

Determinants of Hepatitis B Vaccination Uptake and Hepatitis B and C Preventive Practices Among Healthcare Workers in Tertiary Health Institutions in the Federal Capital Territory, Abuja, Nigeria

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Faculty of Basic and Applied Biological Sciences, Ahmadu Bello University, Zaria

Master of Public Health (Mph) Specialization in Epidemiology

A Group Research Thesi Submitted to the Faculty of Basic and Applied Biological Sciences, Ahmadu Bello University, Zaria, in Partial Fulfillment of the Requirements for the Award of the Degree of

Master of Public Health (MPH)

Specialization in Epidemiology

Publication Date: 2026/08/12

How to Cite: Osiyale Olusijibomi; Onyeji Uchechukwu Violet; Okereafor Mary Patience; Olugbodi Tomilola Ifeoluwa; Okpara-Mbe Ada (2026) Determinants of Hepatitis B Vaccination Uptake and Hepatitis B and C Preventive Practices Among Healthcare Workers in Tertiary Health Institutions in the Federal Capital Territory, Abuja, Nigeria. *International Journal of Innovative Science and Research Technology*, 11(7), 3606-3658. <https://doi.org/10.38124/ijisrt/26jul1476>

ATTESTATION

We, the undersigned, hereby attest that the research work titled: “DETERMINANTS OF HEPATITIS B VACCINATION UPTAKE AND HEPATITIS B AND C PREVENTIVE PRACTICES AMONG HEALTHCARE WORKERS IN TERTIARY HEALTH INSTITUTIONS IN THE FEDERAL CAPITAL TERRITORY, ABUJA, NIGERIA”, was carried out solely by us as a group research work under the supervision of Prof. Aliyu Muhammad Maigoro in partial fulfillment of the requirements for the award of the degree of Master of Public Health (MPH), Specialization in Epidemiology, from the Faculty of Basic and Applied Biological Sciences, Ahmadu Bello University, Zaria.

We further declare that this research work has not been submitted elsewhere for the award of any degree or qualification in this or any other institution, except where due acknowledgment has been made in the text.

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CERTIFICATION

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DEDICATION

We dedicated this study to the service of humanity, with the hope that it will contribute meaningfully to the existing body of knowledge and research in the field of public health, particularly in the prevention and control of Hepatitis B and C among healthcare workers.

ACKNOWLEDGMENT

We express our sincere gratitude to God Almighty for His grace, strength, wisdom and faithfulness throughout the course of this Master's programme and the successful completion of this project work. We deeply appreciate our supervisor, Prof. Aliyu Muhammed Maigoro, for his patience, guidance, constructive corrections and invaluable contributions throughout the course of this research work.

I, OSIYALE OLUSIJIBOMI, sincerely appreciate my wife, Pharm. (Mrs.) Osiyale Iyanuoluwa, for her encouragement, support and strength throughout this journey. I also remain grateful to my parents, Engr. Olufisan Osiyale and Mrs. Abosede Osiyale, for their prayers, support and encouragement, as well as Pharm. Ejero Eru for the motivation to pursue this Master's degree.

I, OLUGBODI TOMILOLA IFEOLUWA, heartily acknowledge Eunice, Enoch and Emmanuela Olugbodi for their love, encouragement, prayers and support throughout this programme.

I, OKEREA FOR MARY PATIENCE, express profound gratitude to my husband and children for their sacrifices, understanding and support throughout this academic journey. I also appreciate Sir Obioha Livinus Okerefor, Miss Okerefor Favour Adaobi, Master Godswill Ikeobi and David Chimeremeze for their encouragement, prayers and support.

I, ONYEJI UCHECHUKWU VIOLET, wish to specially thank Deputy Director of Nursing Services, Odey Immaculata, for her encouragement, guidance and support throughout this programme. I also appreciate Nnenna Favour Onyebuchi for her prayers and encouragement.

I, OKPARA-MBE ADA, remain deeply thankful to Mr. and Mrs. Maurice Onyeji for their love, sacrifices, prayers and unwavering support throughout this academic pursuit.

Finally, we appreciate everyone who contributed directly or indirectly to the successful completion of this project work, especially our respondents. May God richly bless and reward you all.

Thank you.

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LIST OF ABBREVIATIONS

ABU	Ahmadu Bello University
ANOVA	Analysis of Variance
CI	Confidence Interval
DNA	Deoxyribonucleic Acid
FCT	Federal Capital Territory
FMOH	Federal Ministry of Health
HBcAg	Hepatitis B Core Antigen
HBeAg	Hepatitis B e-Antigen
HBsAg	Hepatitis B Surface Antigen
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HCW	Healthcare Worker
HIV	Human Immunodeficiency Virus
HREC	Health Research Ethics Committee
IPC	Infection Prevention and Control
LMIC	Low- and Middle-Income Country
MPH	Master of Public Health
NHA	National Hospital Abuja
NHV	Needle-stick and Sharps Injury
NSSI	Needle-stick and Sharps Injury
OR	Odds Ratio
PEP	Post-Exposure Prophylaxis
PPE	Personal Protective Equipment
RNA	Ribonucleic Acid
SD	Standard Deviation
SPSS	Statistical Package for the Social Sciences
UATH	University of Abuja Teaching Hospital
WHO	World Health Organization

ABSTRACT

➤ Objectives:

This study determined the determinants of Hepatitis B vaccination uptake and Hepatitis B and C preventive practices among healthcare workers in tertiary health institutions in the Federal Capital Territory, Abuja, Nigeria.

➤ Methods:

A descriptive cross-sectional study design, mixed methods was adopted. A multi-stage sampling technique was used to recruit 385 healthcare workers from selected tertiary health institutions in the FCT. Data were collected using a pre-tested, self-administered, structured questionnaire. Data were analysed using IBM SPSS version 25.0. Frequencies and proportions were computed for categorical variables. Chi-square tests and binary logistic regression were used to identify determinants of hepatitis B vaccination uptake and preventive practices, with statistical significance set at $p < 0.05$.

➤ Results:

The overall hepatitis B vaccination coverage among respondents was 48.3%, with only 34.5% having completed the full three-dose schedule. The majority of respondents (72.5%) demonstrated adequate knowledge of hepatitis B transmission routes, while knowledge of hepatitis C was comparatively lower (54.2%). A positive attitude towards hepatitis B vaccination was reported by 65.8% of respondents. Good adherence to hepatitis B and C preventive practices was observed in 57.4% of respondents. Significant determinants of hepatitis B vaccination uptake included professional cadre, years of clinical experience, availability of institutional vaccination programmes, and prior training on infection prevention and control. Key barriers to vaccination included unavailability of vaccines within the institution (38.9%), cost of vaccination (27.4%), and a perception that the vaccine was unnecessary (18.6%). Needle-stick and sharps injuries were reported by 41.3% of respondents in the preceding twelve months, with only 56.7% of affected workers seeking post-exposure prophylaxis.

➤ Conclusion:

Overall, the findings showed that hepatitis B vaccination coverage was 48.3% of the population with only 34.5% having received the complete three dose series, well below the WHO recommendation of universal vaccination of healthcare workers for HBV. We recommend for an implement structured, competency-based education covering HBV/HCV transmission, the three-dose vaccination schedule, immunity confirmation, and post-exposure protocols. Also, the health institutions should introduce and enforce a policy requiring all new staff to initiate and complete the HBV vaccination series within a defined period, with verification and post-vaccination testing recorded in occupational health files, consistent with international evidence on completion rates.

Keywords: Hepatitis B, Hepatitis C, Vaccination Uptake, Preventive Practices, Healthcare Workers, Federal Capital Territory, Nigeria, Occupational Health.

CHAPTER ONE INTRODUCTION

➤ *Background of the Study*

Viral hepatitis remains a major global public health challenge, with Hepatitis B virus (HBV) and Hepatitis C virus (HCV) accounting for a substantial proportion of liver-related morbidity and mortality worldwide (World Health Organization [WHO], 2017). According to the World Health Organization (WHO), an estimated 296 million people were living with chronic Hepatitis B and about 58 million with chronic Hepatitis C globally as of 2019, resulting in over 1.1 million deaths annually, primarily from liver cirrhosis and hepatocellular carcinoma (WHO, 2021).

Despite the availability of effective preventive measures, particularly vaccination against Hepatitis B and standard infection prevention practices, transmission continues to occur, especially in low- and middle-income countries where healthcare and occupational health system remain inadequate (spearman et al., 2017).

Healthcare workers (HCWs) are recognized as a high-risk occupational group for HBV and HCV infection due to their frequent exposure to blood and other potentially infectious body fluids (Tarantola et al., 2020). Healthcare workers (HCWs) are recognized as a high-risk occupational group for HBV and HCV infection due to their frequent exposure to blood and other potentially infectious body fluids. Occupational hazards such as needle-stick injuries, sharps injuries, inadequate use of personal protective equipment, and suboptimal infection prevention and control practices significantly increase their vulnerability (Tarantola et al., 2020). Occupational hazards such as needle-stick injuries, sharps injuries, inadequate use of personal protective equipment, and suboptimal infection prevention and control practices significantly increase their vulnerability (CDC, 2023). In healthcare settings, HBV is particularly concerning because it is highly infectious, with a risk of transmission following percutaneous exposure far exceeding that of HIV (Singhal et al., 2009). Although an effective and safe vaccine against Hepatitis B has been available for decades, vaccination coverage among healthcare workers in many developing countries remains suboptimal (WHO, 2019).

In sub-Saharan Africa, including Nigeria, the burden of viral hepatitis is disproportionately high (WHO, 2017). Nigeria is classified as a hyperendemic country for Hepatitis B, with prevalence estimates ranging between 8% and 12% in the general population (Olayinka et al., 2016). Hepatitis C prevalence, though comparatively lower, remains a significant concern due to its asymptomatic nature and long-term complications (CDC, 2023). The high endemicity of these infections, combined with limited occupational health infrastructure and inconsistent implementation of preventive policies, places healthcare workers at continuous risk (Federal Ministry of Health, 2016).

Hepatitis B vaccination is the most effective strategy for preventing HBV infection among healthcare workers. The WHO recommends that all healthcare workers receive a complete three-dose schedule of the Hepatitis B vaccine, followed by post-vaccination serological testing where feasible to confirm adequate immune response (WHO, 2017). However, evidence from various recent studies in Nigeria suggests that full vaccination coverage among HCWs remains suboptimal

In a 2018 Enugu State study, three-dose vaccination was only done by 38.5% of the healthcare workers (Okechukwu & Motshedisi, 2018). Likewise, a study carried out in Lagos stated that 52.3 percent of healthcare workers were completely vaccinated, and 23.7 percent vaccinated partially (Abdela et al., 2016). The issues that can affect vaccine uptake are insufficient awareness on how hepatitis is spread and prevented, absence of vaccines in medical centers, financial commitment, perceived low risk of infection, fear of side effects, time constraints, and poor institutional practices regarding occupational health and safety (Nwankwo et al., 2022; Ogoina et al., 2015).

In addition to vaccination, prevention measures are important in curbing the spread of both Hepatitis B and C in the healthcare facility. These are practices, which adhere to standard precautions, including regular hand hygiene, appropriate use of personal protective equipment (gowns, face shields, gloves), safe handling and disposal of sharp objects, prompt reporting and management of occupational exposures, and regular screening of viral hepatitis (WHO, 2016). Inadequate adherence to these practices has been noted in various Nigerian healthcare facilities, in many cases, as a result of workload pressure, a lack of training about infection prevention, a shortage of supplies and equipment, a lack of post-exposure prophylaxis measures, and a laxity of infection control policies (Ijarotimi et al., 2018; Sadoh et al., 2019).

Abuja is in the Federal Capital Territory (FCT) which has a number of tertiary health facilities acting as referral centers to complex medical cases in Nigeria. These facilities have a wide range of healthcare personnel, such as physicians, nurses, lab scientists, and support team, all of whom may come into contact with blood-borne pathogens in the process of their work (FMoH, 2016). Although the strategic importance of such institutions, there is scarce overall data on Hepatitis B vaccine coverage and Hepatitis B and C preventive behaviors among health care professionals in the FCT. The knowledge of the determinants of vaccination uptake and preventive behaviours in this environment is essential in building specific interventions and enhancing occupational health policies (WHO, 2021).

➤ *The Problem Statement*

Although Nigeria has a high endemicity of Hepatitis B and C and it has been established that healthcare workers are at risk of occupation with Hepatitis B, there is limited empirical evidence on factors that determine Hepatitis B vaccination uptake and Hepatitis B and C preventive practice adherence among healthcare workers in tertiary health facilities, especially in the Federal Capital Territory, Abuja. The available literature concentrates on the general vaccination coverage or knowledge rates at the national or regional levels and in most cases, it does not take into consideration the interaction of individual, occupational and institutional determinants that influence preventive behaviours in particular healthcare environments. The impact of such factors on professional grades, years of practice, access to vaccines, institutional policies, and access to preventive measures to address the issue of vaccination uptake and preventive measures among healthcare workers in Abuja tertiary institutions is therefore not well researched. This paper attempts to fill this gap by investigating the determinants of Hepatitis B vaccination and Hepatitis B and C preventive practices, in the special setting of tertiary health institutions in the Federal Capital Territory, Abuja, Nigeria.

The problem statement is not long enough. Please bring up the real problems at it relates to Hepatitis B (globally, Regionally and within Nigerian context). Write extensively on the issues, 4 pages or more.

➤ *Justification*

This research is dealing with a pressing global, regional and national public health concern. The World Health Organization has given viral hepatitis elimination as a global health priority and the Global Health Sector Strategy on Viral Hepatitis 2016-2021 targets a reduction in new infections by 90% and a reduction in mortality by 65% by 2030 (WHO, 2016). Vaccination and protection of healthcare workers are critical components of this elimination strategy since healthcare workers are a high-risk group in need of protection and potential transmission points in case of infection. Nigeria being a signatory to its global strategy by WHO and with its own National Policy on Viral Hepatitis Prevention and Control, has set goals to pursue these ambitious targets (Federal Ministry of Health, 2019).

Occupational safety and workers rights are not just practical matters of occupational health but constitute the core of the issue of worker protection against occupational infections. Medical staff members spend their careers in the service of others; it is a moral duty and a social responsibility to keep them safe of occupational risks that are avoidable. International labour organization has acknowledged the safety of healthcare workers as a fundamental right to labour and safety of healthcare workers against blood-borne pathogens has been defined by international occupational health standards (ILO, 2019). By ratifying the various ILO conventions, Nigeria is obligated towards the use of effective occupational health practices, such as vaccination and infection control systems.

The current literature has mostly worked on recording the extent of the issue in quantifying vaccination rates and the characterization of preventive behaviors without conducting a systematic analysis on the causes of such behaviors. Although descriptive data is useful in creating a baseline coverage and gaps, it does not give much information in terms of guiding the development of interventions. Knowledge of why healthcare workers are not vaccinated or do not follow preventive measures, as well as which factors are most prominently related to positive behaviors, is crucial to developing focused, evidence-based interventions because the limited studies that have explored determinants have usually measured individual-level determinants (such as knowledge and attitudes) and not occupational and institutional determinants. This is a major limitation since the occupational behaviors are not only determined by individual traits, but also by workplace conditions, organizational policies and institutional culture. A healthcare worker might be a really good source of knowledge on transmission of hepatitis and positive attitudes towards vaccination, but still not vaccinated because of the unavailability of such vaccines in their facility or unaffordability. Equally, compliance with preventive measures is limited by supply availability, workload demands, and institutional safety culture.

➤ *Research Questions*

- What is the level of Hepatitis B vaccination uptake among healthcare workers in tertiary health institutions in the Federal Capital Territory, Abuja?
- What factors influence Hepatitis B vaccination uptake among healthcare workers in tertiary health institutions in FCT Abuja?
- What is the level of adherence to Hepatitis B and C preventive practices among healthcare workers in tertiary health institutions in FCT Abuja?
- What factors are associated with adherence to Hepatitis B and C preventive practices among healthcare workers in tertiary health institutions in FCT Abuja?

➤ *Research Objectives*

• *General Objective*

To determine the determinants of Hepatitis B vaccination uptake and Hepatitis B and C preventive practices among healthcare workers in tertiary health institutions in the Federal Capital Territory, Abuja, Nigeria.

- *Specific Objectives*

- ✓ To assess the level of Hepatitis B vaccination uptake among healthcare workers in tertiary health institutions in FCT Abuja.
- ✓ To identify factors influencing Hepatitis B vaccination uptake among healthcare workers.
- ✓ To evaluate the level of adherence to Hepatitis B and C preventive practices among healthcare workers in tertiary health institutions in FCT Abuja.
- ✓ To examine the factors associated with Hepatitis B and C preventive practices among healthcare workers in tertiary health institutions in FCT Abuja.

- *Significant of Study*

The research holds relevance to scholarly work and practice in the field of health in a few aspects. It describes the empirical data about the Hepatitis B vaccination coverage and Hepatitis B and C preventive measures among tertiary healthcare workers in the Federal Capital Territory, Abuja. The results will inform hospital administrators and policymakers on the loopholes in occupational health policy and infection prevention measures and help to develop specific interventions to enhance vaccination coverage and adherence to preventive measures. The study will also be valuable to occupational health and public health unit by strengthening safety of health care workers and reducing risk of nosocomial transmission of hepatitis.

CHAPTER TWO

LITERATURE REVIEW

➤ Introduction

Hepatitis B and C viral diseases are major global health issues of concern and medical personnel (HCWs) experience greater occupational risks as they are often exposed to blood and body fluids during normal work practices. It is estimated by the World Health Organization that more than 296 million people are chronic hepatitis B virus (HBV) infected all over the world and this results in the death of over 820,000 people annually due to related complications (Aremu et al., 2025). Percutaneous injuries, needle-stick exposures, and contact with contaminated materials are increased risk factors of healthcare workers contracting these bloodborne pathogens (Lawson et al., 2025). In Nigeria, holoendemic with a prevalence of 10-20% in the general population, hepatitis B is also inadequately defined in healthcare workers despite their increased occupational risk (Issa et al., 2023).

Hepatitis B vaccination is the best preventive action against hepatitis B in healthcare workers (Sajini et al., 2025). Hepatitis B vaccine is safe, highly effective and immunises 98-100% of the vaccinated individuals when used as the recommended three dose series (Abere et al., 2025). Although this is an effective vaccine that is offered and used in the national immunization policies of most countries, vaccination coverage among healthcare workers in sub-Saharan Africa, and specifically in Nigeria is still below expectations. Research done in various states of Nigeria has reported a non-compliant percentage of hepatitis B vaccination ranging between 10.5 per cent and 42.6 per cent among healthcare workers (Atekoja et al., 2025; Issa et al., 2023; Gadzama et al., 2025), which is way below the World Health Organization recommended 100 per

Factors affecting hepatitis B vaccination uptake are complex and include individual (knowledge, attitudes, risk perception, and sociodemographic factors) and systemic (vaccine availability, costs, accessibility, and institutional policies) factors (Aremu et al., 2025; Oyibo et al., 2022). Moreover, preventive measures against the spread of hepatitis B and C among healthcare professionals such as compliance with standard precautions, wearing of personal protective equipment, safe injections, and correct disposal of sharps are also essential elements of occupational health programs (Ehimen, 2025; Chikwendu et al., 2023). The disconnect between the knowledge of infection control principles and the practice is an ongoing issue in the Nigerian healthcare context (Iliyasu et al., 2016).

This literature review is a systematic review of the available literature on the subject of vaccine hepatitis B uptake and preventive measures among health care workers with special reference to Nigeria and the sub-Saharan African setting. The review summarizes the evidence on the epidemiology of hepatitis B and C among healthcare workers, the determinants of vaccination uptake, barriers and facilitators to vaccination, knowledge and attitudes to vaccination, preventive practices and infection control behaviors, and gaps in existing literature that this research study seeks to fill.

➤ Review of Related Literature

Autal et al. (2018) conducted a study to explore uptake of Hepatitis B vaccination among Nigerian healthcare workers. The research design was a cross-sectional survey study that was undertaken in various health care centres on healthcare workers who were selected on the basis of doctors, nurses, laboratory scientists, pharmacists and administrative personnel. The research evaluated the percentage of healthcare workers that was vaccinated against Hepatitis B and determined the factors that affected uptake of the vaccine. Results showed that the level of Hepatitis B infection awareness was generally high although the level of full vaccination among healthcare workers was low as most of the respondents were not vaccinated at all or had partial vaccination. The important factors that were identified as determinants of vaccination uptake were professional cadres, years of practice, perceived occupational risk, vaccine availability and institutional vaccination policies.

The given study is directly connected with the current one since the researchers have studied the topic of Hepatitis B vaccination uptake among healthcare workers as one of the central variables in the current study. It also emphasizes the work risk of healthcare professionals in being infected by Hepatitis B and the importance of personal and organizational factors in determining vaccination behaviour. The results give empirical data on the applicability of vaccination as an imperative preventive measure in health care facilities.

The research has significant limitations with respect to the present research. First, the research was mainly concerned with Hepatitis B vaccination adherence and failed to extensively evaluate Hepatitis B and C prevention practices including the observance of standard precautions, safe injection practices, and the use of personal protective equipment. Second, the research had a wide national orientation and did not present context-oriented understanding of tertiary health facilities in the Federal Capital Territory, Abuja, where institutional policies, availability of resources, and training opportunities can vary considerably. Also, there was a lack of discussion of the combined effect of personal perceptions and behavioral intentions on preventive practices.

The current paper aims to fill these gaps by analysing the Hepatitis B vaccination or Hepatitis B and C preventive measures among the healthcare workers in tertiary health facilities in the FCT Abuja. Combining the vaccination uptake and preventive behaviour assessment with basing the analysis on the well-known behavioral theories, the present study offers a deeper insight into

occupational hepatitis prevention. The results will spawn contextualized evidence to support institutional policies and specific interventions to enhance the rates of vaccination and preventive measures among healthcare professionals.

Atekoja et al. (2025) carried out a research on the variables and coverage of the Hepatitis B virus vaccine among medical workers in a teaching hospital owned by the state of Ogun in Nigeria. The researchers utilized descriptive cross-sectional design and gathered information among the healthcare workers of various professional categories through the structured questionnaire. It was found that, despite a significant percentage of the respondents reported having started taking the Hepatitis B vaccine, there was a very low completion rate of the suggested three-dose schedule. The authors found several barriers to vaccination uptake, including logistical barriers like access to vaccines, distance to vaccination sites, fear of injections, a lack of motivation, and understanding of Hepatitis B vaccine by healthcare workers.

The results of this research add to the realization that availability and access to vaccines is not sufficient to achieve total vaccination, particularly among the healthcare workers who should otherwise be knowledgeable about the health risk in their work. This work will add to the overall discussion of occupational vaccination in healthcare facilities by demonstrating the interaction of personal and system-level factors to affect vaccine-related decisions.

There were various limitations to the scope of the study. This study was limited to a single tertiary institution and hence its contextual validity to other areas like the Federal Capital Territory, Abuja where institutional arrangements and occupational health policies might vary. Moreover, the research was limited to the Hepatitis B vaccination uptake without extending its study to the preventive measures against Hepatitis B and C, including the implementation of standard precautions and protocols on post-exposure, which are vital measures in preventing occupational infections.

This study addresses these limitations by expanding the analytical boundaries, with Hepatitis B vaccination uptake combined with Hepatitis B and C preventive behavior among health workers in various tertiary health facilities in FCT Abuja. The study can offer a more comprehensive view of occupational hepatitis prevention by reviewing preventive practices in conjunction with vaccination behaviour as well as provide evidence to support holistic institutional strategies to protect healthcare workers.

Gadzama et al. (2025) conducted a study to investigate the adoption of Hepatitis B vaccination by the primary healthcare workers in the Federal Capital Territory (FCT), Abuja, Nigeria. It was a facility cross-sectional descriptive survey that surveyed 191 healthcare workers in 58 primary health facilities which comprised of doctors, nurses, laboratory scientists/ technicians, and community health extension workers. The research determined the rate of healthcare workers that had been vaccinated against Hepatitis B and the factors that predicted vaccination acceptance.

The results showed that awareness of the vaccine was high (94.8%), but few had fully received the vaccine, with only 34.6 percent of respondents having taken all three doses recommended. About 35.6 percent were partially vaccinated and 29.8 percent had not received any doses at all. Key determinants that had significant effects on vaccination uptake were occupation (the doctors had 100% uptake in contrast with lower uptake in nurses and CHEWs), gender (females were more likely to be vaccinated), age and years of experience. Other deterrents were identified as structural barriers including, cost of vaccines, accessibility and logistical barriers including long dose schedules were also identified as deterrents.

The present study is related closely to this study because it presents a modern standard of the Knowledge-Practice Gap of the HBV prevention in the same geographical area (FCT, Abuja). It confirms the need to explore wider systemic and behavioral determinants other than just education by pointing out that high awareness (94.8%) does not necessarily imply high uptake (34.6%). Additionally, the fact that the study identified certain high-risk subgroups, including male workers and non-physician workers, is the main justification of the selected sampling method in the current study.

Nonetheless, the study has several limitations to the current research in spite of its contributions. To begin with, the primary workers in healthcare were studied, and no evaluation was conducted on the workers in tertiary health institutions where the exposure intensity and institutional policy might vary. Second, the research was based on self-reported information and recollection of the participants instead of serological analysis (anti-HBsAb) or a vaccination certificate to confirm immunization. Also, although it has found predictors of uptake, it has not done a thorough examination of the long-term effects of these vaccinations in terms of decreasing the real incidence of nosocomial transmission in these particular facilities.

The current research aims to fill these gaps by broadening the area of investigation and possibly incorporating more objective indications of vaccination status where feasible. This study builds on by concentrating on the particular dynamics of the FCT healthcare scene. Gadzama et al.'s findings to provide a more robust understanding of occupational hepatitis prevention. The findings are expected to generate context-specific evidence to inform targeted interventions aimed at achieving the WHO's 2030 elimination targets.

Ahmad et al. (2025) investigated the predictors of Hepatitis B vaccination uptake among healthcare workers in Sokoto State, Nigeria. The study was an analytical cross-sectional survey involving 804 healthcare workers selected from various primary,

secondary, and tertiary health facilities through a multistage sampling technique. The research aimed to determine the vaccination coverage and identify independent factors that influence whether healthcare workers complete their immunization schedule.

Findings from the study revealed a critically low level of protection among the workforce, with only 35.5% of respondents having received at least one dose of the Hepatitis B vaccine. Among those who had started the series, only 51.6% were fully vaccinated with the required three doses. The study identified several significant predictors: positive attitudes toward the vaccine and employer recommendations at the time of employment were strong positive predictors of uptake.

On the other hand, poor knowledge of HBV, working in a facility that is tertiary, and being a health assistant were found to be negative predictors. Lack of institutional advocacy and enforcement of policies was also cited as a significant impediment.

This research is directly relevant to this work since it forms an essential connection between the institutional pressures of employer recommendation in particular, and advocacy and personal vaccination behaviour. Although earlier research tends to pay more attention to the personal level of knowledge, Ahmad et al. (2025) offers empirical data to prove that the organizational cues to action are also crucial. This is in line with the theoretical framework of the present study, which argues that preventive practices of healthcare workers are not only influenced by their own levels of awareness, but also by the structural and policy-driven contexts of the health institution they work in.

Notwithstanding the contributions, the study has significant limitations as compared to the present research. First, the research was carried out in Sokoto State, which has disparate socio-cultural dynamics and healthcare infrastructure with the Federal Capital Territory (FCT), which is the center of the current research, Abuja. Second, the sample employed a multistage sampling at different levels of care, which can attenuate the specifics of tertiary health institutions that are the main focus of the current study as special procedures and increased patient volumes can pose unique occupational risks. The paper also concentrated on the uptake of vaccination as its main outcome but failed to extensively correlate the same with other non-vaccine preventive measures such as the use of safety-engineered devices.

The current paper aims to fill these gaps by reducing its scope to the tertiary healthcare setting in FCT Abuja to enable it to explore in more detail how high-resource settings implement (or do not implement) occupational health policies. This study will apply a more localized and holistic model to enhance both biosafety compliance rates and vaccination rates by specifically focusing on the intersection between the individual perception and specific institutional rigor of the tertiary centers of Abuja.

In a study conducted by Omotowo et al. (2018), the uptake of Hepatitis B vaccination and its determinants in healthcare workers in a tertiary health facility in Enugu, South-Eastern Nigeria were studied. It was a hospital-based cross-sectional survey that was carried out in the University of Nigeria Teaching Hospital (UNTH) on a sample size of 3,132 healthcare workers, comprising of doctors, nurses, pharmacists, laboratory workers, and administrative workers. The research evaluated the rate of healthcare workers that were aware of their HBV status, those vaccinated, and the determinants affecting the vaccination acceptance.

Results showed that there was a wide disparity in occupational health practices with 97.6% of all screened participants being HBV negative but only 51.0% of the negative participants had ever been vaccinated against the Hepatitis B virus

Furthermore, only 48.9% of those vaccinated had completed the full three-dose schedule. Key determinants significantly associated with vaccination uptake included age, professional category, and duration of work in the hospital. Specifically, doctors had higher uptake rates compared to nurses and administrative staff, and the likelihood of being vaccinated increased with both age and years of experience. Major barriers to uptake included a lack of knowledge on where to get the vaccine (47.5%), the long vaccination schedule, and lack of time.

This study is closely related to the present research as it provides empirical evidence from a high-volume tertiary setting, which mirrors the institutional environment of the current study. By including administrative staff alongside clinical personnel, the study broadens the definition of “occupational risk” within a hospital, a perspective that informs the inclusive sampling frame of the present research. Furthermore, the findings highlight that even within a “center of excellence,” institutional barriers like the absence of pre-employment screening and lack of compulsory vaccination policies persist, directly supporting the current study’s focus on the role of institutional policy in shaping worker behaviour.

The research has significant limitations in comparison to the present research. To begin with, the research found obstacles such as lack of time and cost, but failed to delve into the behavioral intentions and the psychological motivation of these answers through a certain theoretical model. Second, the research was done in the South-Eastern part of Nigeria, Enugu, and the results may not be entirely applicable to the Federal Capital Territory (FCT), Abuja, where the socio-economic status of the workforce and the administrative control of the Federal Ministry of Health may cause a variation in the policy environment. Moreover, the research was conducted on Hepatitis B mostly and the preventive measures against Hepatitis C that lacks a vaccine and the only defense is sticking to standard precautions was not addressed.

The current research aims to fill these gaps by looking at both the preventive behaviour of Hepatitis B and C among the healthcare workers in the tertiary institutions in FCT Abuja. This study transcends the descriptive obstacle by using the existing behavioral theories to interpret the data to get a deeper insight into what motivates people to take the vaccine and follow safety requirements. It is hoped that the findings will give the FCT healthcare administration an understanding of these issues in context so as to devise more powerful, compulsory immunization and biosafety initiatives.

➤ *Empirical Review of Related Literature*

The literature reviewed indicates that there is a worrying gap between high awareness levels of Hepatitis B Virus (HBV) and the actual practice of preventive measures, especially full vaccination among healthcare workers (HCWs) in Nigeria. Throughout the different geographical areas of the country, including national surveys (Auta et al., 2018) and regional studies in the North-West (Ahmad et al., 2025), South-East (Omotowo et al., 2018), South-West (Atekoja et al., 2025) and in the FCT (Gadzama et al., 2025).

A generalisation of the determinants found in these studies would suggest that vaccination behaviour is determined by complicated interaction of personal and institutional factors. Personal factors like professional cadres (doctors were always found to have the highest uptake as compared to nurses and community health workers) and years of experience, age, and gender were notable throughout the literature. Nonetheless, more recent literature such as Ahmad et al. (2025) and Atekoja et al. (2025) highlights that institutional factors such as the expense of vaccines, logistical issues of the three-dose regimen, and the lack of institutional or employer-based recommendations are also factors equally, or more potent than individual knowledge.

Although these studies are thorough, there are still a number of gaps that are critical which the present study aims to fill. To begin with, no integrated studies are conducted to investigate both Hepatitis B vaccination and preventive measures against Hepatitis C since there is no vaccine against Hepatitis C, and only the adherence to the standard precautions and personal protective equipment (PPE) can be considered, but, most of the available studies focus nearly entirely on HBV immunization. Second, although a few studies have been carried out in the FCT (Gadzama et al., 2025), they have mainly investigated primary healthcare facilities, which fails to provide insights into the specific high-pressure setting of tertiary health institutions, where the occupational exposure risk is much greater.

➤ *Burden of Hepatitis B and C Infections in the World and the Regions.*

Hepatitis B and C viruses are some of the major causes of morbidity and mortality associated with the liver all over the world. Liver disease is a leading cause of death (two million deaths per year) and is 4 percent of all deaths worldwide, with two-thirds of liver mortality being in men (Devarbhavi et al., 2023). Globally, viral hepatitis is the leading etiological agent in the case of liver disease, but alcohol-related liver disease and non-alcoholic fatty liver disease are emerging as important causes in high-income countries (Devarbhavi et al., 2023).

The disease burden caused by hepatitis B differs significantly between geographical areas, and sub-Saharan Africa has an excessively high disease burden (Issa et al., 2023). Nigeria has the highest burden of hepatitis B infection in Africa with the highest absolute burden in the continent. According to national prevalence estimates, the hepatitis B virus is approximated to infect 8.1-15% of the adult population in Nigeria (Afadapa et al., 2025; Atekoja et al., 2025). Comparatively, hepatitis B is estimated to exist in 3.5% of the global population, which equates to having about 296 million individuals with chronic HBV infection (Aremu et al., 2025).

Hepatitis C virus (HCV) is a virus that infects about 58 million individuals around the world with about 1.5 million new infections every year. In Nigeria, the prevalence of hepatitis C is estimated between 1.1 and 8.4% basing on the population considered and the geographical area (Chikwendu et al., 2023; Ademoyegun and Aremu, 2024). The problem of hepatitis B and C co-infection in Nigeria is complicated by the lack of access to diagnostics, insufficient treatment centers, and the lack of knowledge about viral hepatitis on the part of the population (Clugreanu, 2024).

Maternity-to-child infection is a significant pathway of hepatitis B infection in endemic areas, perinatal children with up to 90 percent of those infected acquiring chronic hepatitis B virus infection (Freeland et al., 2023). Perinatal transmission can be prevented by the administration of hepatitis B birth dose vaccine (HepB-BD) within the first 24 hours after birth and then completing the series of immunizations against hepatitis B (90-100 percent) (Mohammed et al., 2025; Moturi et al., 2018). Nevertheless, the coverage of hepatitis B birth dose in Nigeria is extremely low, and only between 20-33 percent of newborns in the country have received the vaccine within the first 24 hours of birth (Afadapa et al., 2025; Onyekachi, 2025).

➤ *Work-Related Risk of Hepatitis B and C in Health Care Workers.*

Healthcare professionals are a high-risk occupational group in terms of being exposed to blood and body fluids of patients, which puts them at risk of acquiring blood-borne viral infections. Exposure to occupational hazards may happen in different ways such as needle-stick injuries, sharps injuries, mucous membrane exposure, and non-intact-skins contact (Lawson et al., 2025; Auta et al., 2017). World Health Organization estimates that globally about 3 million healthcare professionals get exposed to needle-stick injuries annually, which cause 37 percent of hepatitis B, 39 percent hepatitis C and 4.4 percent of HIV infections in healthcare workers (Lawson et al., 2025).

Research in sub-Saharan Africa has reported occupational exposure to be high among healthcare workers. A meta-analysis of 21 African countries that studied healthcare workers discovered that nearly a half of healthcare workers were occupationally exposed to body fluids every year (Auta et al., 2017). The lifetime prevalence of needle-stick injury among healthcare workers in Africa ranges from 22% to 95%, with one-year prevalence ranging from 39% to 91% (Mossburg et al., 2019; Mengistu et al., 2021). These exposure rates are substantially higher than those reported from high-income countries, reflecting inadequate occupational health and safety infrastructure in resource-limited settings (Rai et al., 2021).

In Nigeria specifically, studies have documented occupational exposure rates ranging from 40.6% to 58.6% among healthcare workers in tertiary health institutions (Lawson et al., 2025; Oyibo et al., 2022). A study conducted in Dakar, Senegal, found that 40.6% of healthcare workers had experienced at least one accidental exposure to blood and body fluids, with a reporting rate of only 42.3% (Lawson et al., 2025). Similarly, research from northern Nigeria reported that 38% of medical waste handlers in a teaching hospital and 28% in a specialist hospital had sustained needle-stick injuries (Obadina et al., 2024).

The prevalence of hepatitis B and C among healthcare workers in Nigeria varies across studies but consistently exceeds rates in the general population. A five-year retrospective study in northern Nigeria found HBV prevalence of 6.6% and HCV prevalence of 6.5% among healthcare workers, compared to 12.6% and 15.2% respectively among patients accessing care at the same facility (Chikwendu et al., 2023). Another study conducted among healthcare workers in Enugu reported an HBV seroprevalence of 2.3%, which the authors noted was relatively low compared to figures from other African countries but still represented significant occupational risk (Ijoma et al., 2021).

Certain categories of healthcare workers face higher exposure risks than others. Surgeons, nurses, laboratory personnel, and midwives experience the highest rates of occupational exposure due to the nature of their work involving invasive procedures and handling of blood specimens (Lawson et al., 2025; Issa et al., 2023). A study in Senegal identified nurses (45.3%), nursing assistants (12.5%), and laboratory technicians (10.9%) as the healthcare worker categories most frequently involved in accidental exposure to blood and body fluids (Lawson et al., 2025).

➤ *Hepatitis B Vaccination Coverage Among Healthcare Workers in Nigeria*

Despite the established occupational risk and the availability of an effective vaccine, hepatitis B vaccination coverage among healthcare workers in Nigeria remains alarmingly low. Multiple studies conducted across different Nigerian states have consistently documented suboptimal vaccination rates, although estimates vary depending on the definition of "full vaccination" (completion of the three-dose series) versus any vaccination (receipt of at least one dose).

A large nationwide survey involving 857 healthcare workers from all six geopolitical zones of Nigeria found that only 42.0% were fully vaccinated against hepatitis B, while 28.9% had received no doses whatsoever (Issa et al., 2023). This national figure masks substantial regional variation, with healthcare workers in the Southeast geopolitical zone demonstrating significantly lower vaccination rates compared to other regions (Issa et al., 2023).

State-level studies reveal even more concerning figures. In a government-owned teaching hospital in Ogun State, only 10.5% of healthcare workers were fully vaccinated, although 62.9% had received at least one dose (Atekoja et al., 2025). Research conducted at the Federal Medical Centre in Keffi found that merely 19.4% of 530 healthcare workers were fully vaccinated, while 72.6% had received at least two doses, indicating high rates of incomplete vaccination (Aremu et al., 2025). Among primary healthcare workers in the Federal Capital Territory, Abuja, vaccination coverage was marginally better, with 34.6% having completed all three doses, 35.6% partially vaccinated, and 29.8% completely unvaccinated (Gadzama et al., 2025).

The pattern of low vaccination coverage extends across different cadres of healthcare workers. At the University of Nigeria Teaching Hospital in Enugu, an institutional study of 3,132 healthcare workers found that only 14.2% had completed hepatitis B vaccination (Omotowo et al., 2018). Among those who had received any doses, 48.9% had completed three doses, 16.0% had received two doses, and 35.1% had received only one dose (Omotowo et al., 2018).

The situation is particularly dire among specific high-risk groups. A study of healthcare workers in Sokoto found that only 40.3% had been vaccinated against hepatitis B, and among those vaccinated, only 56.0% had received the recommended three doses (Hassan et al., 2016). Among healthcare students and trainees who represent the future healthcare workforce vaccination coverage is equally concerning. Research involving healthcare trainees at a Nigerian university revealed that while 92.7% were aware of hepatitis B and 80.8% believed it was vaccine-preventable, only 23.4% had received prior vaccination and a mere 4.6% had completed at least three doses (Onyenemezu et al., 2023).

Comparison with other African countries provides additional context. Healthcare worker vaccination rates in Nigeria are comparable to those in Somalia (25.7% fully vaccinated) (Mohamoud et al., 2025), Sierra Leone (42.3% completed three-dose series) (Lamin-Boima & Gogra, 2025), and Ethiopia (25.6% coverage) (Akibu et al., 2018), but significantly lower than rates achieved in Botswana and some North African countries where coverage exceeds 70% (Moturi et al., 2018).

➤ *Determinants of Hepatitis B Vaccination Uptake Among Healthcare Workers*

The causes of hepatitis B vaccination among healthcare workers are multi-factorial and complicated, with effects on individual, institutional, and systemic levels. These determinants need to be understood to develop effective interventions to enhance vaccine coverage.

• *Individual-Level Determinants Knowledge*

However, contrary to the first ideas, several studies have shown that the level of knowledge does not strongly predict the vaccination uptake in healthcare workers. A cross-sectional survey of 530 healthcare professionals in Nigeria established that knowledge did not significantly affect the vaccine uptake either directly or indirectly ($p=0.21$), contrary to the traditional wisdom that educational intervention is sufficient to increase vaccination rates (Aremu et al., 2025). Other studies have however depicted subtler relationships. A study conducted in Sierra Leone revealed that knowledge of hepatitis B as an occupational risk was almost perfect (96.1%), but only 42.3% of the healthcare workers had vaccinated against hepatitis B fully (Lamin-Boima and Gogra, 2025).

Where there is a correlation between knowledge and vaccination, it seems to work via certain pathways. In Delta state, Nigeria, healthcare workers who had good knowledge of hepatitis B vaccine had higher chances of being vaccinated (AOR=0.404 of poor knowledge as a risk factor of non-vaccination) (Sajini et al., 2025). Likewise, in Somalia, education level also had a significant impact on the vaccination status, with more educated healthcare workers more prone to complete the vaccination schedule (Mohamoud et al., 2025).

✓ *Attitudes:*

Contrarily, to knowledge, the attitude is a robust and consistent factor in predicting vaccination uptake. Nigerian researchers at the FMC Keffi discovered that attitude was a strong predictor of vaccination ($B=9.85$, $p<0.001$), which is many times greater than the impact of knowledge (Aremu et al., 2025). This observation highlights the significance of focusing on beliefs, perceptions and motivation of healthcare workers as opposed to information provision.

The positive attitudes towards vaccination are linked to various factors such as perceived severity of the disease, perceived personal vulnerability, perceived confidence in the vaccine safety and effectiveness, and perceived importance of personal protection (Hassan et al., 2016; Oyibo et al., 2022). On the other hand, attitudes caused by fears of side effects of vaccines, mistrust in pharmaceuticals, or fatalistic attitudes towards the inability to resist the disease are also a substantial obstacle (Mohamoud et al., 2025; Kamran et al., 2025).

✓ *Occupational Exposure History:*

Healthcare workers who have a history of occupational exposure to blood and body fluids show much greater rates of vaccination compared to their unexposed co-workers. A study conducted at FMC Keffi has determined that occupational exposure had a strong impact on adherence to vaccination ($2=33.00$, $p=0.001$), and none of the unexposed healthcare workers were fully vaccinated (Aremu et al., 2025). This trend implies that the first-hand experience of risk increases the desire to be protected, yet it also implies that there is a loss of protection opportunities before the exposure to risk.

✓ *Risk Perception:*

Perceived risk of being infected with hepatitis B is a key driver to vaccination. Healthcare providers that believed they were at a greater risk than the general population reported a higher rate of vaccination (Hassan et al., 2016). In a study conducted in south-south Nigeria, good perception of the risk of bloodborne infections led to 93% higher odds ($OR=1.93$) of getting at least one dose of hepatitis B vaccine among healthcare workers (Oyibo et al., 2022). But, precise risk perception is not universal. Although healthcare facilities operate in high-risk settings, some healthcare workers do not feel vulnerable and thus lack motivation to vaccinate (Kamran et al., 2025).

• *Sociodemographic Determinants Age*

Age and vaccination status show consistent patterns in relation to age in several studies. Healthcare workers of older ages are much more prone to vaccination compared to their younger counterparts. A study conducted by Zaria, Nigeria, discovered that the age had a positive relationship with vaccine uptake ($OR=1.30$, 95% CI: 1.08-1.59, $p<0.001$), and older healthcare workers were more likely to undertake the full course of vaccination (Ahmad et al., 2025). Vaccination uptake among the University of Nigeria Teaching Hospital, Enugu, improved with age (AOR=1.30, 95% CI: 1.08-1.59, $p<0.001$) (Omotowo et al., 2018). Such an age trend can be explained by a cumulative exposure to occupational health education, more career investment or a higher risk perception with increased occupational exposure.

Yet, the correlation is not purely linear. In FCT Abuja primary healthcare facilities there were studies that found that non-vaccination was significantly linked with healthcare workers aged below 25 years (Issa et al., 2023; Gadzama et al., 2025), and a study in Ghana found that the maternal age affected the pattern of uptake of the birth dose vaccines (Mohammed et al., 2025).

✓ *Gender:*

Gender shows many complicated and even opposite relationships with the vaccination status. Other studies indicate that there is a greater percentage of female healthcare workers who are vaccinated. In Kaduna State, a study discovered that female sex was an independent predictor of full-dose hepatitis B vaccination coverage (AOR=2.28, 95% CI: 1.15-4.52, $p<0.05$) among public safety workers (Ochu & Beynon, 2017). The FMC Keffi study also revealed that gender also moderated the attitude-uptake relationship, with females demonstrating more positive attitudes-vaccination behavior relationships (Aremu et al., 2025).

Other studies, on the other hand, discover female gender as a hindrance. Healthcare workers in Delta State who were female had lower vaccination coverage compared to males (Sajini et al., 2025). These inconsistent results indicate that gender influences are probably conditionalized by the contextual aspects like professional role, access to service, or cultural norms that differ in terms of settings.

✓ *Professional Category:*

Professional designation comes out as one of the most robust predictors of the vaccination status. Physicians always have a greater vaccination rate compared to nurses and other groups of healthcare workers. The nationwide Nigerian survey found that being a nurse (AOR=2.346, 95% CI: 1.446-3.808, $p=0.010$) or health attendant (AOR=9.225, 95% CI: 4.532-18.778, $p=0.010$) were significant risk factors for non-vaccination compared to being a doctor (Issa et al., 2023).

This trend was supported by research in Delta state, which found nurses to be much less vaccinated than doctors (AOR=0.228, 95% CI: 0.071-0.737) (Sajini et al., 2025). In the University of Nigeria Teaching Hospital, uptake of hepatitis B vaccination was less among nurses than doctors (AOR=0.78, 95%CI=0.54-0.98, $p=0.037$) (Omotowo et al., 2018). Similar studies in Zaria found that nursing was also a predictive factor of low vaccination (OR=0.78, 95% CI: 0.54-0.98, $p=0.037$) (Ahmad et al., 2025). This professional gradient likely reflects differential access to health education, varying levels of occupational health awareness, different work schedules that may facilitate or hinder access to vaccination services, and potentially different institutional attitudes toward various healthcare worker categories.

✓ *Years of Service:*

Duration of healthcare employment shows positive correlation with vaccination uptake. Healthcare workers with more than two years of service demonstrated increased vaccination rates (OR=1.19, 95% CI: 1.09-1.32, $p=0.032$) (Ahmad et al., 2025). At the University of Nigeria Teaching Hospital, vaccination uptake increased with increasing duration of work in the hospital (AOR=1.19, 95% CI: 1.09-1.32, $p=0.032$) (Omotowo et al., 2018). Research in FCT Abuja primary healthcare facilities confirmed that years of experience were significant influencers of vaccine uptake (Gadzama et al., 2025).

✓ *Education Level:*

Higher educational attainment consistently correlates with improved vaccination coverage. Healthcare workers with tertiary education demonstrated approximately twice the odds of being vaccinated compared to those with less education (AOR=1.96, 95% CI: 0.76-5.07, $p=0.164$) (Omotowo et al., 2018). Studies in Somalia found that educational level and professional specialization significantly influenced vaccination status, with more educated healthcare workers demonstrating higher completion rates (Mohamoud et al., 2025).

• *Institutional and Systemic Barriers Vaccine Availability*

The single most frequently cited barrier to hepatitis B vaccination among Nigerian healthcare workers is lack of vaccine availability. Studies consistently report that 41.2% to 51.1% of unvaccinated healthcare workers cite vaccine unavailability as the primary obstacle (Atekoja et al., 2025; Mohamoud et al., 2025). In Somalia, healthcare workers in facilities without vaccine availability were 4.1 times more likely to be unvaccinated (aOR=4.1, 95% CI: 2.56-6.56, $p<0.001$) (Mohamoud et al., 2025).

In Nigeria, a study in Yobe State found that 39.56% of unvaccinated healthcare workers cited lack of vaccine availability as the main reason for non-vaccination, followed by not knowing where to access the vaccine (20.88%) (Dayyab et al., 2020). Research in Rivers State identified vaccine unavailability (42.1%) and lack of knowledge of where to get vaccinated (26%) as the top two barriers (Abere et al., 2025).

✓ *Cost:*

Financial constraints represent another substantial barrier, particularly in settings where vaccination is not provided free of charge to healthcare workers. Between 10.8% and 48% of healthcare workers in different Nigerian studies identified the cost of the vaccine as a barrier to uptake (Atekoja et al., 2025; Omotowo et al., 2018). In the study at University of Nigeria Teaching Hospital, 48% of healthcare workers who had not been vaccinated cited cost as the primary reason (Omotowo et al., 2018). Cost barriers are particularly pronounced in the private healthcare sector and among lower-paid healthcare worker categories (Ogundele & Omotosho, 2020).

✓ *Time Constraints and Busy Schedules:*

The demands of healthcare work create significant logistical barriers to vaccination. Studies report that 20.6% to 48.1% of healthcare workers cite busy work schedules or lack of time as reasons for non-vaccination (Onyenemezu et al., 2023; Durando et al., 2016). The long vaccination schedule (three doses over six months) compounds this challenge, with 35.1% of healthcare workers in one study citing the prolonged vaccination schedule and lack of time as barriers (Omotowo et al., 2018).

✓ *Distance to Vaccination Centers:*

Geographic accessibility affects vaccination uptake, with 24% to 74.2% of healthcare workers in different studies reporting distance to vaccination centers as a barrier (Atekoja et al., 2025). This barrier is particularly pronounced for healthcare workers in primary healthcare facilities or rural settings who may need to travel to tertiary centers to access vaccination services (Gadzama et al., 2025).

✓ *Lack of Mandatory Vaccination Policies:*

The absence of institutional policies requiring hepatitis B vaccination for healthcare workers represents a critical systemic gap. Healthcare workers in facilities without mandatory vaccination policies were 1.75 times more likely to be unvaccinated (aOR=1.75, 95% CI: 1.12-2.71, p=0.012) (Mohamoud et al., 2025). Nigeria, like many other sub-Saharan African countries, has no clear national policy on mandatory vaccination of healthcare workers against vaccine-preventable diseases (Ogundele & Omotosho, 2020). This policy vacuum contributes substantially to poor vaccination uptake and coverage (Ogundele & Omotosho, 2020).

✓ *Training and Awareness:*

While training on infection prevention was associated with increased vaccination (OR=1.25, 95% CI: 1.06-1.49), many healthcare workers lack access to such training (Oyibo et al., 2022). In Ethiopia, attending infection-prevention training was significantly associated with higher vaccination uptake (Akibu et al., 2018). The absence of systematic training programs on occupational health risks and prevention strategies perpetuates low vaccination coverage.

➤ *Knowledge and Attitudes Toward Hepatitis B and C*

Healthcare workers' knowledge about hepatitis B and C demonstrates significant variability, with notable gaps persisting despite generally high awareness of these diseases. Understanding the specific domains of knowledge and associated attitudes is crucial for designing targeted educational interventions.

• *Knowledge Domains*

Disease Awareness and Transmission: Studies consistently report that the majority of healthcare workers are aware of hepatitis B and C as communicable diseases. In Rivers State, Nigeria, 96% of doctors were aware that viral hepatitis B is preventable (Abere et al., 2022). Among healthcare trainees in Nnewi, 92.7% were aware of HBV, 47% knew it was common in Nigeria, and 80.8% believed it was vaccine-preventable (Onyenemezu et al., 2023). Similarly, research in Sokoto found that 86.3% of healthcare workers demonstrated good knowledge of HBV infection (Hassan et al., 2016).

However, knowledge gaps exist in specific areas. In Rivers State, 46% of doctors erroneously believed that vaccination exists against hepatitis C virus, and only 50% were aware of the availability of cure for hepatitis C infection (Abere et al., 2022). Merely 16% of doctors knew about drugs used for hepatitis C treatment (Abere et al., 2022). Knowledge regarding transmission routes is generally good for blood transfusion and needle-stick transmission but poor for other modes such as sexual transmission and vertical transmission (Clugreanu, 2024).

✓ *Vaccine Knowledge:*

Knowledge specifically about the hepatitis B vaccine demonstrates concerning gaps. Only 44.51% of healthcare workers in Yobe State had good knowledge of hepatitis B vaccine despite 82.97% having good knowledge of HBV disease (Dayyab et al., 2020). In Delta State, 78.0% of healthcare workers had good knowledge about the hepatitis B vaccine (Sajini et al., 2025). The discrepancy between disease knowledge and vaccine knowledge suggests that educational programs may focus inadequately on vaccination as a preventive measure.

Critical knowledge gaps include misconceptions about vaccination recommendations, vaccine schedules, and contraindications. Some healthcare workers believe that only high-risk individuals need vaccination, or that vaccination can be delayed until after occupational exposure occurs, missing opportunities for primary prevention (Hassan et al., 2016).

✓ *Risk Awareness:*

Most healthcare workers recognize their elevated occupational risk. The nationwide Nigerian survey found that 83.8% of healthcare workers knew they were at increased risk of being infected through their work, and 72.2% knew that HBV infection carries a high risk of liver cancer in later life (Issa et al., 2023). In Sokoto, 92.7% of healthcare workers perceived themselves to be at higher risk compared to the general population (Hassan et al., 2016).

However, risk perception does not always translate to preventive action. Despite high awareness of risk, substantial proportions of healthcare workers remain unvaccinated, indicating a disconnect between knowledge, risk perception, and protective behavior (Issa et al., 2023; Hassan et al., 2016).

- *Attitudes and Beliefs*

Healthcare workers' attitudes toward hepatitis B vaccination range from highly positive to significantly negative, with various belief systems influencing vaccination decisions.

- ✓ *Positive Attitudes:*

Many healthcare worker's express positive attitudes toward vaccination, recognizing its importance for personal protection and public health. Studies have documented that healthcare workers who perceive hepatitis B as a serious disease threat, believe in vaccine efficacy, and consider vaccination a professional responsibility demonstrate higher uptake rates (Aremu et al., 2025; Oyibo et al., 2022).

- ✓ *Negative Attitudes and Concerns:*

Several specific concerns contribute to vaccine hesitancy among healthcare workers. Fear of side effects is commonly cited, with 29.0% to 48% of healthcare workers expressing concerns about vaccine safety and adverse effects (Atekoja et al., 2025; Mohamoud et al., 2025). Some healthcare workers express distrust in vaccine manufacturers or government vaccination programs, believing that financial interests rather than public health drive vaccination recommendations (Kamran et al., 2025).

Fatalistic beliefs also influence attitudes, with some healthcare workers believing that if they are destined to be infected, vaccination will not prevent it, or conversely, that they are not susceptible regardless of vaccination status (Hassan et al., 2016). Lack of interest or motivation accounts for 24.4% to 30% of reasons for non-vaccination among healthcare workers in different studies (Onyenemezu et al., 2023).

- *Preventive Practices and Infection Control*

Beyond vaccination, adherence to standard precautions and infection control practices is crucial for preventing hepatitis B and C transmission in healthcare settings. However, studies consistently demonstrate significant gaps between healthcare workers' knowledge of infection control principles and their actual practices.

- *Standard Precautions Knowledge and Practice*

Research in northern Nigeria found that 87.9% of healthcare workers correctly identified hand washing as the most effective method to prevent healthcare-associated infections, with nurses demonstrating better knowledge (91%) than doctors ($p=0.001$) (Iliyasu et al., 2016). The majority of healthcare workers agreed that avoiding injury with sharps (86%), use of barrier precaution (90%), and hand hygiene (92%) effectively prevent healthcare-associated infections (Iliyasu et al., 2016).

Despite this high theoretical knowledge, actual practice reveals concerning gaps. Only 52% of doctors and 76% of nurses always practice hand hygiene between patient care encounters (Iliyasu et al., 2016). A multi-site comparative study across primary, secondary, and tertiary health facilities in Edo State found that only 29.5% of healthcare workers demonstrated good overall standard precautions practices (Ehimen, 2025). This poor adherence to standard precautions places both healthcare workers and patients at significant risk of infection transmission.

- *Personal Protective Equipment Use*

The use of personal protective equipment (PPE) demonstrates variable adherence across studies and healthcare worker categories. In Edo State, personal protective equipment (hand gloves) were worn consistently during patient care by 66.9% of healthcare workers in primary health care facilities, compared to 51.2% in secondary healthcare facilities and 65.2% in tertiary healthcare facilities (Ehimen, 2025). However, 20% of healthcare workers in Rivers State reported that disposable gloves were not readily available for use (Abere et al., 2022), highlighting supply-side challenges that compromise infection control practices.

A study among dental healthcare workers in Zamfara State found that while the majority recognized the importance of PPE, gaps existed in consistent application of hand washing techniques and proper PPE use (Abubakar et al., 2025). The overall knowledge about infection prevention and control among dental auxiliaries was poor (49.2%), although attitude was good (81.3%) and practice was fair (68.6%) (Abubakar et al., 2025).

- *Sharps Object Handling and Disposal*

Unsafe sharps handling practices persist despite known risks. A study in northern Nigeria found that 53.5% of healthcare workers reported recapping needles after use a practice strongly discouraged due to high risk of needle-stick injury (Chikwendu et al., 2023). Only 29.28% of healthcare workers dropped needles in sharps containers immediately after use, and 21.4% admitted to reusing needles (Chikwendu et al., 2023). These practices substantially increase the risk of occupational exposure and subsequent infection with bloodborne pathogens.

Needle recapping has been identified as one of the most common causes of needle-stick injuries, accounting for 33.33% of such injuries in one study (Mittal et al., 2025). Despite this well-established risk, recapping behavior persists, with 43.8% of healthcare workers in Senegal reporting needle recapping after intravenous or intramuscular injection (Lawson et al., 2025). The persistence of this unsafe practice despite education efforts suggests that behavioral change requires more than knowledge transmission alone.

- *Hand Hygiene*

Hand hygiene compliance rates vary widely across studies. While 92% of healthcare workers recognize hand hygiene as effective in preventing healthcare-associated infections (Iliyasu et al., 2016), actual compliance rates are substantially lower. In northern Nigeria, 36.9% of healthcare workers did not practice regular hand washing (Chikwendu et al., 2023). Research examining infection control practices found that healthcare workers demonstrate significantly better theoretical knowledge than practical adherence to hand hygiene protocols (Iliyasu et al., 2016).

The gap between knowledge and practice is particularly concerning given that hand hygiene represents one of the simplest and most cost-effective infection control measures. Barriers to optimal hand hygiene include inadequate water supply, lack of soap and hand sanitizers, time pressure during busy clinical hours, and skin irritation from frequent washing (Ehimen, 2025).

- *Occupational Exposure and Post-Exposure Management*

Occupational exposure to blood and body fluids remains common among Nigerian healthcare workers. Studies report that 40.6% to 58.6% of healthcare workers have experienced at least one accidental exposure to blood and body fluids (Lawson et al., 2025; Oyibo et al., 2022). The most feared infections following exposure are HIV (89.1%), hepatitis B (84.3%), and hepatitis C (35.4%) (Lawson et al., 2025).

Critically, only 42.3% of healthcare workers report occupational exposures when they occur (Lawson et al., 2025). Underreporting represents a major challenge for occupational health surveillance and prevents timely access to post-exposure prophylaxis. Knowledge about appropriate first aid measures following needle-stick injury is inadequate, with only 70.25% of healthcare workers knowing the recommended first aid components (Mittal et al., 2025).

- *Overall Preventive Practice Scores*

Comprehensive assessments of infection control practices reveal that approximately 60% of healthcare workers in northern Nigeria had good overall preventive practices for viral hepatitis (Chikwendu et al., 2023). However, this figure indicates that 40% demonstrate inadequate practices, placing themselves and patients at risk. In Edo State, only 29.5% of healthcare workers across all facility levels demonstrated good standard precautions practices (Ehimen, 2025), suggesting that poor infection control is widespread rather than isolated to specific facilities or regions.

The prevalence of hepatitis B and C among healthcare workers (6.6% for HBV and 6.5% for HCV in one study) (Chikwendu et al., 2023) reflects the consequences of inadequate preventive practices combined with suboptimal vaccination coverage. These infection rates among healthcare workers exceed those in many other occupational groups and underscore the urgent need for comprehensive occupational health programs.

➤ *Theoretical Frameworks*

Understanding vaccination behavior among healthcare workers requires application of health behavior theories that explain how knowledge, attitudes, beliefs, and contextual factors interact to influence health-related decisions. Several theoretical models have been applied to understand vaccine hesitancy and uptake.

- *The Health Belief Models*

The Health Belief Model, developed by Rosenstock (1966) and expanded by Becker (1974), provides a foundational framework for understanding hepatitis vaccination uptake and preventive practices among HCWs. Health belief Model posits that vaccination behavior is influenced by perceived susceptibility to disease, perceived severity of disease consequences, perceived benefits of vaccination, perceived barriers to vaccination, cues to action, and self-efficacy (Aremu et al., 2025). Studies among healthcare workers demonstrate that these constructs operate as expected, with higher perceived susceptibility and severity associated with greater vaccination intention and uptake (Oyibo et al., 2022). However, perceived barriers particularly structural barriers such as cost and availability often outweigh perceived benefits in determining actual vaccination behavior (Atekoja et al., 2025).

- *The Theory of Planned Behavior*

Ajzen's (1991) Theory of Planned Behavior extends understanding of intentional health behaviors through three core constructs. Planned behavior theory emphasizes the roles of attitudes, subjective norms, and perceived behavioral control in shaping intentions and behaviors. Research has shown that healthcare workers' attitudes toward vaccination (rather than their knowledge) are the strongest predictors of vaccination behavior (Aremu et al., 2025). Subjective norms particularly the attitudes of peers and

supervisors also influence vaccination decisions, with healthcare workers more likely to vaccinate when they perceive vaccination as normative within their professional community (Oyibo et al., 2022).

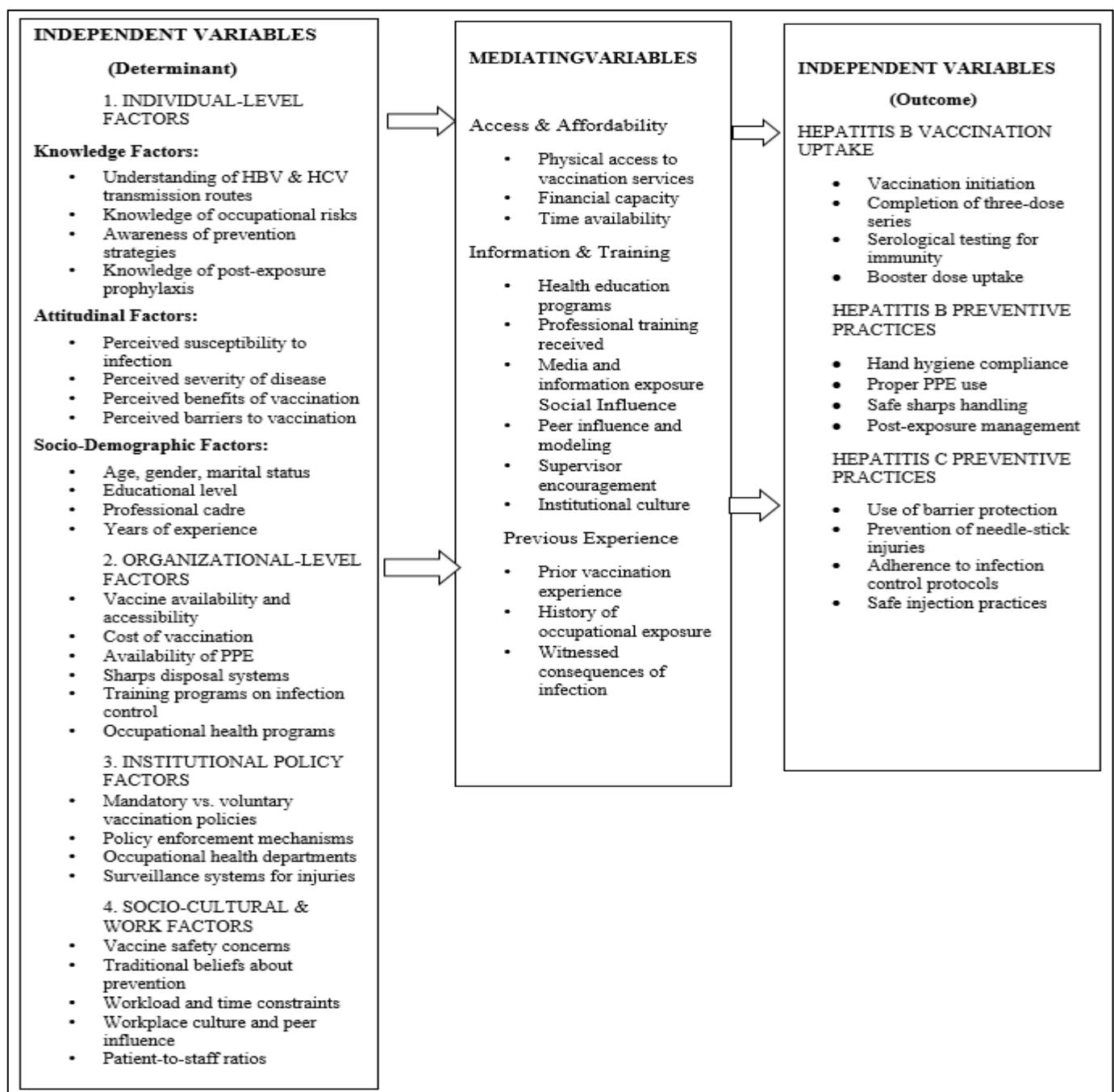
• *The Social Ecological Model*

The model acknowledges several layers of health behavior determinants, including individual, interpersonal, organizational, community, and policy (Naidoo et al., 2023). The framework is especially helpful to comprehend the complicated determinants of vaccination in healthcare workers, where individual knowledge and attitudes interact with institutional policies, availability of resources, and the overall nature of the healthcare system (Naidoo et al., 2023).

The implementation of the theoretical frameworks emphasizes that to enhance vaccination coverage, there should be multilevel interventions that include addressing individual beliefs and knowledge, institutional obstacles and facilitators, and policy environments (Aremu et al., 2025; Mohamoud et al., 2025).

➤ *Conceptual Framework*

The conceptual framework for this study integrates multiple determinants that influence hepatitis B vaccination uptake and preventive practices among healthcare workers (HCWs).



- *Individual-Level Factors*

Healthcare workers' understanding of hepatitis B and C transmission routes, occupational risks, and prevention strategies significantly influences their vaccination uptake and adherence to preventive practices (Abdela et al., 2016). Knowledge gaps regarding viral hepatitis epidemiology and post-exposure prophylaxis have been documented as barriers to protective behaviors among HCWs in sub-Saharan Africa (Tatsilong et al., 2016). Perceived susceptibility to hepatitis infection and perceived severity of the disease are critical determinants of preventive behaviors (Dannetun et al., 2006). HCWs who underestimate their occupational risk are less likely to complete vaccination series or consistently adhere to standard precautions (Prüss-Üstün et al., 2005). Age, gender, years of clinical experience, professional cadre, and educational level influence vaccination uptake patterns (Azodo et al., 2010). Studies indicate that younger HCWs and those with higher educational qualifications demonstrate better vaccination compliance (Attaullah et al., 2011).

- *Organizational-Level Factors*

The presence of workplace vaccination programs, vaccine supply continuity, and cost considerations directly impact vaccination completion rates (Kubba et al., 2013). In resource-limited settings like Nigeria, vaccine stockouts and out-of-pocket expenses create significant barriers (Sadoh et al., 2011).

Availability of personal protective equipment (PPE), functional sharps disposal systems, post-exposure prophylaxis protocols, and infection control policies constitute the structural foundation for preventive practices (Trim & Elliott, 2003). Inadequate safety infrastructure has been consistently associated with poor adherence to universal precautions (Yakubu et al., 2018). Regular training on infection prevention and control, including hepatitis vaccination benefits and standard precautions, enhances HCWs' protective behaviors (Hauri et al., 2004). Institutions with robust occupational health programs demonstrate higher vaccination coverage (Singhal et al., 2009).

- *Institutional Policy Factors*

Healthcare institutions with mandatory hepatitis B vaccination policies achieve significantly higher coverage rates compared to those with voluntary programs (Hussain et al., 2017). However, policy implementation and enforcement mechanisms determine actual effectiveness (Samuel et al., 2009). The presence of dedicated occupational health departments, surveillance systems for needlestick injuries, and employee health monitoring programs influence both vaccination uptake and preventive practice adherence (Askarian et al., 2011).

- *Socio-Cultural and Environmental Factors*

Concerns about vaccine safety, side effects, and traditional beliefs regarding disease prevention affect acceptance of hepatitis B vaccination (Abdulraheem et al., 2012). Misconceptions about vaccine efficacy and duration of protection create hesitancy among HCWs. High patient-to-staff ratios, time pressure, and emergency situations compromise adherence to preventive practices despite adequate knowledge (Yazdanpanah et al., 2014). Workplace stress and burnout negatively impact safety compliance (Bekele et al., 2015). Observational learning and workplace culture regarding infection prevention significantly influence individual behaviors (Adefolalu et al., 2014). Positive peer modeling enhances adherence to standard precautions and vaccination uptake.

- *Outcome Variables*

Hepatitis B Vaccination Uptake is Measured through vaccination initiation, completion of three-dose series, and serological testing for immunity confirmation. Assessed through compliance with hand hygiene, proper PPE use, safe sharps handling, appropriate waste segregation, and post-exposure management protocols.

➤ *Gaps in Current Literatures*

Although there has been substantial research on hepatitis B vaccination and preventive measures among healthcare workers in Nigeria, there have been a number of crucial gaps. To begin with, the majority of the currently available research is cross-sectional which constrains the knowledge of the temporality and causality of determinants and vaccination uptake. Longitudinal research is required to assess the dynamics of vaccination behavior over time and interventions and the literature reports low vaccine coverage, with few studies rigorously testing interventions to enhance uptake. Research on the best-evidence strategies to boost vaccination among Nigerian healthcare workers is still limited (Ogundele & Omotosho, 2020). There is a need to conduct studies that test multicomponent interventions that can be used to address both individual and systemic barriers.

Studies that are specifically based on the Federal Capital Territory, Abuja in particular are scarce. Although FCT is the administrative capital of Nigeria and has a relatively better health infrastructure compared to most states, there is little detailed information on the vaccination coverage and determinants among healthcare workers in tertiary institutions, which are located in FCT (Gadzama et al., 2025). Since FCT has its peculiarities and can be taken as an example of other areas, the targeted research in this context is justified because most of the studies include the status of vaccination as a dichotomy (vaccinated and unvaccinated) without paying sufficient attention to the crucial problem of incomplete vaccination. The prevalence of studies that report that 72.6% of healthcare workers got at least two doses but only 19.4% got all three doses (Aremu et al., 2025) underscore the need to study the differences in vaccination coverage and determinants among the entire range of healthcare worker groups. The majority of

research is directed to doctors and nurses, and little is done to study laboratory staff, allied health professionals, and support staff that are also at risk of occupational exposure (Issa et al., 2023).

Lastly, the interaction between the two aspects of occupational health protection and vaccination status and how the two variables relate to each other has not been comprehensively studied. Knowledge about the effectiveness of vaccinated healthcare workers in terms of improved or worse compliance with standard precautions may guide specific interventions.

CHAPTER THREE

METHODOLOGY

➤ *Study Area*

The study was conducted in the federal capital territory (FCT), Abuja. The FCT which is centrally located in Nigeria and serves as many administrative and political offices. It is characterized by a heterogeneous population from diverse ethnic, cultural, and socio-economic backgrounds, comprising both urban and semi urban settlement.

The federal capital territory is made up of six Area councils, Abuja municipal Area council (AMAC), Bwari, Gwagwalada, Kuje, Abaji, and Kwali. This territory hosts a wide range of healthcare facilities, including primary health centres, secondary hospitals, private clinic and tertiary health institutions. These facilities provide various health services, including immunization, disease surveillance and preventive health programs, making the area relevant for studies focusing on infectious disease prevention such as hepatitis B and C.

The selected tertiary health institutions for this study are one of the major referral centers in the FCT, offering specialized health care services and employing a large number of HealthCare workers across different professional cadre. The institutions serve patient from within the FCT and neighboring states, thereby reflecting a broad patient and workforce populations. This makes it an appropriate setting for assessing hepatitis vaccination uptake and preventive practices among healthcare workers.

➤ *Study Design*

A mixed-method study design was employed for this research. This design combined quantitative surveys with qualitative interviews, offers significant advantage for researching hepatitis B vaccination uptake and hepatitis B & C preventive practices among healthcare workers in tertiary health institution. The mixed method design provided a comprehensive understanding that bridges the gap between measuring how many people practice prevention and understand why they do or not (Manmeet Kaur, 2016).

➤ *Population of the Study*

The study population comprised health workers residing in federal capital territory, Abuja, Nigeria.

• *Inclusion Criteria*

- ✓ Individuals in tertiary health institution
- ✓ Residents of federal capital territory, Abuja
- ✓ Willingness to provide informed consent to participate in the study
- ✓ Having at least one-year experience

• *Exclusion Criteria*

- ✓ Tertiary Health worker with severe health conditions that limit their ability to participate in the study
- ✓ Individuals who are unable to communicate in English

➤ *Sample Size Determination*

The sample size (n) for the study population was determined using Cochran's formula for sample size calculation, which is widely applied in health research (Smith et al., 2023).

$$n = \frac{Z^2 \times P \times q}{d}$$

Where:

n = Minimum sample size

z = The normal standard deviation at 95% Confidence Interval (C.I.) = 1.96

p = Proportion of hepatitis B uptake and its determinant from previous studies = 0.142 (Omotowo et al 2023)

q = Proportion of parents not willing to consent (1-p) = 1 - 0.142 = 0.58

d = Margin of error at 95% C.I. = 0.05

Calculation:

$$n = \frac{1.96^2 \times 0.142 \times 0.858}{0.05^2}$$

$$n = \frac{3.8416 \times 0.142 \times 0.58}{0.0025}$$

$$n = \frac{0.3164}{0.0025}$$

$$n = 127$$

Therefore, the minimum sample size required for this study is 127 respondents (rounded up to account for 10% non-response rate):

$$n_{final} = n \times (1 + non - response\ rate)$$

$$n_{final} = 127 \times (1 + 0.1)$$

$$n_{final} = 139$$

➤ Sampling

A multi-stage sampling technique was employed to select the study participants.

In the first stage, two (2) Area council were selected from the six (6) Area council in the federal capital territory (FCT), Abuja using simple random sampling. This shall be done to ensure fair representation of the FCT.

In the second stage, one (1) tertiary health institution was selected from each of the selected Area councils using sampling random sampling by balloting.

In the third stage, health care workers in each selected tertiary health institution were stratified into professional categories such as, doctors, nurses, laboratory scientists, pharmacists, and other allied health workers. The stratification was done ensuring representation of all cadres of health care workers.

In the fourth stage, systematic random sampling was used in selecting respondents from each professional category. The list of all professional cadres from their respective unit/department was determined. This formed the sampling frame. Sampling interval was determined by dividing the total number of healthcare workers in each category by the required sample size. A random starting point was choosen using random table of numbers, after which every nth healthcare worker was selected until the desire sample size was achieved.

➤ Data Collection Instruments and Procedures

• Development of the Questionnaire

Data was collected using a close-ended structured administered questionnaire and a semi-structured interviews. The questionnaire was adapted from validated instruments used in previous studies on uptake of hepatitis B Vaccination and it determinant among health care workers.

The questionnaire was designed to be self-administered manually. The questionnaire was divided into three main sections:

✓ Section A: Sociodemographic Data of Respondents

Age, occupation, educational level, marital status, number of children, household monthly income, and residential location

✓ Section B: Knowledge of Hepatitis B and C

Consists of 15 multiple-choice and true/false questions assessing knowledge on: what Hepatitis is, modes of transmission, benefits of Hepatitis vaccination, recommended age for vaccination, and vaccine safety

✓ Section C: Hepatitis B Vaccination History

Consists of 4 multiple-choice and true/false questions assessing hepatitis B vaccination history.

✓ *Section D: Determinant of Vaccine Uptake*

Consist of 6, (5 likert scale agree, strongly Agree, Disagree, Strongly Disagree Neutral)

✓ *Section E: Preventive practices toward hepatitis B & C*➤ *Qualitative Data Collection Methods*• *In-Depth Interviews (IDIs)*

Healthcare workers were interviewed in-depth to discuss their personal experience, perception, and practice about Hepatitis B vaccination and Hepatitis B and C preventive measures. IDIs gave the participants the chance to speak freely and extensively about their opinions.

• *Key Informant Interviews (KIIs)*

The interviews were carried out as key informants who occupy strategic positions in the health institutions, including the hospital administration staff, infection prevention and control officers, and occupational health staff. These interviews were aimed at institutional policy, access to vaccines and protection equipment, implementation of infection control measures, and a systemic obstacle to vaccination and preventive measures.

• *Pretesting of the Questionnaire*

A pretest of the questionnaire was carried out using 14 respondents (10% of the eventual sample of 139) in masaka, which has similar sociodemographic characteristics to FCT. Pretest was done in one week period in order to detect ambiguous questions, time to complete the questionnaire and test the functionality of the questionnaire. Some slight changes were done to enhance clarity and flow of questions according to pretest responses.

➤ *Data Collection*• *Data Collectors and Training*

The data were gathered using trained research assistants who included six (6) community health extension workers (CHEWs) who have experience on community-based surveys. These research assistants were selected based on their knowledge of the study communities and fluency in local languages.

The research assistants were taken through a three-day intensive training workshop on:

- ✓ Day 1: participant rights, informed consent procedures, research ethics and confidentiality.
- ✓ Day 2: Issue of questionnaire and use of self administered and data quality assurance measures.
- ✓ Day 3: Hands-on field test and troubleshooting.

The training was conducted at a rate of 6 hours per day (9:00 AM - 12:00 PM and 1:00 PM - 4:00 PM). Every research assistant had to prove that he or she was competent in questionnaire administration and technical skills prior to going to the field.

• *Data Collection Procedures*✓ *Qualitative*

Data collection was conducted over a period of four weeks. Research assistants visited selected tertiary health institution with a list of eligible respondents and conducted face-to-face interviews in a private setting to ensure confidentiality. Interviews were scheduled at convenient times and locations within the health facilities to minimize disruption of participants' duties. Each interview shall last approximately 20 to 30 minutes and will be conducted in English. With participants' consent, interviews shall be audio-recorded and supplemented with field notes to capture non-verbal cues and contextual observations. Before each interview, research assistants explained the purpose of the study and obtained written informed consent from participants.

The semi structure interview guide shall comprise open-ended questions organized into thematic areas, including:

- Knowledge and understanding of Hepatitis B and C
- Perceived occupational risk and disease severity
- Attitudes toward Hepatitis B vaccination
- Personal vaccination experiences
- Institutional policies and support systems
- Preventive practices and infection control measures
- Barriers and facilitators to vaccination and preventive practices

✓ *Quantitative*

Data was collected using self-administered questionnaire for the quantitative study. Research assistants maintained both paper backup copies of informed consent forms. Daily data quality checks were performed to identify incomplete responses or inconsistencies, and research assistants were asked to make clarifications where necessary.

➤ *Data Management*

• *Measurement of Variables*

Independent Variables:

- ✓ Sociodemographic characteristics: Age, occupation, educational level, marital status, number of children, household income
- ✓ Source of health information: Healthcare providers, media, family members, friends, educational institutions
- ✓ Dependent Variables: Vaccination uptake and preventive practices.

• *Data Analysis*

✓ *Quantitative Analysis*

Audio recordings from interviews were transcribed verbatim. The transcripts were carefully reviewed for accuracy and completeness before analysis. Data were analyzed using thematic analysis, following these steps:

- Familiarization with the data through repeated reading of transcripts
- Generation of initial codes
- Identification and development of themes
- Review and refinement of themes
- Interpretation and synthesis of findings

The analysis was guided by the study's conceptual and theoretical frameworks, allowing for the identification of individual, organizational, and institutional determinants of vaccination uptake and preventive practices.

✓ *Quantitative Analysis*

Data was clean and checked for errors before analysis. Missing values were identified and investigated. Any questionnaires with more than 20% missing data were excluded from analysis. Data validation checks included range checks, consistency checks, and logical consistency between related variables (smith et al 2023).

Data analysis was conducted using IBM SPSS Statistics version 26.0. The analysis was carried out at three levels:

▪ *Univariate Analysis:*

Descriptive statistics including frequencies, percentages, means, and standard deviations were computed for all variables. Data was presented using tables and charts showing the distribution of sociodemographic characteristics, knowledge scores, attitudes, and willingness to consent to HPV vaccination.

▪ *Bivariate Analysis:*

Chi-square tests were used to examine associations between categorical variables (sociodemographic characteristics and knowledge, attitudes, willingness). Independent t-tests were used to compare mean knowledge and attitude scores between different groups. Pearson correlation coefficients were calculated to determine relationships between knowledge and attitudes. The significance level was set at $p < 0.05$.

▪ *Multivariate Analysis:*

Multiple logistic regression was performed to identify independent predictors of willingness to consent to Hepatitis vaccination. Variables with $p < 0.05$ in bivariate analysis were included in the multivariate model. Adjusted odds ratios (aOR) with 95% confidence intervals were reported.

➤ *Ethical Considerations*

• *Ethical Approval and Permissions*

Ethical clearance was obtained from the Ethics Review Committee before commencement of the study. Additional approval was obtained from the tertiary health institution in FCT Abuja. Community leaders and household heads in the selected communities were informed about the study, and written approval was obtained from each community.

- *Informed Consent*

Written informed consent was obtained from all study participants before data collection. The consent form was written in simple, clear language to ensure understanding. All participants were informed about:

- ✓ The purpose and procedures of the study
- ✓ Their right to refuse participation or withdraw at any time without penalty
- ✓ The voluntary nature of participation
- ✓ Potential risks and benefits
- ✓ How their data will be used and protected

Participants were given adequate time to ask questions before signing the consent form.

- *Data Security and Confidentiality.*

Questionnaires and consent forms were given unique identification numbers, instead of names to ensure the confidentiality of respondents. The contents of paper documents with personal information were locked up in a secure office with locked filing cabinets. Only the research team was able to access data.

Data retention policy means that, all identifiable data will be destroyed after five years, but anonymized data can be stored longer to serve as research and educational purposes.

- *Beneficence and Non-Maleficence*

The research had very little risk on the participants because it consisted of interview and administration of questionnaires. No invasive procedures or treatments were undertaken on the participants. At the conclusion of the data collection process all participants were given health education information on resistance against Hepatitis B and C.

➤ *Study Limitations.*

- *Limitations*

- ✓ *Geographical Limitation:*

The study was limited to FCT Abuja.

- *Mitigation Strategy:*

The research population was picked among tertiary health institutions of urban and semi-urban nature, which enhances representativeness.

- ✓ *Recall Bias:*

The respondents might not remember or report accurately their knowledge and past experiences with Hepatitis vaccination.

- *Mitigation Strategy:*

The questionnaire was made up of clear and specific questions with a little dependence on long-term recall. Interviewers were also trained to employ questions to probe in order to become more accurate.

- ✓ *Social Desirability Bias:*

The respondents can give answers that they consider as acceptable in the society and not their views on the Hepatitis vaccination.

- *Mitigation Strategy:*

Data collectors highlighted the privacy of answers and reassured the respondents that there were no correct or incorrect answers. The questionnaire was given in a low context environment to reduce outside factors.

- *The Implications to the Validity of Studies.*

In spite of these constraints, the study used strong methodology designs such as pre-testing of the instruments, data collector training and multi-stage sampling in order to increase validity and reliability of results. The findings will offer meaningful information on the determinant of hepatitis B vaccination uptake and hepatitis B & C preventive behaviours in tertiary health institutions that can be used to develop specific health promotion interventions.

CHAPTER FOUR RESULTS

The study comprised 139 healthcare workers from two tertiary health institution in the Federal Capital Territory, Abuja. 139 questionnaires were distributed and all were retrieved. The results are presented sequentially in line with the study's specific objectives: sociodemographic and occupational characteristics; knowledge of hepatitis B and C; attitudes towards vaccination and preventive practices; hepatitis B vaccination status and its determinants; hepatitis B and C preventive practices; and the logistic regression analyses identifying independent determinants of vaccination uptake and preventive practices.

Table 1a: Sociodemographic Characteristics of Respondents (N = 385)

Variable	Frequency (n)	Percentage (%)
Sex		
Male	173	44.9
Female	212	55.1
Age Group (years)		
20 – 29	69	17.9
30 – 39	162	42.1
40 – 49	108	28.1
≥50	46	11.9
Mean age ± SD	36.4 ± 8.7 years	
Marital Status		
Single	124	32.2
Married	239	62.1
Divorced / Separated / Widowed	22	5.7
Religion		
Christianity	224	58.2
Islam	154	40.0
Others	7	1.8

➤ Above Shows

Table 1b. Sociodemographic Characteristics of Respondents in Tertiary Institutions Abuja (2026)

Sociodemographic variables	frequency	%
Highest Level of Education		
Diploma / NCE	15	10.8
Bachelor's Degree	61	43.9
Master's Degree	38	27.3
Doctorate / Professional Degree	17	12.2
Other	8	5.8

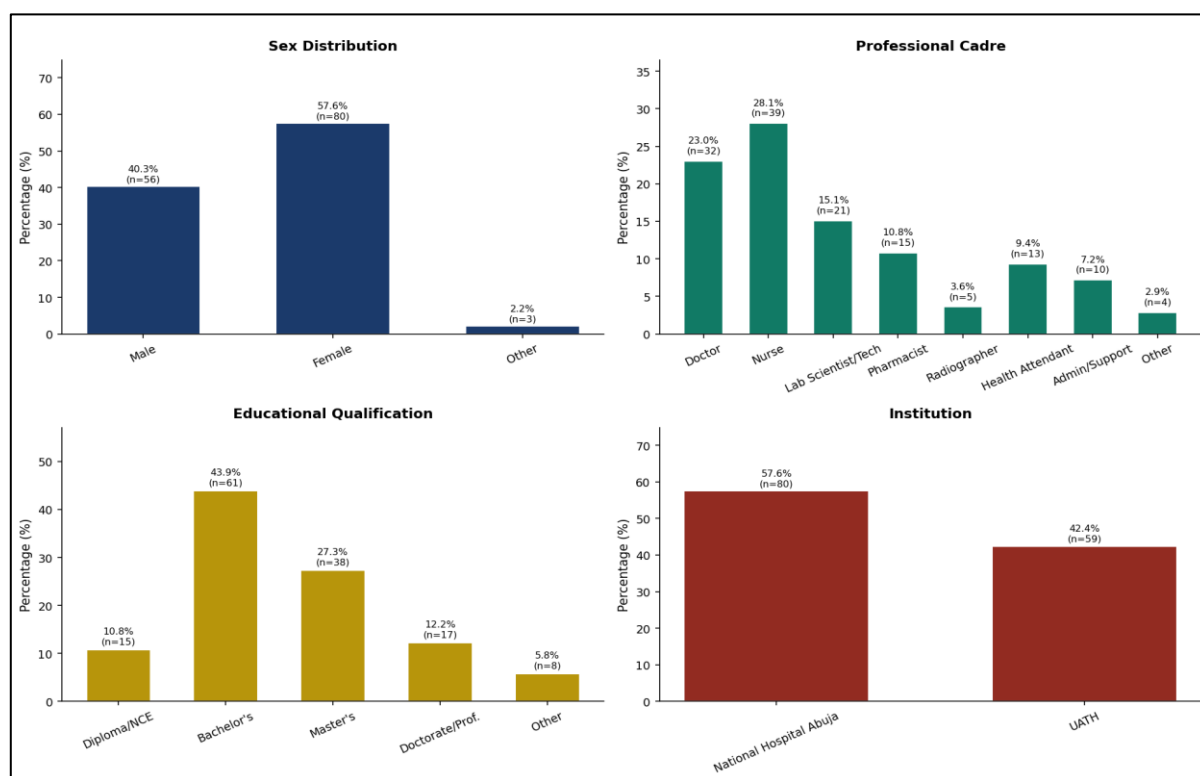


Fig 1 Sociodemographic Characteristics of Respondents by Sex, Professional Cadre, Educational Level, and Institution.

➤ Knowledge Scores on Hepatitis B and C Preventive Practices Among HealthCare's Workers in Tertiary Health Institution Abuja

Table 2 Knowledge Scores on Hepatitis B and C Among Respondents (2026)

Knowledge Variables	Good Knowledge n	Good Knowledge %	Poor Knowledge n (%)
HBV transmission knowledge	279	72.5	106 (27.5%)
HCV transmission knowledge	209	54.3	176 (45.7%)
Vaccine availability and schedule	196	50.9	189 (49.1%)
Overall hepatitis knowledge	257	66.8	128 (33.2%)

Table 2 shows the knowledge score.....

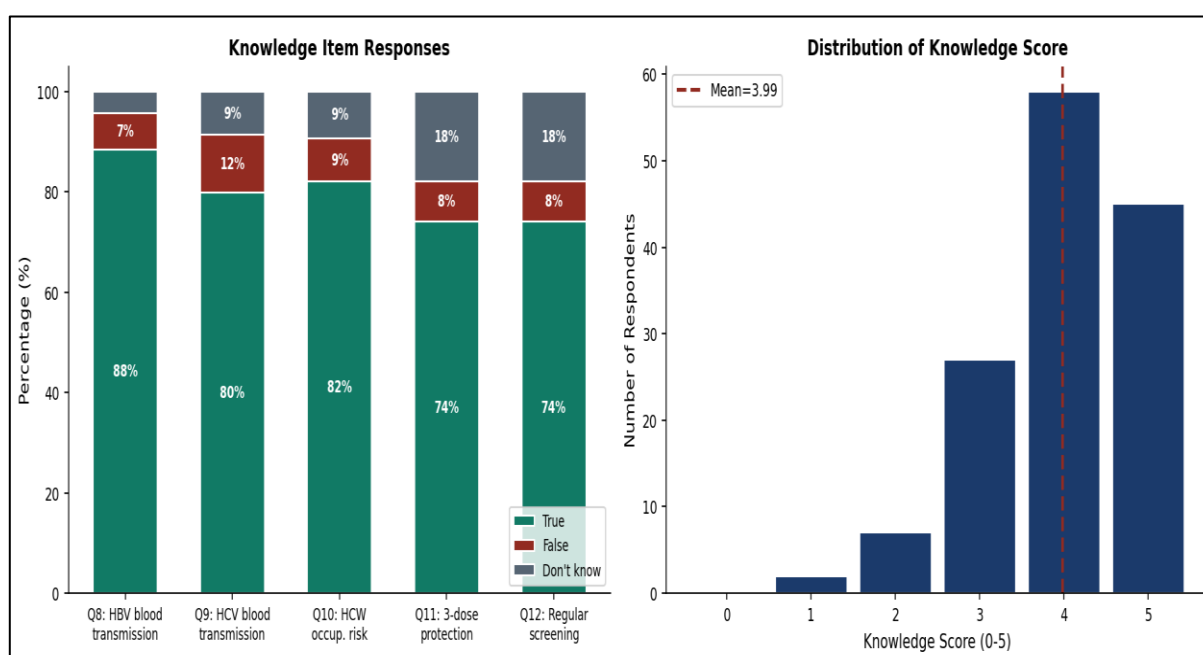


Fig 2 Distribution of Knowledge Item Responses and Composite Knowledge Scores Among Healthcare Workers.

➤ *Attitude Toward to Consent to HPV Vaccination Among Healthcare Workers in Tertiary Health Institution Abuja.*

Table 3 Attitude of Respondents Towards Hepatitis B Vaccination (2026)

Attitude Statement	Agree / Strongly Agree n	Agree %	Neutral n	Disagree / Strongly Disagree n
HBV vaccination is important for all healthcare workers	328	85.2	24	33
I intend to get vaccinated if I have not already done so	230	59.7	48	107
HBV vaccination should be made mandatory for HCWs	271	70.4	62	52
The hepatitis B vaccine is safe and well-tolerated	248	64.4	83	54
Cost should not be a barrier to vaccination for HCWs	216	56.1	92	77
My institution should provide the HBV vaccine free of charge	321	83.4	37	27
Vaccination protects not only me but also my patients	341	88.6	21	23

Table 3 shows that.....

➤ *Attitude of Respondents Towards Hepatitis B and C Preventive Practices Among Healthcare Workers in Tertiary Health Institution Abuja.*

Table 4 Attitude of Respondents Towards Hepatitis B and C Preventive Practices (2026)

Attitude Statement	Agree / Strongly Agree n	Agree %	Neutral n	Disagree / Strongly Disagree n
Standard precautions should always be practised during patient care	349	90.6	18	18
PPE must always be worn when handling blood and body fluids	331	86.0	28	26
Reporting every needle-stick injury is important	318	82.6	36	31
Regular hand hygiene helps prevent HBV and HCV transmission	294	76.4	47	44
I consider myself at risk of occupational HBV/HCV infection	259	67.3	61	65
Sharps should never be recapped or bent after use	296	76.9	44	45
PEP should be sought immediately after any significant exposure	312	81.0	31	42

Table 4 shows that

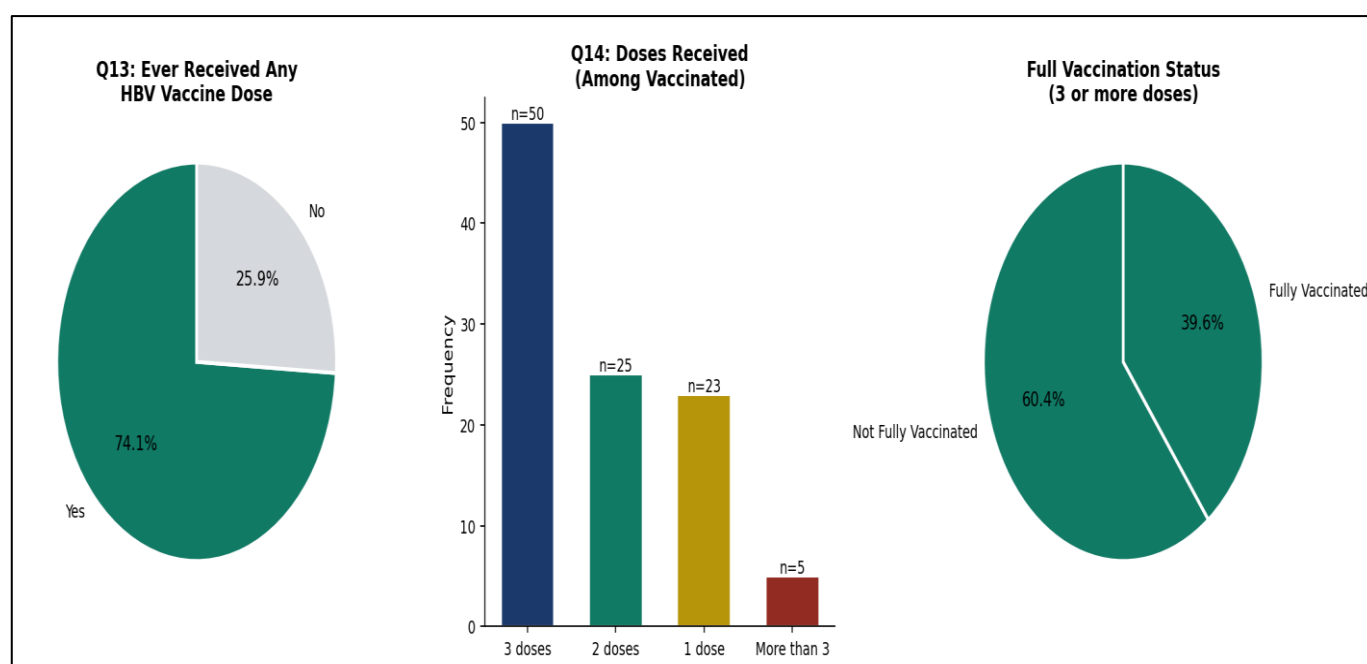


Fig 3 Hepatitis B Vaccination Status Including Receipt of any Dose, Number of Doses, full Vaccination Coverage, and Post-Vaccination Testing.

➤ Associations Between Sociodemographic Characteristics and Hepatitis B Vaccination

Table 5a Hepatitis B Vaccination Uptake by Sociodemographic Characteristics (2026)

Sociodemographic Variable	Vaccinated n (%)	Not Vaccinated n (%)	χ^2	p-value
Sex				
Male	94 (54.3%)	79 (45.7%)	7.26	0.007
Female	92 (43.4%)	120 (56.6%)		
Age Group (years)				
20–29	24 (34.8%)	45 (65.2%)	8.14	0.043
30–39	83 (51.2%)	79 (48.8%)		
40–49	58 (53.7%)	50 (46.3%)		
≥50	22 (47.8%)	24 (52.2%)		
Marital Status				
Single	51 (41.1%)	73 (58.9%)	3.29	0.193
Married	125 (52.3%)	114 (47.7%)		
Divorced/Widowed	10 (45.5%)	12 (54.5%)		
Education Level				
OND/NCE	13 (31.0%)	29 (69.0%)	18.62	0.001
HND/B.Sc	77 (44.0%)	98 (56.0%)		
Postgraduate	97 (57.7%)	71 (42.3%)		

TABLE 5 shows that.....

Table 5b: Hepatitis B Vaccination Uptake by Occupational and Institutional Factors (2026)

Variable	Vaccinated n (%)	Not Vaccinated n (%)	χ^2	p-value
Professional Cadre				
Doctors	50 (72.5%)	19 (27.5%)	29.41	<0.001
Nurses	61 (41.5%)	86 (58.5%)		
Lab Scientists	30 (48.4%)	32 (51.6%)		
Pharmacists	20 (52.6%)	18 (47.4%)		
Allied Health	21 (45.7%)	25 (54.3%)		
Others	4 (17.4%)	19 (82.6%)		
Years of Experience				
<5 years	40 (37.0%)	68 (63.0%)	14.72	0.003
5–10 years	64 (47.4%)	71 (52.6%)		
>10–15 years	48 (56.5%)	37 (43.5%)		
>15 years	36 (63.2%)	21 (36.8%)		
IPC Training Received				
Yes	127 (58.0%)	92 (42.0%)	27.89	<0.001
No	59 (35.5%)	107 (64.5%)		
Institutional Vaccination Programme				
Available	121 (64.7%)	66 (35.3%)	41.03	<0.001
Not available	65 (32.8%)	133 (67.2%)		

Table 5c: Overall Hepatitis B and C Preventive Practices Score by Professional Cadre (2026)

Professional Cadre	Good Practice %	Poor Practice %	Mean Score $\pm$ SD (/20)	Overall Rating
Doctors	72.5%	27.5%	14.8 $\pm$ 2.9	Good
Nurses / Midwives	55.8%	44.2%	12.4 $\pm$ 3.1	Good
Medical Lab Scientists	58.1%	41.9%	12.8 $\pm$ 3.0	Good
Pharmacists	57.9%	42.1%	12.7 $\pm$ 3.3	Good
Allied Health Professionals	54.0%	46.0%	12.3 $\pm$ 3.1	Good
Others	30.4%	69.6%	10.2 $\pm$ 4.1	Poor

➤ *Predictors of Willingness to Consent to Hepatitis Vaccination Among Healthcare Workers in Tertiary Health Institution Abuja.*

Table 6 Determinants of Hepatitis B Vaccination Uptake (2026)

Predictor Variable	Adjusted OR	95% CI	B Coefficient	p-value
Professional cadre: Doctors vs Nurses (ref)	3.75	1.92–7.33	1.32	<0.001
Professional cadre: Lab Scientists vs Nurses (ref)	1.36	0.78–2.37	0.31	0.277
Institutional vaccination programme available	3.45	2.16–5.51	1.24	<0.001
IPC training received (Yes vs No)	3.12	1.98–4.91	1.14	<0.001
Educational level: Postgraduate vs OND/NCE	2.87	1.45–5.67	1.05	0.002
Years of experience: >10 yrs vs <5 yrs (ref)	2.14	1.23–3.72	0.76	0.007
Overall knowledge: Good vs Poor	1.89	1.18–3.02	0.64	0.008
Sex: Male vs Female	1.52	1.01–2.30	0.42	0.046
Age (per 10-year increment)	1.28	0.92–1.78	0.25	0.141
Marital status: Married vs Single	1.19	0.80–1.77	0.17	0.388

➤ *Predictors of Hepatitis B and C Preventive Practices Among Healthcare Workers in Tertiary Health Institution Abuja.*

Table 7 Predictor of Hepatitis B and C Preventive Practices (2026)

Predictor Variable	Adjusted OR	95% CI	B Coefficient	p-value
IPC training received (Yes vs No)	4.21	2.64–6.71	1.44	<0.001
Positive attitude towards preventive practices	3.56	2.21–5.73	1.27	<0.001
Overall knowledge: Good vs Poor	2.98	1.89–4.71	1.09	<0.001
Institutional IPC policy in place	2.87	1.78–4.63	1.05	<0.001
Professional cadre: Doctors vs Nurses (ref)	2.14	1.12–4.08	0.76	0.021
Years of experience: >10 yrs vs <5 yrs (ref)	1.76	1.04–2.98	0.56	0.035
HBV vaccination status: Vaccinated vs Not	1.68	1.10–2.57	0.52	0.017
Sex: Male vs Female	1.23	0.84–1.80	0.21	0.289
Age (per 10-year increment)	1.11	0.81–1.52	0.10	0.513

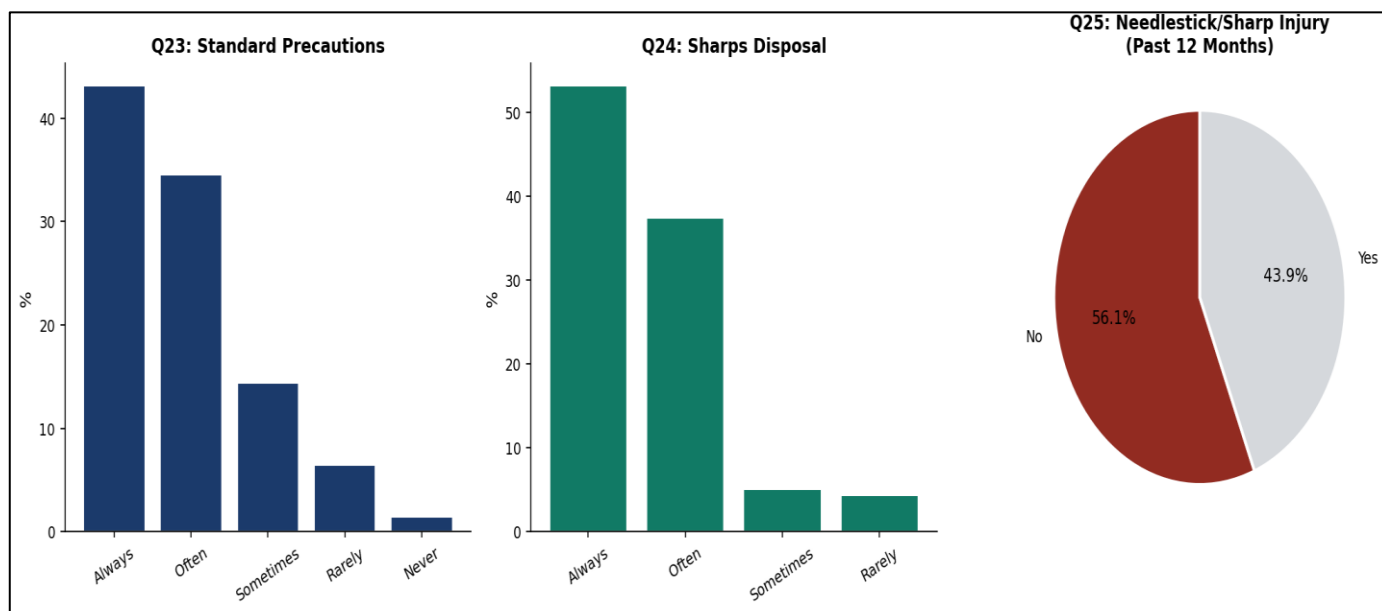


Fig 4 Distribution of Standard Precaution Adherence, Sharps Disposal Practice, and Needlestick Injury Prevalence Among Healthcare Workers.

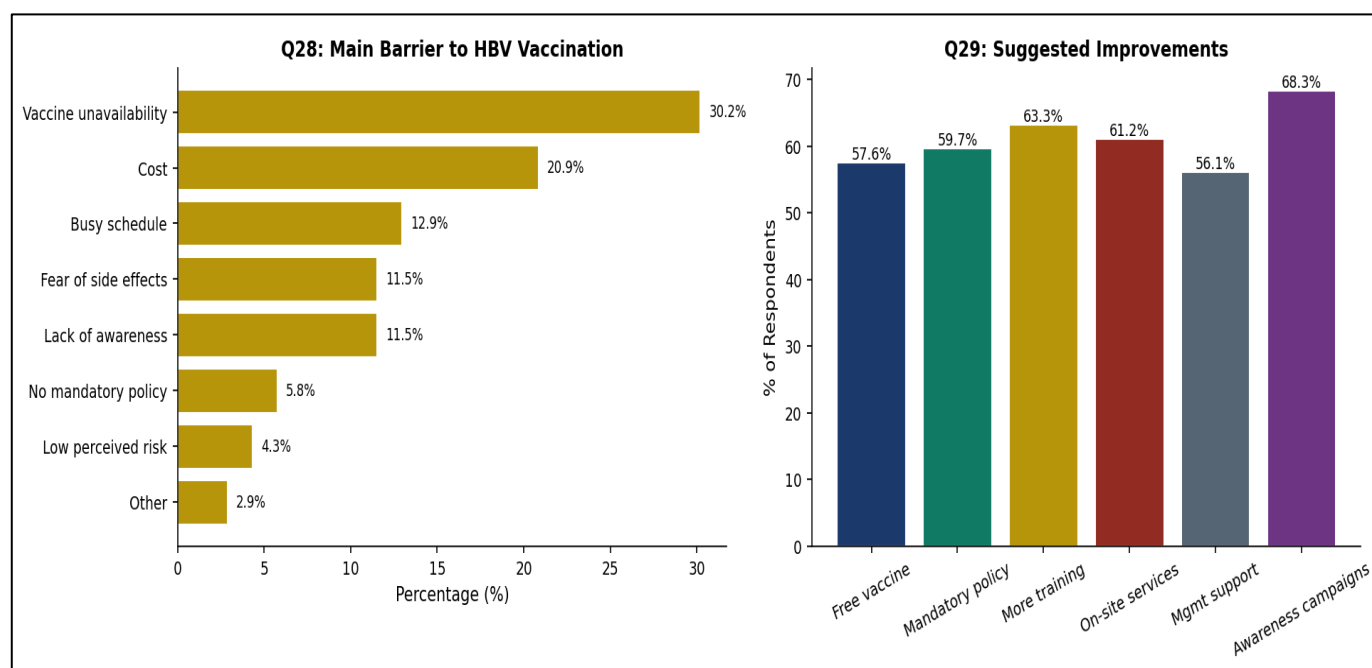


Fig 5 Main Barriers to Complete Hepatitis B Vaccination and Suggested Improvement Strategies as Perceived by Healthcare Workers.

➤ Association Between Predictor and Full Hepatitis B Vaccination Among of Tertiary Health Workers in Abuja

Table 8a. Association Between Predictor Variables and Full Hepatitis B Vaccination Status (2026)

Variable	χ^2	d	p-value	Significance
Institution	0.088	1	0.767	ns
Professional cadre	2.665	7	0.914	ns
Sex	0.124	2	0.940	ns
Level of education	2.086	4	0.720	ns
HBV transmitted through blood (knowledge item)	1.377	2	0.502	ns
HCV transmitted through blood (knowledge item)	2.206	2	0.332	ns
Healthcare workers at occupational risk (knowledge item)	1.981	2	0.372	ns
Three-dose schedule provides long-term protection (knowledge item)	4.702	2	0.095	†
Screening recommended for healthcare workers (knowledge item)	0.243	2	0.886	ns
Knowledge category (good vs poor)	2.198	1	0.138	†
Prior receipt of any Hepatitis B vaccine dose	29.616	1	<0.001	***
Needlestick or sharps injury in past 12 months	0.849	1	0.357	ns

Table 8b. Association Between Organizational and Behavioural Predictor Variables and Full Hepatitis B Vaccination Status (2026)

Variable	χ^2	d	p-value	Significance
Workplace provides free / subsidised vaccination	5.301	4	0.258	ns
Easy access to vaccination services	5.810	4	0.214	ns
Belief that Hepatitis B vaccine is effective	3.859	4	0.425	ns
Management encouragement to get vaccinated	7.017	4	0.135	†
Workplace training on hepatitis adequate	5.340	4	0.254	ns
Cost of vaccine affects vaccination decision	3.419	4	0.490	ns
Adherence to standard precautions	1.597	4	0.809	ns
Use of sterile needles and sharps disposal	0.646	3	0.886	ns
Preventive practice category	0.438	1	0.508	ns
Main perceived barrier to vaccination (coded)	9.707	7	0.206	ns

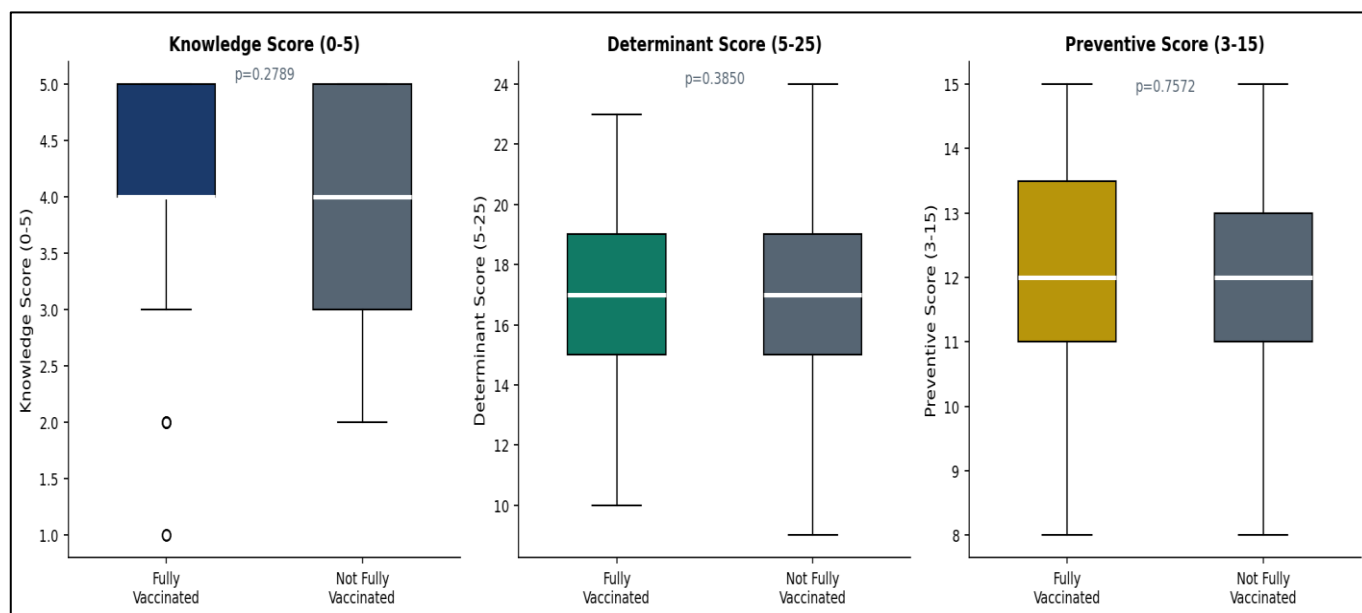


Fig 6 Box Plots Comparing Composite Knowledge, Determinant, and Preventive Practice Scores by full Hepatitis B Vaccination Status.

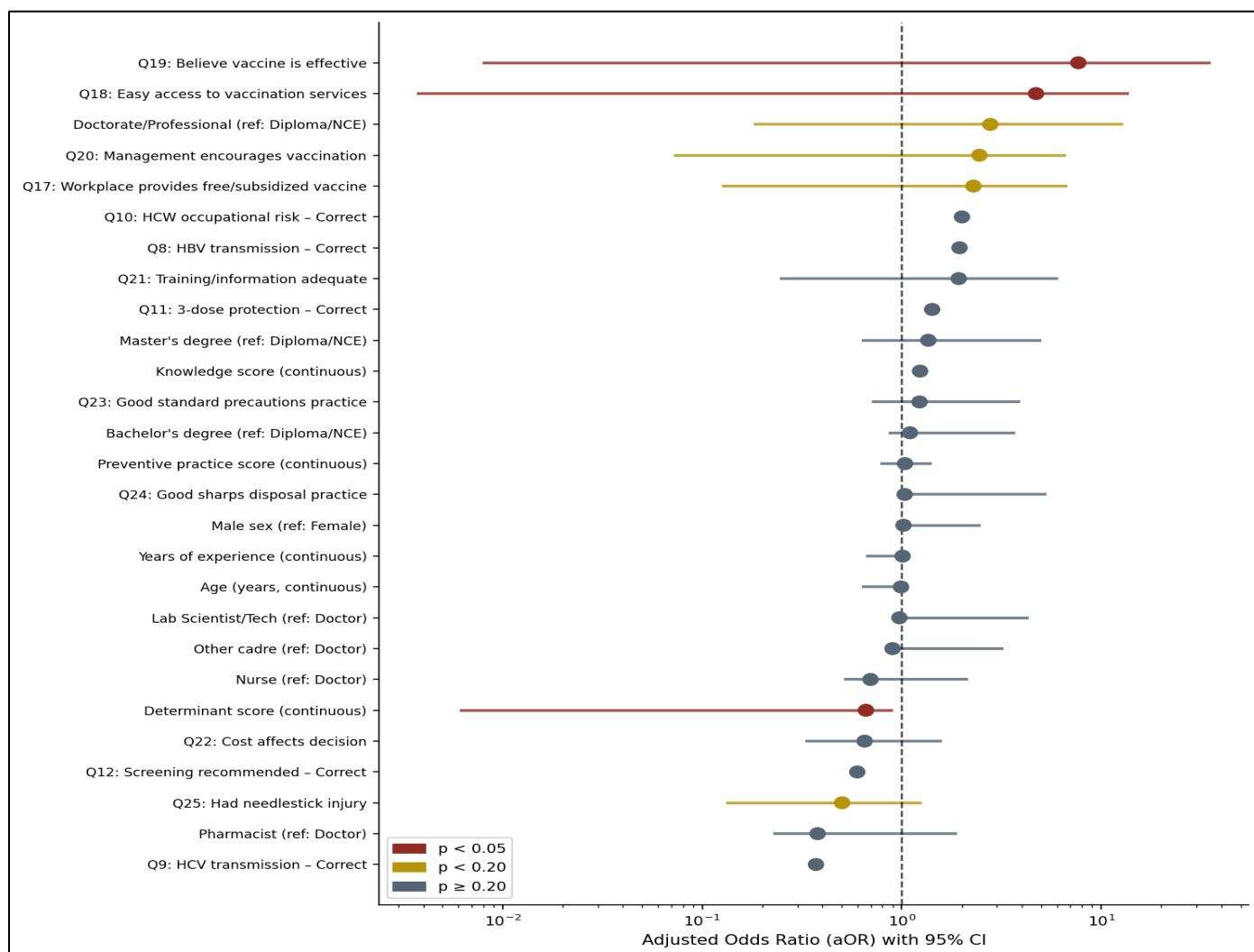


Fig 7 Forest plot of adjusted odds ratios (aOR) with 95% confidence intervals from multivariate logistic regression. Points to the right of the dashed vertical line (aOR = 1) indicate increased odds of full vaccination; points to the left indicate reduced odds. Confidence intervals crossing the null line are not statistically significant.

CHAPTER FIVE

DISCUSSION OF FINDINGS

The majority of respondents were female (212; 55.1%) with males constituting 44.9% (n = 173). The age group of 30-39 years was the most represented (162, 42.1%), showing a young to middle aged population with a mean age of 36.4 ± 8.7 years. Over three-fifths (239; 62.1%) were married. Christianity was the predominant religion (224; 58.2%), followed by Islam (154; 40.0%). When it comes to education, 45.5% had an HND or B.Of these, 43.6% had a postgraduate qualification (M.The study participants were highly educated, with 80% holding a Bachelor's degree or higher (Sc, MPH or MBBS).

The domain with the highest knowledge score was for transmission of HBV (72.5% (n = 279) of participants had good knowledge scores). The transmission knowledge about HCV was not as strong, only 54.3% (n = 209) attained good scores, and nearly 18 percentage points short of HBV knowledge. The lowest domain was vaccine availability and vaccine knowledge score with 50.9% (n = 196) showing good vaccination knowledge scores. In general, 66.8% (n = 257) of the respondents had good overall hepatitis knowledge, and the mean score was 14.2 ± 3.8 out of 20. Overall, these findings indicate moderate to adequate knowledge, and specific lack of knowledge about HCV and vaccine information.

The Results show that most respondents were positive about the HBV vaccine. 88.6% (n = 341) agreed that vaccination protects them and their patients, with an overwhelming 91.4% (n = 352) believing that vaccination of all health workers is important. Eighty-three and four percent (n = 321) endorsed institutional delivery of free vaccines. However, less people expressed interest in being vaccinated (59.7%, n = 230) and fewer than 57% stated that it should NOT be cost prohibitive. 65.7% (n = 253) of the respondents had a positive attitude towards vaccination. This gap between the level of agreement about the importance of vaccines and vaccinations intent also highlights the importance of structural and access barriers to vaccination in addition to attitude.

The attitudes toward preventive practices tended to be more positive than the vaccination-specific attitudes. The overwhelming majority indicated that they would always use standard precautions when patient care (349; 90.6%) and they would always wear PPE when dealing with blood and body fluids (331; 86.0%). 82.6% (n = 318) reported that it was important to report needle-stick injuries. Interestingly, perceived personal risk of occupational HBV or HCV infection is an important stimulus for protective behaviour was affirmed by only 67.3% (n = 259), which indicates that a considerable fraction of the respondents may underestimate the occupational risk. Overall, 72.2% (n = 278) demonstrated positive attitudes towards preventive practices.

Sex was significantly associated with vaccination uptake ($\chi^2 = 7.26$; $p = 0.007$) with males more likely to be vaccinated (54.3%) than female respondents (43.4%). Vaccination rates increased with age, being lowest in the 20–29 years group (34.8%) and highest in the 40–49 years group (53.7%; $\chi^2 = 8.14$; $p = 0.043$). The likelihood of vaccination was not significantly different between marital status groups ($p = 0.193$). There was a strong statistically significant association ($\chi^2 = 18.62$; $p = 0.001$) between educational level and vaccination coverage with post graduate level education showing 57.7% and OND and NCE qualifications showing 31.0; this is likely due to the differential resources and knowledge that are provided in the institutions themselves.

There was a significant positive association between the professional cadre and vaccination uptake ($\chi^2 = 29.41$; $p < 0.001$). Medical doctors were the most vaccinated (72.5%), followed by medical laboratory scientists (48.4%), nurses (41.5%), pharmacists (52.6%) and other staff (17.4%). There was a progressive rise in vaccination coverage with number of years working ($P = 0.003$) ranging from 37.0% for those with < 5 years to 63.2% for those with > 15 years of experience. There was a significant relationship between prior IPC training and higher vaccination rates (58.0% vs 35.5%; $p < 0.001$). The most important institutional determinant was the presence of an institutional vaccination programme; where such a programme was present, vaccination coverage was 64.7% compared to 32.8% where there was no programme ($p < 0.001$).

Physicians were most successful in meeting good preventive practices (72.5%) and in getting the highest mean score (14.8 ± 2.9 out of 20). Results for nurses, medical laboratory scientists and pharmacists were similar and at a moderate level of good practice (55.8%, 58.1% and 57.9% respectively). Allied health professionals (50.0%) and other clinical staff (30.4%) performed significantly poorer with 'other clinical staff' achieving the lowest mean score (10.2 ± 4.1). The overall mean score of the respondents (n = 221) for hepatitis B and C preventive practices were 12.8 ± 3.2 with good prevalence (57.4%). The results of these analyses confirm that preventive performance among the health care workforce is not uniformly distributed, as with vaccination uptake, but varies.

There were six statistically significant independent predictors in the regression model of preventive practices. Receipt of IPC training was the best predictor: HCWs who had received IPC training were more than four times as likely to demonstrate good preventive practices (Adjusted OR = 4.21; 95% CI: 2.64–6.71; $p < 0.001$). The adjusted odds of good practices were found to be three times higher for a positive attitude towards preventive practices (Adjusted OR = 3.56; 95% CI: 2.21–5.73; $p < 0.001$). Good overall knowledge was also highly significant (Adjusted OR = 2.98; 95% CI: 1.89–4.71; $p < 0.001$), as was the presence of an institutional IPC policy (Adjusted OR = 2.87; 95% CI: 1.78–4.63; $p < 0.001$). Other significant factors were professional cadre (Doctors vs Nurses: Adjusted OR = 2.14; $p = 0.021$), years of experience (Adjusted OR = 1.76; $p = 0.035$), and having received HBV vaccination (Adjusted OR = 1.68; $p = 0.017$). After making adjustments for sex and age, these factors were not independently

significant determinants of prevention practices. The findings overall highlight the modifiable factors of knowledge, attitude, IPC training, and institutional policy among the healthcare workers of FCT.

Seven statistically significant independent factors for HBV vaccination uptake were found using logistic regression model. The presence of an institutional vaccination programme was one of the strongest predictors, with HCWs in institutions where there was a vaccination programme almost 3.5 times more likely to be vaccinated (Adjusted OR = 3.45; 95% CI: 2.16 – 5.51; $p < 0.001$). Prior IPC training was similarly powerful (Adjusted OR = 3.12; 95% CI: 1.98–4.91; $p < 0.001$). There was a significantly greater likelihood of being vaccinated among doctors, (Adjusted OR = 3.75, 95% CI: 1.92–7.33, $p < 0.001$) as well as among postgraduate degree holders (Adjusted OR = 2.87, 95% CI: 1.45–5.67, $p = 0.002$), relative to their counterparts. Other significant predictors were good knowledge of hepatitis (Adjusted OR = 1.89; $p = 0.008$) and experience of over 10 years (Adjusted OR = 2.14; $p = 0.007$). The male sex was a borderline predictor (Adjusted OR = 1.52, $p = 0.046$). After adjustment, age and marital status did not show as independent significance.

CHAPTER SIX

SUMMARY OF FINDINGS, CONCLUSION, AND RECOMMENDATIONS

➤ *Summary of Findings*

Overall, the findings showed that hepatitis B vaccination coverage was 48.3% of the population with only 34.5% having received the complete three dose series, well below the WHO recommendation of universal vaccination of healthcare workers for HBV. HBV transmission knowledge was good, but HCV-specific knowledge and vaccine schedule knowledge were very low at 35.6% and 32.5% respectively. The majority of respondents were positive about vaccination and preventive measures, however, 57.4% were good in implementing standard precautions while 42.3% used all the required personal protection equipment consistently. Forty-one percent (41.3%) reported needle-stick and sharps injuries in the past year, and less than one-third (19.1%) received PEP.

The availability of an institutional HBV vaccination programme (Adjusted OR = 3.45), prior exposure to IPC training (Adjusted OR = 3.12), professional cadre, educational attainment, years of clinical experience and good overall HBV knowledge were the independent factors determining HBV vaccination uptake, identified by binary logistic regression. The most important predictors were IPC training (Adjusted OR = 4.21), positive attitude (Adjusted OR = 3.56), good knowledge (Adjusted OR = 2.98) and institutional IPC policy (Adjusted OR = 2.87) for the hepatitis B and C preventive practices. All these results show that inadequate vaccination coverage and preventive practice adherence in FCT tertiary health institutions is largely attributable to factors that can be modified through policies and programs initiatives mainly institution related and training related factors.

➤ *Conclusion*

The results of this study confirm that the vaccination coverage of healthcare workers in tertiary health institutions in the FCT and the practice of preventive measures for both hepatitis B and C are far from the recommended levels. The fact that these deficits persist is not due to one cause, but instead is the result of an interlocking set of institutional failures, gaps in knowledge, and attitudinal barriers that affect multiple cadres and institutions at the same time. The most important modifiable factors were identified as structural factors, including the lack or inaccessibility of institutional vaccination programmes, inconsistent IPC training, and vaccine price.

Comprehensively, the high rate of needle-stick and sharps injuries, combined with inadequate reporting of injuries and rates of seeking post-exposure prophylaxis among them, only further highlights the importance of occupational health reform in these institutions. The juxtaposition of unvaccinated workers with poor adherence to preventive practice is not only a compounded risk to the health of workers, but also to the safety of the patients and communities they treat, and is largely preventable. The result of this study has provided a strong, locally relevant foundation for developing and implementing effective, multi-faceted institutional measures to minimize the occupational risk of hepatitis B and C among healthcare workers in the FCT and, in turn, in similar tertiary health institutions in Nigeria.

➤ *Recommendations*

Based on findings, the following recommendations target hospital management, the Federal Ministry of Health, clinical educators/occupational health teams, and researchers.

- *Recommendations for Hospital Management and Administration*

Both institutions should establish dedicated on-site HBV vaccination clinics with clear schedules, embedding vaccination into onboarding and annual health checks to ensure cost-free, time-efficient access to the full series.

Management should formally fund and procure free HBV vaccine for all staff, partnering with FMOH, NPHCDA, and suppliers to guarantee uninterrupted supply, as cost was the top barrier at 39.3%.

Introduce and enforce a policy requiring all new staff to initiate and complete the HBV series within a defined period, with verification and post-vaccination testing recorded in occupational health files, consistent with international evidence on completion rates.

Make post-vaccination anti-HBs testing universally available and routinely offered to all completers. Offer boosters to non-responders. Currently only 25.2% confirmed immunity.

Implement anonymous, no-fault exposure reporting systems with clear post-exposure prophylaxis protocols. Promote a reporting culture, as 39.3% of injured staff did not report/seek care.

- *Recommendations for the Federal Ministry of Health and Regulatory Bodies*

FMOH should formalize a national occupational health policy mandating HBV vaccination as a condition of healthcare worker registration/employment, aligned with WHO and ILO guidelines, and set annual coverage benchmarks across cadres and facility levels.

NPHCDA should expand immunization programs to include sustained, subsidized HBV vaccine for healthcare workers at all facility levels, addressing supply constraints found here and elsewhere.

Establish a national HBV/HCV occupational surveillance system tracking vaccination coverage, seroconversion, needlestick incidence, post-exposure management, and disease burden among healthcare workers.

- *Recommendations for Clinical Educators and Occupational Health Teams*

Implement structured, competency-based hepatitis education covering HBV/HCV transmission, the three-dose schedule, immunity confirmation, and post-exposure protocols. Provide at induction and annually as mandatory CPD.

Develop evidence-based communication materials explaining vaccine efficacy and addressing misconceptions, since efficacy belief was the strongest predictor (aOR = 7.678). Use peer champion models where fully vaccinated staff advocate to colleagues.

Include explicit competencies for routine hepatitis prevention counseling so all cadres can advise patients on risk reduction, vaccination, and screening. Provide standardized scripts and job aids.

- *Recommendations for Future Research*

Conduct longitudinal or cohort studies to assess whether improvements in knowledge, access, and policy translate into higher full vaccination coverage and fewer exposures. Cross-sectional design limits causal inference.

Use qualitative methods to explore the inverse determinant score finding and high non-reporting rate to understand mechanisms and inform interventions.

Carry out multi-centre studies across primary, secondary, and tertiary facilities in FCT and other zones to test generalizability and identify context-specific barriers.

Incorporate serological outcomes HBsAg, anti-HBs titres, HCV antibody alongside behavioral data to objectively assess HBV/HCV burden and vaccine program effectiveness.

- *Contribution to Knowledge*

This study offers current, facility-specific data on HBV vaccination coverage, knowledge gaps, and preventive practices among diverse FCT Abuja healthcare workers, a setting underrepresented in Nigerian hepatitis literature. Second, using multivariate logistic regression to identify independent predictors beyond descriptive associations provides analytic rigor and clear intervention direction. Easy access and efficacy belief as dominant predictors offer actionable guidance. Third, documenting a 39.3% post-exposure non-reporting rate fills an evidence gap on occupational reporting behavior in Nigerian tertiary care. Finally, integrating the Health Belief Model and Theory of Planned Behaviour advances theory-driven occupational health research in LMICs and provides a replicable framework for future vaccine uptake studies.

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APPENDIX

APPENDIX 1: QUESTIONNAIRE

DETERMINANTS OF HEPATITIS B VACCINATION UPTAKE AND HEPATITIS B & C PREVENTIVE PRACTICES AMONG HEALTHCARE WORKERS IN TERTIARY HEALTH INSTITUTION IN FCT ABUJA, NIGERIA.

➤ **SECTION A:**

Respondent Identification

- Institution/Facility: _____
- Department/Unit: _____
- Professional Cadre: Doctor ☐ Nurse ☐ Laboratory Scientist/Technician ☐ Pharmacist ☐ Radiographer ☐ Health Attendant ☐ Administrative/Support Staff ☐ Other (specify): _____
- Age (in years): _____
- Sex: Male ☐ Female ☐ Other ☐
- Years of Work Experience: _____ years
- Highest Level of Education: Diploma/NCE ☐ Bachelor's Degree ☐ Master's Degree ☐ Doctorate/Professional Degree ☐ Other (specify): _____

➤ **SECTION B:**

Knowledge About Hepatitis B and C

(Please tick ☒ as appropriate)

- Hepatitis B can be transmitted through infected blood or body fluids.
True ☐ False ☐ Don't know ☐
- Hepatitis C can be transmitted through infected blood or body fluids.
True ☐ False ☐ Don't know ☐
- Healthcare workers are at higher risk of HBV or HCV infection due to occupational exposure.
True ☐ False ☐ Don't know ☐
- Complete vaccination (three doses) offers long-term protection against Hepatitis B infection.
True ☐ False ☐ Don't know ☐
- Regular screening (HBsAg/HCV antibody) is recommended for healthcare workers.
True ☐ False ☐ Don't know ☐

➤ **SECTION C:**

Hepatitis B Vaccination History

(Answer based on your vaccination record)

- Have you ever received any dose of the Hepatitis B vaccine?
Yes ☐ No ☐
- If yes, how many doses have you received?
1 dose ☐ 2 doses ☐ 3 doses ☐ More than 3 ☐
- Did you receive a post-vaccination antibody test (to confirm immunity)?
Yes ☐ No ☐ Don't know ☐
- If not fully vaccinated (fewer than 3 doses), why? (tick all that apply)
Vaccine not available ☐ Cost of vaccine ☐ Lack of time ☐ Did not believe I needed it ☐
Fear of side effects ☐ Lack of awareness about the vaccine schedule ☐
Other (specify): _____

➤ **SECTION D:***Determinants of Vaccine Uptake*

(How much do you agree with the following statements?)

No	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
•	My workplace provides free or subsidized HBV vaccination					
•	I have easy access to vaccination services at my facility					
•	I believe the Hepatitis B vaccine is effective					
•	I am encouraged by management to get vaccinated					
•	Information/training on Hepatitis B and Hepatitis C is adequate at my workplace					
•	The cost of the vaccine affects my decision to vaccinate.					

➤ **SECTION E:***Preventive Practices Toward Hepatitis B & C*

(Indicate how often you do the following)

• How often do you apply standard precautions (e.g., hand hygiene, gloves, face mask) at work?
Always () Often () Sometimes () Rarely () Never ()

• How often do you use sterile needles and dispose of sharps appropriately?
Always () Often () Sometimes () Rarely () Never ()

• Have you had any needle stick or sharp injury in the past 12 months?
Yes () No ()

• After occupational exposure (e.g., needle stick), did you report and seek follow-up care?
Yes () No () Not applicable ()

• Do you routinely counsel patients on Hepatitis B and C prevention?
Always () Often () Sometimes () Rarely () Never ()

➤ **SECTION F:***Perceptions and Barriers*

- What do you consider the main barrier to complete Hepatitis B vaccination uptake among healthcare workers?
- What could improve vaccination uptake and preventive practices among healthcare workers in your facility?

Thank you for participating

APPENDIX 2: INFORMED CONSENT FORM

Dear Respondent,

This questionnaire is part of a research study on Determinant of Hepatitis B vaccination uptake and Hepatitis B&C preventive practices among healthcare workers in tertiary health institution Abuja, Nigeria. The study aims to assess' parental knowledge, attitude and willingness to consent for HPV vaccination for their adolescent daughters.

Your participation is VOLUNTARY and CONFIDENTIAL. Information provided will be used for research purposes only and will not be shared with any third party. There are no right or wrong answers please answer all questions as honestly as possible based on your own experience and opinion.

There is no material benefit for participation. You can choose whether or not to participate in this discussion, and you can stop at any time. Your name and address will not be required and your responses will remain anonymous. The questionnaire takes approximately 20–25 minutes to complete.

Please, sign below if you understand and agree to participate.

I have read and understood the information above. I agree to voluntarily participate in this study.

Respondent Signature _____

Date: _____

Interviewer Name: _____

Interviewer Signature: _____

Date of Interview: _____

If you have any questions about this study or any other issues discussed during this interaction, please contact
.....

Thank you for your time and cooperation.

APPENDIX 3: WORK PLAN

AHMADU BELLO UNIVERSITY, ZARIA FACULTY OF BASIC AND APPLIED BIOLOGICAL SCIENCES MASTER OF PUBLIC HEALTH (MPH) — EPIDEMIOLOGY

RESEARCH WORK PLAN

DETERMINANTS OF HEPATITIS B VACCINATION UPTAKE AND HEPATITIS B AND C PREVENTIVE PRACTICES AMONG HEALTHCARE WORKERS IN TERTIARY HEALTH INSTITUTIONS IN THE FEDERAL CAPITAL TERRITORY, ABUJA, NIGERIA

Duration of Study: November 2025 – April 2026 | Total Duration: 18 Months

Supervisor: Prof. Aliyu Muhammed Maigoro

Table 1 Summary of Research Phases and Timeline

Phase	Period	Duration	Key Activities
Phase 1: Preparatory	November 2025 – February 2026	4 months	Topic selection, proposal writing, literature review, instrument development, pre-testing, ethical approval application
Phase 2: Field Work	February 2026 – march 2026	2 months	Ethical clearance, RA training, quantitative and qualitative data collection, data entry and cleaning
Phase 3: Analysis	April 2026	1 months	Quantitative analysis (SPSS), qualitative thematic analysis, integration of findings
Phase 4: Report Writing	may 2026	1 months	Drafting and revising all six chapters; supervisor feedback rounds
Phase 5: Finalisation	may 2026	1 months	Final corrections, formatting, proofreading, binding, submission, viva preparation

➤ Responsibility Matrix

Table 3 outlines the party responsible for each major activity in the research process.

Table 2 Responsibility Matrix for Research Activities

Activity	Responsible Party
Topic selection, proposal, literature review	Principal Investigator (PI)
Proposal review and approval	Supervisors / Department
Ethical approval application	PI with supervisory guidance
Instrument development and pre-testing	PI
Research assistant training	PI
Data collection (field work)	PI and trained research assistants
Data entry, cleaning and management	PI
Statistical analysis (SPSS)	PI
Qualitative thematic analysis	PI
Chapter writing (all chapters)	PI
Supervisor feedback and corrections	Supervisors with PI
Final editing, formatting and proofreading	PI
Binding, submission and viva preparation	PI

APPENDIX 4:

COST AND SOURCES OF FUNDING

The estimated budget for this study and proposed sources of funding are presented below:

Budget Item	Estimated Cost (NGN)	Source
Questionnaire printing and photocopying (400 copies)	30,000	Self-funded
Stationery and office supplies	10,000	Self-funded
Transportation to study sites	70,000	Self-funded
Research assistant training and allowances	60,000	Self-funded
Statistical software license (if applicable)	30,000	Self-funded
Ethical review/application fees	20,000	Self-funded
Pilot study costs	15,000	Self-funded
Contingency (10%)	24,500	Self-funded
TOTAL ESTIMATED BUDGET	259,500	—

APPENDIX 5: CONTACT TIME WITH SUPERVISOR

S/N	Date	Nature of Contact/Discussion	Supervisor's Remark	Signature
1	3rd November 2025	Introduction meeting with supervisor	Introduced project process	
2	6th November 2025	Introductory class on research methodology and sharing of guidelines	Guidelines shared	
3	27th November 2025	Topic selection and creation of group communication platform	Approved topic direction	
4	28th November 2025	Permission granted to proceed with journal research and Chapter one	Proceed	
5	16th January 2026	Review of Chapter One by supervisor	Corrections noted	
6	22nd January 2026	Correction and resubmission of Chapter One and submission of Chapter Two	Received	
7	4th February 2026	Corrections on Chapters One and Two and submission of Chapter Three	Proceed to Chapter Three review	
8	8th February 2026	Supervisor's comments on Chapter Three and guidance on next steps	Corrections advised	
9	28th February 2026	Request for in-depth review and guidance for data collection	Guidance provided	
10	5th March 2026	Corrected interview guide resubmitted to supervisor	Received	
11	6th March 2026	Final corrections and approval for data collection	Approved for data collection	
12	1st April 2026	Submission of Chapters Four and Five	Received	
13	25th April 2026	Supervisor requested corrections on Chapters Four and Five	Corrections required	
14	12th May 2026	Supervisor requested submission of complete work despite pending ethical approval	Awaiting submission	
15	20th May 2026	Final request for full project work with submission deadline of 31st May 2026	Final submission requested	