students.

TO THE NIGERIA CENTRE FOR DISEASE CONTROL AND PREVENTION (NCDC)

1. Surveillance systems should be strengthened to monitor hepatitis B infection among healthcare workers and students.
2. Risk Communication Campaigns: Public health campaigns should be intensified to increase awareness of occupational exposure risks.
3. Research Support: The agency should support research on hepatitis B prevention strategies among healthcare trainees.

TO THE FEDERAL MINISTRY OF HEALTH AND SOCIAL WELFARE

1. Policies promoting hepatitis B vaccination among healthcare workers and students should be strengthened and implemented nationwide.
2. Hepatitis B vaccination for healthcare trainees should be incorporated into national infection prevention and occupational health programmes.
3. Adequate funding should be allocated for hepatitis B vaccination programmes across tertiary institutions in Nigeria.

APPENDIX I
RESEARCH QUESTIONNAIRE

We are 600-level medical students conducting a research study to assess the knowledge, attitudes, and uptake of the Hepatitis B vaccine among medical and nursing students at the University of Benin. The findings will contribute to a better understanding of vaccination trends and inform strategies to improve vaccine uptake among healthcare students.

Participation in this study is entirely voluntary, all responses will be kept confidential, and the data collected will be used solely for research purposes.

Instruction: Please answer the following questions honestly. Your responses will be kept confidential and used for research purposes only. Tick (✓) the appropriate options or fill in the blanks as required.

Section A: Socio-Demographic Data

1. Age (as at last birthday):_____
2. Sex: [ ] Male [ ] Female
3. Ethnicity: [ ]Yoruba [ ]Igbo [ ]Hausa [ ]Benin [ ]Urhobo [ ]Esan [ ]Others(please specify)_____
4. Relationship Status: [ ]Single [ ]Married [ ]Cohabiting [ ]Widowed [ ]divorced [ ]separated
5. Religion: [ ]Christianity [ ]Islam [ ]ATR [ ]Others (please specify) _____
6. Course of Study: [ ] Medicine [ ] Nursing
7. Level of Study: Medicine- [ ]Med230 [ ]Med220 [ ]Med210 [ ]Med200 [ ]Med190 [ ] Med180 [ ]Med170 Nursing- [ ]200 [ ]300 [ ]400 [ ]500
8. Have you started clinical postings? [ ] No (pre-clinical class) [ ] Yes (clinical class)

9. Have you ever clerked/encountered Hepatitis B patients in a posting? [ ] Yes [ ] No

Section B: Knowledge of Hepatitis B and its vaccination

10. Have you heard of Hepatitis B before? [ ] Yes [ ] No
11. If yes, how did you hear about it? [ ]School lectures [ ]Friends [ ]Health Seminar [ ]Mass media (radio/TV) [ ] Social Media

    [ ] Others (please specify)_____
12. What is the causative agent of Hepatitis B? [ ]Virus [ ]Bacteria [ ]Parasite [ ]Don't know
13. What are the modes of transmission of Hepatitis B? (Tick all that apply)

    [ ]Unprotected sexual intercourse [ ]Sharing needles or sharp objects

    [ ]Mother-to-child transmission [ ]Holding hands with an infected person

    [ ]Blood transfusion [ ]Saliva [ ] Contaminated food or water [ ] Mosquito bites

    [ ] Faeco-Oral [ ] Airborne [ ] Contact with Hospital equipment [ ] Contact with patients

    [ ] Don't know [ ] Other (please specify) : _____
14. Can Hepatitis B be prevented through vaccination? [ ] Yes [ ]No [ ]Don't know
15. How many doses of the Hepatitis B vaccine are recommended for complete protection?

    [ ] One [ ] Two [ ] Three [ ] Don't know
16. When should the first dose of the Hepatitis B vaccine ideally be taken?

    [ ] At birth [ ] After exposure [ ] Anytime [ ] Don't know
17. Is Hepatitis B infection curable? [ ] Yes [ ] No [ ] Don't know
18. Is Hepatitis B Virus more infectious than HIV/AIDS? [ ] Yes [ ] No [ ] Don't know
19. In Hepatitis B, can infected persons be easily identified? [ ] Yes [ ] No [ ] Don't know

20. What are the possible complications of chronic Hepatitis B infection? (Tick all that apply.)

[ ] Liver cancer [ ] Liver cirrhosis [ ] Death [ ] HIV [ ] Infertility [ ] Jaundice

[ ] Don't know [ ] Other (please specify) : _____

Section C: Attitude towards Hepatitis B vaccination

S/N		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
21.	Hepatitis B is a serious health problem					
22.	Healthcare students, like Medicine and Nursing students are at risk of Hepatitis B infection					
23.	Vaccination is an effective way to prevent Hepatitis B					
24.	The Hepatitis B vaccine is safe					
25.	Heath care students and professionals should be vaccinated against Hepatitis B					
26.	Hepatitis B screening should be made compulsory in medical clearance for health care students					
27.	Medical and nursing students should be vaccinated within 1 year of joining school					
28.	Regular vaccination campaigns should be conducted in medical and nursing schools					

29. Would you recommend the vaccine to your friends or classmates? [ ]Yes [ ]No [ ]Maybe

30. If free vaccination were provided, would you take it immediately? [ ]Yes [ ]No [ ]Maybe

31. Do you feel you need to be protected against Hepatitis B infection? [ ]Yes [ ]No [ ]Maybe

32. Are you willing to receive the Hepatitis B vaccination? [ ]Yes [ ]No [ ]Maybe

33. Have you participated in any educational program or campaign on Hepatitis B? [ ]Yes [ ]No

34. Would you be willing to attend educational programs or campaigns on Hepatitis B?

    [ ]Yes [ ]No [ ]Maybe

35. If no, why? (Feel free to give more than one reason)

    _____

    _____

    _____

    _____

36. If yes, why? ((Feel free to give more than one reason)

    _____

    _____

    _____

    _____

Section D: Hepatitis B Vaccination Uptake

37. Have you checked your Hepatitis B status (via test)? [ ]Yes [ ]No

38. Have you ever received the Hepatitis B vaccine? (excluding dose at birth) [ ]Yes [ ]No

    If no, skip to section E

39. If yes, how many doses have you received? [ ]One [ ]Two [ ]All three doses [ ]Don't know

40. Where did you receive the vaccination? [ ]University Health Centre [ ]Government Hospital [ ]Private Hospital [ ]Outreach/Campaign [ ]Other(please specify):_____

41. What motivated you to get vaccinated? (Tick all that apply)

[ ]Doctor's recommendation [ ]School requirement [ ]Personal decision [ ]Family/friend influence [ ]Awareness campaign [ ]Other (please specify) : _____

42. Have you completed your Hepatitis B vaccination? [ ]Yes [ ]No [ ]Maybe

43. If you did not complete the 3-dose series, what was the reason? [ ]Forgot [ ]Busy schedule [ ]Side effects [ ]Not necessary [ ]Other (please specify): _____

44. Did you screen for Hepatitis B just before vaccination? [ ] Yes [ ]No [ ]Not sure

45. Have you checked your immune status (Anti-HbS) after vaccination? [ ]Yes [ ]No

Section E: Barriers/Determinants to Vaccination Uptake

46. If you have not received the vaccine, what are the reasons? (Tick all that apply)

[ ]Lack of awareness [ ]High cost of vaccine [ ]Fear of side effects [ ]Unavailability of vaccine [ ]Not perceived as necessary [ ]Lack of time [ ]Not yet offered [ ]Fear of needles [ ]Negative screening result [ ]Positive screening result [ ]Have plans to take it later [ ]Not at risk of HBV [ ]Other (please specify) : _____

47. Which of the following would encourage you to get vaccinated? (Tick all that apply)

[ ]Awareness campaigns [ ]Peer encouragement [ ]Free vaccination

[ ]Compulsory school policy [ ]Doctor's recommendation

[ ]Other (please specify): _____

48. Do you know where to get the Hepatitis B vaccine on or near campus? [ ]Yes [ ]No

APPENDIX II
INFORMED CONSENT FORM

INVESTIGATORS

1. Igbinoba Etinosa Gabriel (MED1807413)

2. Igbinomwanhia Delight Osamudiamen (MED1807414)

SUPERVISOR

Professor A.N. Ofili

Department of Community Medicine and Public Health

FINANCIAL SPONSORSHIP

This research project is self-sponsored.

PURPOSE OF THE RESEARCH

This study aims to assess the knowledge, attitudes, and vaccination uptake of Hepatitis B among medical and nursing students at the University of Benin. It will also identify barriers to vaccination and compare these factors between the two student groups.

PROCEDURES AND PROTOCOL INVOLVED IN THE STUDY

You will be asked to complete a structured questionnaire about your:

- Knowledge of Hepatitis B transmission, prevention, and vaccination.

- Attitudes toward Hepatitis B vaccination.

- Personal vaccination status and reasons for non-uptake (if applicable).

- Perceived barriers to vaccination.

The questionnaire will take approximately **10–15** minutes to complete.

COMPENSATION

There will be no financial compensation for participating in this study.

VOLUNTARY PARTICIPATION

Your participation is entirely voluntary. You may withdraw at any time without penalty.

SIDE EFFECTS

No physical or psychological risks are anticipated.

BENEFIT

This study will provide data to improve vaccination policies and educational programs for healthcare students in Nigeria.

CONFIDENTIALITY

All responses will be anonymised. Data will be stored securely and used only for research purposes.

CONTACT INFORMATION

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Tel: 08148203203

Igbinomwanhia Delight **Osamudiamen: deigbinomwanhia@gmail.com**

Tel: 08062877043

Ethics and Research Committee:

University of Benin Teaching Hospital

Email: **ubthresearchethics@gmail.com**

Tel: 07063331337

IF THERE IS ANY PORTION OF THE FIELD WORKER OR INVESTIGATOR BEFORE SIGNING. UNDERSTAND, ASK THE FIELD WORKER OR INVESTIGATOR BEFORE SIGNING.

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

CERTIFICATION OF CONSENT

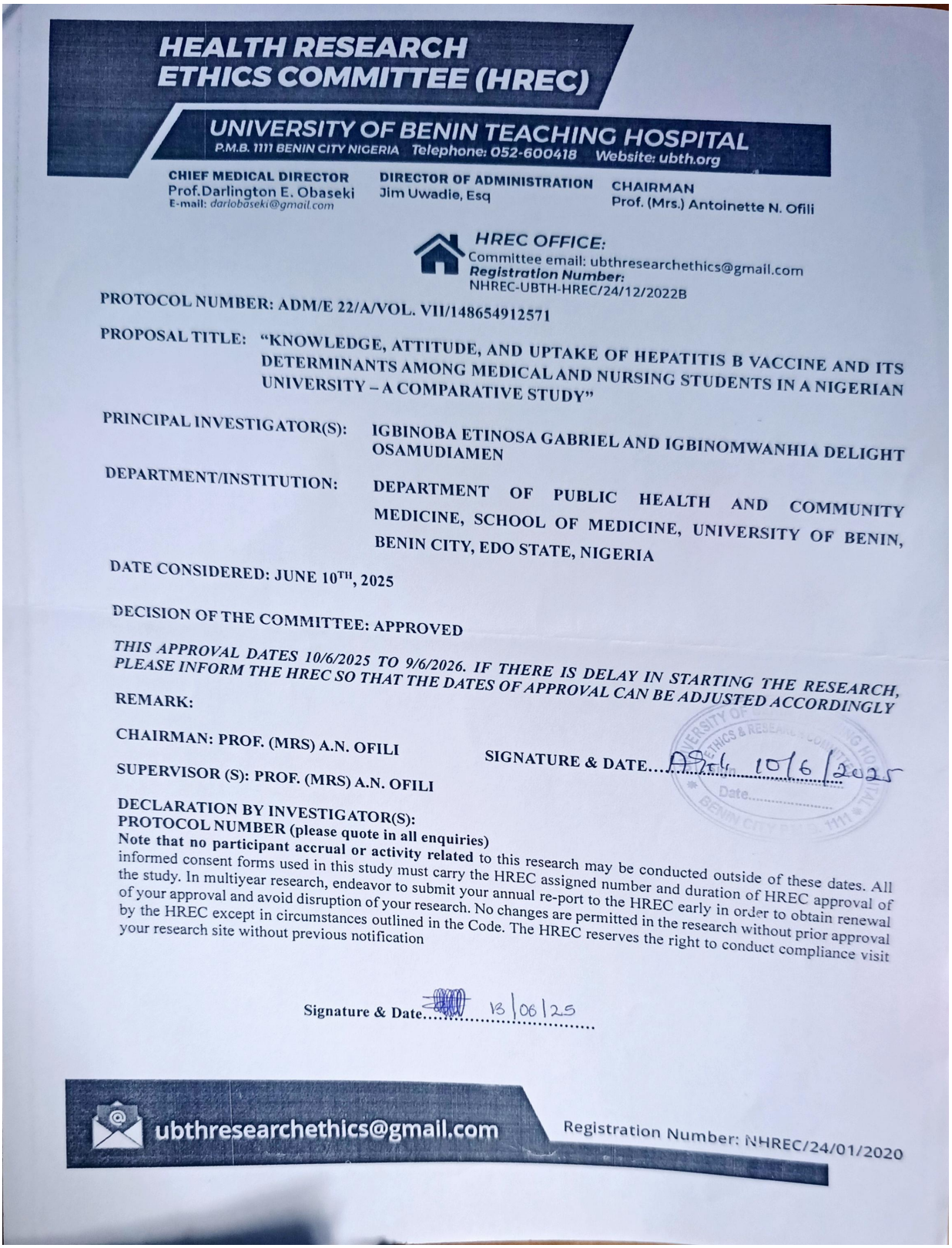
I, _____, having full capacity to consent for myself, do hereby consent to my participation in the research study. The methods and means by which the study will be conducted have been explained to me by the Ethical Committee. I have been given the opportunity to ask questions concerning this investigational study, and any such questions have been answered to my complete satisfaction. I understand that I may at any time during this study revoke this consent and withdraw myself from the study without prejudice.

Name of Participant: _____

Signature of participant: _____

Date: _____

APPENDIX III
ETHICAL APPROVAL



HEALTH RESEARCH ETHICS COMMITTEE (HREC)

UNIVERSITY OF BENIN TEACHING HOSPITAL

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

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CHAIRMAN
Prof. (Mrs.) Antoinette N. Ofili

HREC OFFICE:
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Registration Number:
NHREC-UBTH-HREC/24/12/2022B

PROTOCOL NUMBER: ADM/E 22/A/VOL. VII/148654912571

PROPOSAL TITLE: "KNOWLEDGE, ATTITUDE, AND UPTAKE OF HEPATITIS B VACCINE AND ITS DETERMINANTS AMONG MEDICAL AND NURSING STUDENTS IN A NIGERIAN UNIVERSITY – A COMPARATIVE STUDY"

PRINCIPAL INVESTIGATOR(S): IGBINOBA ETINOSA GABRIEL AND IGBINOMWANHIA DELIGHT OSAMUDIAMEN

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

DATE CONSIDERED: JUNE 10TH, 2025

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 10/6/2025 TO 9/6/2026. 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**... 10/6/2025

SUPERVISOR (S): PROF. (MRS) A.N. OFILI

Date.....

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

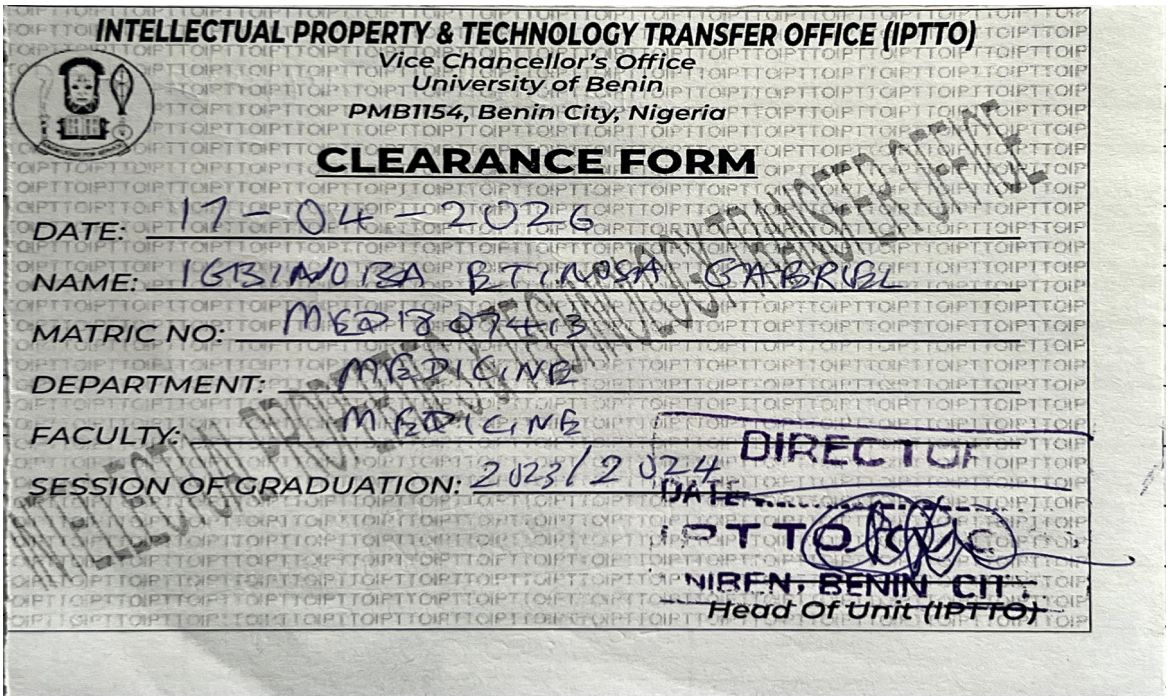
Signature & Date..... 13/06/25.....

ubthresearchethics@gmail.com Registration Number: NHREC/24/01/2020

APPENDIX IV
WORK PLAN

Project Activities	Dec 2024	Jan - Feb 2025	Mar - May 2025	Jun - Sep 2025	Nov 2025 - Jan 2026	Feb - Mar 2026	Apr 2026
Topic selection and approval							
Chapter 1 writing, Literature review (Ch 2) & corrections							
Chapter 3 submission, Proposal writing & Ethical approval							
Pretesting & Data Collection							
Data analysis							
Report writing, Review of Chapter 4 & writing Chapter 5							
Collation, Plagiarism testing, Bindery & Final Submission							

APPENDIX V
PLAGIARISM TEST FORM



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

CLEARANCE FORM

DATE: 17-04-2026
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MATRIC NO: MBBS18074113
DEPARTMENT: MEDICINE
FACULTY: MEDICINE
SESSION OF GRADUATION: 2023/2024

DIRECTOR
DATE
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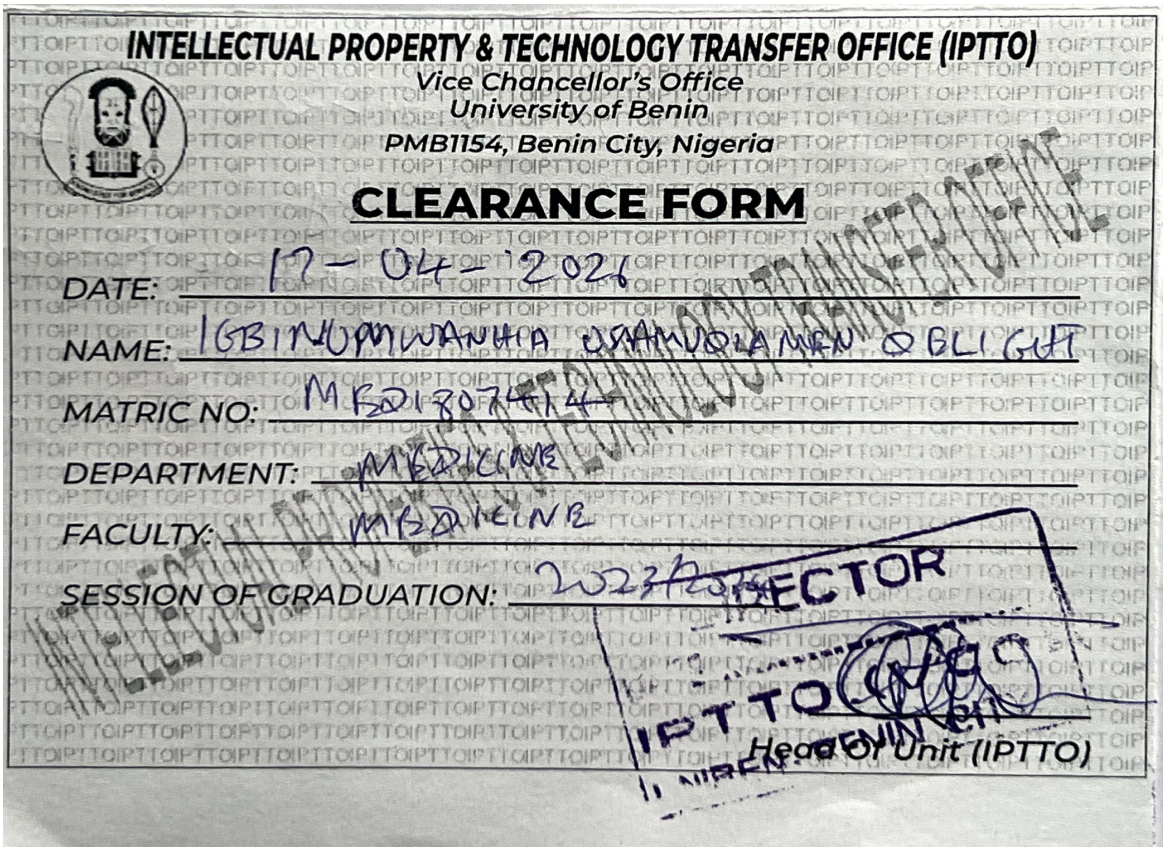
NIREN, BENIN CITY
Head Of Unit (IPTTO)



INTELLECTUAL PROPERTY & TECHNOLOGY TRANSFER OFFICE (IPTTO)
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CLEARANCE FORM

DATE: 17-04-2026
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FACULTY: MEDICINE
SESSION OF GRADUATION: 2023/2024

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