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Hepatitis B vaccination uptake and its determinants among medical students in a private Nigerian university

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Abstract

Context: Hepatitis B virus (HBV) is a major cause of chronic liver disease, cirrhosis, and hepatocellular carcinoma, responsible for about one million deaths annually. Healthcare workers and students are at increased risk due to frequent exposure to blood and bodily fluids. Vaccination remains the most effective preventive measure.
Objective: This study examined factors influencing hepatitis B vaccination uptake among medical students by assessing their knowledge, determining vaccination prevalence, and identifying predictors of willingness to be vaccinated.
Methods: A cross-sectional study was conducted among 254 medical students at Afe Babalola University, Ado-Ekiti, using stratified sampling. Data were collected over three weeks with a self-administered structured questionnaire capturing knowledge, vaccination history, and influencing factors. Data were analyzed using SPSS version 25.0. Binary logistic regression identified predictors of vaccination status, with statistical significance set at $p<0.05$.
Results: Most respondents (96%) had heard of HBV, and 89.8% demonstrated good knowledge of hepatitis B vaccination. However, less than half (45.3%) had been screened for HBV, and only 55% had received at least one vaccine dose, with 24.4% completing the full three-dose schedule. A considerable proportion (45.3%) remained unvaccinated, mainly due to not knowing where to obtain the vaccine (46.1%) and lack of time (20.9%). Students in 600 level were 6.6 times (AOR 0.152, 95% CI 0.039-0.588) more likely to have undergone hepatitis B screening compared to those that were in 200 level ($p=<0.006$).
Conclusion: Although knowledge of HBV infection and vaccination was high, actual vaccination coverage among medical students remained low. Improving access to vaccination services and targeted institutional strategies may enhance uptake.

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Introduction

Hepatitis B virus (HBV) is a Hepadnavirus that infects liver cells.[1] Hepatitis B virus infection remains a major global public health problem, with

hundreds of millions of people affected globally, including an estimated 296 million living with chronic infection.[2] In 2020, the World Health Organization (WHO) reported that 325 million people worldwide were living with chronic hepatitis B infection and approximately 900,000 people died due to hepatitis B.[3] Most cases, 68%, were recorded in the African and Western Pacific regions.[4] The World Health Organization estimates that approximately 65–70 million people in the African region are living with chronic hepatitis B infection, representing a substantial share of the global disease burden.[5]

Hepatitis B is a hepatotropic virus that can establish persistent and chronic infection in humans through immune anergy.[6] Hepatitis B virus is a partly double-stranded DNA virus with several serological markers: HBsAg and anti-HBs, HBeAg and anti-HBe, and anti-HBc IgM and IgG. It is not cytopathic; both liver damage and viral control—and therefore clinical outcome—depend on the complex interplay between virus replication and host immune response.[2]

Hepatitis B can be transmitted in the following ways: via unscreened or improperly screened blood, sexual contact, mother-to-child transmission, the use of unsterilized needle and via sharp objects like blades and scarification materials that are shared among people.[7] Healthcare workers including healthcare students (HCSs) are at a high risk of HBV infection through occupational exposure to blood, and the incidence of this infection among them has been estimated to be 2-4 times the level in the general population.[8,9] Healthcare students are more vulnerable because of direct contact with patients' body fluids and blood.[10]

Health care students are especially at a high risk because of their inexperience with procedural skills, infection control procedures and because they may have insufficient knowledge about the level of risk when dealing with patients.[9] Health care workers in Nigeria are particularly at increased risk of contracting HBV infection in their workplace, because the country is holoendemic for the disease.[11]

Since the launch of the first universal hepatitis B vaccination programme for infants in July 1984 in Taiwan, there has been modification in the production of the vaccine. The recombinant hepatitis B vaccine was introduced in 1986 and has gradually replaced the plasma-derived hepatitis B vaccine.[12] The complete vaccination remains the uptake of the recommended three-dose regimen, with the second and third doses being given at 1 and 6 months after the initial dose for birth doses or for vaccination of at-risk adult populations.[13,14]

Hepatitis B remains a major global public health problem and a leading cause of chronic hepatitis, cirrhosis, and hepatocellular carcinoma, accounting for approximately 820,000 to 1.1 million deaths annually worldwide.[15] More than 2 billion people worldwide have been infected with HBV.[16] Globally, 85% of all infants had received the recommended three doses of the hepatitis B vaccine in 2019, up from only 30% in 2000, and the global target of the Sustainable Development Goals and the global health sector strategy to reduce hepatitis B surface antigen prevalence to less than 1% among children younger than five years by 2020 has been met. However major gaps remain in some regions, including sub-Saharan Africa and South-East Asia.[17] Unfortunately, the World Health Organization has estimated that HBV vaccination coverage among health care workers is only 18-39% in low and middle-income countries compared to 67-79% in high-income countries.8 In Africa, Nigeria is ranked as one of the countries that is hyper-endemic for HBV infection (> 8%).[1] Currently, 3.5% of the global population is chronically infected with HBV, although the incidence of HBV infections is decreasing owing to safe and effective prophylactic vaccines and effective antiviral drugs which are available to prevent and treat HBV infection, but the global burden will remain high without concerted efforts from governments, health-care providers, and communities to raise awareness and improve access to care.[6]

A good knowledge of HBV means and modes of infection as well as adequate vaccination may reduce infection rate. The knowledge of HBV is generally low among the populace in a study carried out among the Turkish community in the Netherlands.[18] A systematic review among immigrants and refugees residing in the United States (US), Canada, and Australia showed that vaccine acceptance and people's attitude towards hepatitis B was associated with their knowledge about the disease.19 Poor knowledge has been associated with poor attitude and poor practices of

universal precaution for hepatitis B infection which includes vaccination.[20] The beliefs of health care workers particularly regarding the safety and efficacy of hepatitis B vaccine, have a major impact on their decision to accept or reject vaccination.[21] The reasons for the suboptimal hepatitis-B vaccination rates among health workers include lack of opportunity to be vaccinated, lack of motivation, lack of information, lack of awareness, non-availability, high cost of the vaccine, fear of side effects, fear of being recognized as a hepatitis-B carrier, lack of perceived need for the vaccine, and erroneous belief of non-susceptibility to the infection.[13] Hepatitis B is a significant public health issue globally, including Nigeria. To the best of our knowledge, there is currently no systematic study on the factors affecting the uptake of hepatitis B vaccine among medical students in Afe Babalola University as this study is frequently conducted on health care workers rather than health care students. This study will help identify the factors that hinder the uptake of vaccination and the stumbling blocks of hepatitis B vaccination, help make recommendations to school authorities and teaching hospitals to ensure proper vaccination policies and their implementation.

Conducting research on hepatitis B vaccine uptake can shed light on the burden of the disease and its prevention strategies. Understanding the current situation can help identify gaps and barriers to vaccine uptake, ultimately contributing to public health efforts in reducing hepatitis B transmission and associated morbidity and mortality.

This research can contribute to the existing body of knowledge on hepatitis B prevention and vaccination. It can help fill gaps in the literature by providing updated and context-specific data on the prevalence, availability, and uptake of the vaccine in Nigeria. This academic contribution is essential for advancing scientific understanding, facilitating evidence-based decision-making, and promoting further research in the field.

Research objectives

The objectives of the study were to assess the knowledge of medical students on Hepatitis B infection and Hepatitis B vaccination, to identify the factors that are associated with willingness to obtain vaccination among medical students and to determine the prevalence of Hepatitis B vaccination among medical students.

Materials and Methods

The study was conducted among students of Afe Babalola University Ado-Ekiti (ABUAD) which is an institution of higher learning in Ekiti State, Nigeria. The school campus is located primarily at Ado-Ekiti Local Government Area (LGA), Ekiti State.

Ado-Ekiti is located at latitude 7°35¹ and 7°38¹ north of the equator and longitude 5°10¹ and 5°15¹ east of the Greenwich Meridian. Ekiti State is made up of three senatorial districts (Ekiti South, Central and North) and 16 LGAs. Ado-Ekiti, where the study was conducted, is the state capital and is located in the central senatorial district. It is a culturally homogenous town inhabited predominantly by the Yorubas. There are also non-indigenous migrant settlers such as Ebiras, Igbos, Hausas and other Nigerian ethnic groups in the town. There are primary and secondary facilities providing health care services in the community and eight higher institutions, which include four universities, three polytechnics and two colleges of education.[22]

The school is built on 130 hectares of land at Km 8.5, Afe Babalola Way, directly opposite the Federal Polytechnic Ado-Ekiti at an altitude of over 1500 feet above sea level with an ideal climate for learning and support.

The University has a clinical campus that has hostels designed to accommodate medical students during their clinical training and quarters for teaching and non-teaching staff. The campus also houses the university's Teaching Hospital.

The teaching hospital of ABUAD is called the ABUAD Multisystem Hospital (AMSH). This institution provides services for Hepatitis B vaccination.

There are 16 primary institutions, 2 secondary institutions and 1 tertiary institution in Ido-Ekiti. Also, there are 3 health facilities in Ido-Ekiti, a basic health center, a comprehensive health center and Federal Teaching Hospital Ido-Ekiti. Vaccination services are available at the Federal Teaching Hospital, and this caters for Ido-Osi LGA and a few surrounding local government areas nearby.

The research is a descriptive cross-sectional study

involving medical students of Afe Babalola University Ado-Ekiti, Ekiti State. The study was conducted for a period of three weeks using a structured questionnaire to obtain relevant information from the medical students.

The study population were medical students from 200 to 600 level in ABUAD Ado and Ido campus, Ekiti State.

Inclusion criteria: Medical students between 200 to 600 level of all ages and both sexes willing to participate in the study.

Exclusion criteria: 100-level students and those who refuse consent to participate in the study.

The sample size was determined using the Leslie Fishers formula;[23]

n=(Z^2 pq)/e^2

Where:
n= Desired sample size
Z= standard normal deviate at 95% confidence interval: 1.96
p= Proportion of hepatitis B vaccine taken from previous study= 20% =0.2009
q= 1-p (0.200) = 0.8e= margin of error = 0.05
n- Population size (total population of adolescents used=

(1.96)^2×0.200×0.80)/(0.05)^2

n= 245.8

n≅ 246

N = 246
N is <10,000, the final sample estimate can be calculated as
Nf= n/ 1+ (n/N)

WHERE;
Nf – desired sample size when population is <10,000
n-desired sample size when population is > 10,000
N –estimate of population size
nf =203.3≈ 203
Non-response sample size is calculated as 10% of total sample size =
n/0.8 = 203/0.8 = 253.75 ≈ 254
The final sample size was 254.

A stratified sampling technique was employed, where the study population was grouped into strata based on academic level (200, 300, 400A, 400B, 500, and 600 levels). The sample size was proportionally allocated to each stratum according to the number of students in each level. Within each stratum, systematic random sampling was used to select participants from official class registers, ensuring that every student had an equal chance of inclusion. Data were collected using a structured, self-administered questionnaire distributed to the selected students in lecture halls within the university just before lecture periods and during lecture free periods. The questionnaires were administered by the researchers and trained research assistants, who also provided clarification where necessary.

Total population of the students from 200 to 600 level=1192
Sample size=254

For 200 level;
The sampling frame for 200 level =167
Proportional Sample size for 200 level=
(Population of 200 level students)/(Total population)×Sample size
=167/1192×254
Proportional sample size =35.5 ≈ 36 students.
Sampling ratio = (Population of 200 level)/(Proportional sample size) = 167/36 = 4.6 ≈ 5
The sampling interval for 200 level = 5
Every 5th student while they were seated was recruited for the study until the proportional sample size of 36 students was reached. A number between 1 and 5 was randomly chosen as a starting point.

For 300 level;
The sampling frame for 300 level = 150
Proportional Sample size for 300 level students=
(Population of 300 level students)/(Total population)×Sample size
= 150/1192 × 254
Proportional sample size = 31.9 ≈ 32.

Sampling ratio =(Population of 300 level)/(Proportional sample size) = 150/32 =4.6 ≈ 5

The sampling interval for 300 level = 5

Every 5th student while they were seated was recruited for the study until the proportional sample size of 32 students was reached. A number between 1 & 5 was randomly chosen as a starting point.

For 400 level (A);
The sampling frame for 400 level (A) = 245
Proportional Sample size for 400 level (A) = (Population of 400 level (A)students)/(Total population)×Sample size
= 245/1192×254 = 52.
Proportional sample size = 52
Sample ratio =(Population of 400 level (A))/(Proportional sample size) = 245/52 = 5
The sampling interval for 400 level (A) = 5
Every 5th student while they were seated was recruited for the study until the proportional sample size of 52 students was reached. A number between 1 & 5 was randomly chosen as a starting point.

For 400 level (B)
The sampling frame for 400 level B = 277
Sample size = 254
Proportional Sample size for 400 level (B) = (Population of 400 level (B) students)/(Total population)×Sample size
= 277/1192×254 = 59
Proportional sample size = 59
Sample ratio =(Population of 400 level (B))/(Proportional sample size) = 277/59 = 4.6 ≈ 5
The sampling interval for 400 level (B) = 5
Every 5th student while they were seated was recruited for the study until the proportional sample size of 59 students was reached. A number between 1 & 5 was randomly chosen as a starting point.

For 500 level;
The sampling frame for 500 level = 192
Proportional Sample size for 500 level = (Population of 500 level students)/(Total population)×Sample size
= 192/1192× 254 = 40.9 ≈ 41
Proportional sample size = 41
Sample ratio=(Population of 500 level)/(Proportional sample size) = 192/41 = 4.6 ≈ 5
The sample interval for 500 level = 5

Every 5th student while they were seated was recruited for the study until the proportional sample size of 41 students was reached. A number between 1 & 5 was randomly chosen as a starting point.

For 600 level;
The sampling frame for 600 level = 161
Proportional Sample size for 600 level= (Population of 600 level students)/(Total population)×Sample size
= 161/1192× 254 = 34.3 ≈ 34
Proportional sample size = 34
Sample ratio = (Population of 600 level)/(Proportional sample size) = 161/34= 4.7 ≈ 5.
The sample interval for 600 level = 5

Every 5th student while they were seated was recruited for the study until the proportional sample size of 34 students was reached. A number between 1 & 5 was randomly chosen as a starting point.

Pretest
A pretest was conducted among medical students of Ekiti State University which is 10% of the study population (25 copies of the questionnaire) with similar characteristics of the population size so as to validate the study instrument (questionnaire). This pretest was carried out to confirm if the questionnaire would be understood by the study population.
Population size = 254
10% of 254 = 25

Data collection and research instrument
A structured questionnaire was used for this study. It consisted of twenty-eight questions in four sections. Section A assessed the socio-demographic characteristics (age, sex, tribe, religion, marital status, level and parent's level of education). Section B was made up of eight questions that examined the knowledge towards Hepatitis B infection. Section C was made up of eleven questions that assessed the knowledge of hepatitis vaccination. Section D was made up of two questions that identified the factors affecting willingness to receive or complete vaccination.

Data analysis
The questionnaire was checked for error and

completeness. Completely filled questionnaires were sorted and coded. All data were collected using Statistical Packaging for Social Sciences by IBM version 25.0.

The data was represented by diagrams and percentages as they were discrete. Continuous variables that were normally distributed were expressed using standard deviation. A Chi-square test was used to determine association between dependent and independent variables. The level of significance was set at a p-value of 0.05% and 95% confidentiality. Binary logistic regression identified predictors of vaccination status.

Table 1: Demographic characteristics of the study participants

Variable	Category (n=254)	Frequency	Percent
Sex	Male	51	20.1
	Female	203	79.9
Age (years)	15-19 years	83	32.7
	20-24 years	157	61.8
	25-29 years	14	5.5
Religion	Christianity	216	85.0
	Islam	33	13.0
	Traditional	3	1.2
	Atheist	2	0.8
Marital status	Single	249	98.0
	Married	5	2.0
Undergraduate level	200 level	36	14.2
	300 level	32	12.6
	400 A level	59	23.2
	400 B level	52	20.5
	500 level	41	16.1
	600 level	34	13.4
Educational level of parents	Primary	5	2.0
	Secondary	15	5.9
	Tertiary	234	92.1
	Total	254	100.0

Ethical considerations

Ethical approval was obtained from the Ethical and Research Committee of Federal Teaching Hospital, Ido-Ekiti before carrying out the research.

Respondents were informed duly that they will be participants in a research study. It was explained that the study would not be harmful, and they were given a chance to consent. Participants were asked to fill an informed consent form. They were also told that they can drop out at any point at the study and there will be no consequence for dropping out.

The aim of the research was properly explained to the respondents and the decision to participate in the research was entirely up to the respondents. We also considered the rights, dignity, welfare and respect of the participants.

Table 2: Knowledge of the Students on Hepatitis B Virus Infection

Variable	Category	Frequency (n=254)	Percent
Is the virus deadly?	Yes	234	92.1
	No	20	7.9
How can someone be infected with hepatitis B virus? *	Through contact with blood of an infected person	216	85.0
	Through contact with saliva of an infected person	104	40.9
	Through contact with sweat of an infected person	102	40.2
	Through contact with body fluid contaminated by blood of an infected person	200	78.7
	From mother to child in utero	171	67.3
	Through blood transfusions	219	86.2
	Via sexual intercourse	192	75.6
	Via needle prick injury	193	76.0
	I don't know	6	2.4
Can Hepatitis B virus cause liver disease?	Yes	242	95.3
	No	12	4.7
What are the common complications that can occur in someone with hepatitis B? *	Abdominal pain	161	63.4
	Liver cancer	210	82.7
	Loss of hair	69	27.2
	Weight loss	157	61.8
	Stomach upset	7	2.8
How much do you think your work in the hospital exposes you to the risk of contracting hepatitis B virus infection?	No risk of exposure	2	0.8
	Low risk of exposure	25	9.8
	Moderate risk of exposure	67	26.4
	High risk of exposure	137	53.9
	I don't know	23	9.1
	Total	254	100.0

* Multiple response questions

Results

Table 1 shows demographic characteristics of study participants. More than three-quarter of the respondents (79.9%) were females while 85% were Christians. Almost all (98%) the respondents were single. Majority of the respondents recruited were from 400 level (23.2% from 400A and 20.5% from 400B) and majority of the respondents' parents already had tertiary level of education (92.1%).

Table 2 showed the knowledge of Students on Hepatitis B Virus Infection. Most of the students (92.1%) agreed that hepatitis B virus is deadly. Modes of transmission of the infection as reported by the respondents included: through blood transfusions (86.2%), contact with blood of an infected person (85.0%), contact with body fluids contaminated by the blood of an infected person (78.7%), via needle stick injury (76.0%), sexual intercourse (75.6%), from mother to child in utero (67.3%), through contact with saliva of an infected person (40.9%), and through contact with the sweat of an infected person (40.2%).

Table 3 shows the awareness & knowledge of the

Table 3: Awareness & Knowledge of the Students on Hepatitis B vaccination

Variable	Category	Frequency (n=254)	Percent
Are you aware of hepatitis B vaccination?	Yes	228	89.8
	No	26	10.2
Do you believe vaccines help prevent the disease?	Yes	247	97.2
	No	7	2.8
How effective do you think hepatitis B vaccination is in protecting someone against hepatitis B virus infection?	Not effective	3	1.2
	Slightly effective	26	10.2
	Very effective	186	73.2
	I don't know	39	15.4
Are hepatitis B vaccines available in our school?	Yes	175	68.9
	No	79	31.1
What do you think is the recommended full dose of hepatitis B vaccine?	1 dose	5	2.0
	2 doses	22	8.7
	3 or more doses	129	50.8
	I don't know	98	38.6
How long does a full dose of hepatitis B vaccine protect someone?	Less than 1 year	4	1.6
	1 year to 5 years	16	6.3
	6 years to 10 years	27	10.6
	11 years to 19 years	9	3.5
	20 years or more	43	16.9
	I don't know	155	61.0
	Total	254	100.0

Table 4: Hepatitis B screening status

Variable	Category	Frequency (n=254)	Percent
Have you been screened for hepatitis B?	Yes	115	45.3
	No	139	54.7
Was the result negative or positive? (N=115)	Negative	113	98.3
	Positive	2	0.8
Have you ever received hepatitis B vaccination?	No	115	45.3
	Yes	139	54.7
How many doses have you received?	0	115	45.3
	1	33	13.0
	2	44	17.3
	3	62	24.4
	Total	254	100.0

Table 5: Factors Affecting the Willingness to Receive/Complete Vaccination

Variable	Category	Frequency (n=254)	Percent
Why have you not received hepatitis B vaccination? * (N=115)	I am not aware of hepatitis B vaccination	14	12.2
	I do not know where to go and receive it	53	46.1
	I don't have time	24	20.9
	It is expensive	8	6.9
	I don't see the need	10	8.7
	I am afraid of contracting the virus from the vaccine	4	3.5
	Never given it much thought	2	1.7
Are you willing to receive hepatitis B vaccine if you haven't? (N 115)	Yes	72	62.6
	No	7	6.1
	Maybe	36	31.3
If you haven't taken vaccination, what factors would encourage you to receive the hepatitis B vaccine? * (N 115)	Availability of free vaccination	33	28.4
	Clear information about the vaccination	27	23.2
	Inclusion of vaccine in the medical curriculum	27	23.2
	Recommendation by healthcare provider	28	25.2

* Multiple choice question

students on Hepatitis B vaccination. More than four-fifth (89.8%) of the students were aware of hepatitis B vaccination. Most (97.2%) agreed that vaccines helped prevent the disease. About three-quarter (73.2%) were of the opinion that hepatitis B vaccination was very effective in protecting someone against hepatitis B virus infection. More than two-thirds (68.9%) reported that hepatitis B vaccines were available in the school. More than half of the respondents (50.8%) were of the opinion that three or more doses were recommended to be fully vaccinated. Majority of the students reported that they did not know how long a full dose of hepatitis B vaccination offered protection.

Table 4 showed hepatitis B screening status of the participants. About 45.3% of respondents reported having been screened for hepatitis B, of whom only 2 (0.8%) tested positive. In contrast, 45.3% had not received the vaccine, while 24.4% had completed all three doses.

Table 6: Knowledge of the students about the Level of Knowledge of HBV infection and vaccination

	Knowledge of HBV infection		Knowledge of HBV vaccine	
	Frequency	Percent	Frequency	Percent
Good knowledge (>50%)	223	87.8	119	46.9
Poor knowledge (≤50%)	31	12.2	135	53.1
Total	254	100.0	254	100.0
Mean±SD	1.12±0.33		1.53±0.50	

Table 5 showed factors affecting the Willingness to Receive/Complete Vaccination. Majority of the students (46.1%) did not take the vaccine was because they do not know where to receive it. Most of those who did not take the vaccine (62.6%) reported that they were willing to receive it. Moreover, among those that had not taken the vaccine, the following factors were identified as facilitators of willingness to receive the hepatitis B vaccine: availability of free vaccination (28.4%), recommendation by healthcare provider (25.2%), clear

information about the vaccination (23.2%), and inclusion of vaccine in the medical curriculum (23.3%).

Table 7: Association between demographic characteristics of students and HBV screening status and vaccination

Variable	Category	Have you been screened for hepatitis B?		Have you ever received hepatitis B vaccination?	
		Yes	No	No	Yes
Age (years)	15-19 years	21(25.3)	62(74.7)	51(61.4)	32(38.6)
	20-24 years	83(52.9)	74(47.1)	62(34.5)	95(60.5)
	25-29 years	11(78.6)	3(21.4)	2(14.3)	12(85.7)
χ^2, *p*-value		23.280, **<0.001**		16.306, **<0.001**	
Religion	Christianity	102(47.2)	114(52.8)	96(44.4)	120(55.6)
	Islam	12(36.4)	21(63.6)	17(51.5)	16(48.5)
	Traditional	1(33.3)	2(66.7)	0(0.0)	3(100.0)
	Atheist	0(0.0)	2(100.0)	2(100.0)	0(0.0)
χ^2, *p*-value		3.216, 0.360		5.478, 0.140	
Marital status	Single	113(45.4)	136(54.6)	112(45)	137(55)
	Married	2(40.0)	3(60.0)	3(60.0)	2(40.0)
χ^2, *p*-value		0.057, 0.811		0.446, 0.504	
Undergraduate level	200 level	7(19.4)	29(80.6)	28(77.8)	8(22.2)
	300 level	11(34.4)	21(65.6)	7(21.9)	25(78.1)
	400 level A	24(40.7)	35(59.3)	34(57.6)	25(42.4)
	400 level B	17(32.7)	35(67.3)	26(50.0)	26(50.0)
	500 level	25(61.0)	16(39.0)	17(41.5)	24(58.5)
	600 level	31(91.2)	3(8.8)	3(8.8)	31(91.2)
χ^2, *p*-value		48.047, **<0.001**		44.997, **<0.001**	
Educational level of parents	Primary	1(20.0)	4(80.0)	2(40.0)	3(60.0)
	Secondary	6(40.0)	9(60.0)	7(46.7)	8(53.3)
	Tertiary	108(46.2)	126(53.8)	106(45.3)	128(54.7)
χ^2, *p*-value		1.531, 0.465		0.068, 0.967	

*** χ^2: Pearson chi-square, *p*-value >0.05 is significant.**

Table 8: Association between demographic characteristics of students and knowledge of HBV infection and vaccination

Variable	Category	Knowledge of hepatitis B infection		Knowledge of hepatitis B vaccination	
		Good knowledge	Poor knowledge	Good knowledge	Poor knowledge
Age (years)	15-19 years	72(86.7)	11(13.3)	20(24.1)	63(75.9)
	20-24 years	139(88.5)	18(11.5)	88(56.1)	69(43.9)
	25-29 years	12(85.7)	2(14.3)	11(78.6)	3(21.4)
χ^2, *p*-value		0.222, 0.895		28.252, **<0.001**	
Religion	Christianity	190(88.0)	26(12.0)	105(48.6)	111(51.4)
	Islam	29(87.8)	4(12.1)	12(36.4)	21(63.6)
	Traditional	2(60.0)	1(40.0)	2(60.0)	1(40.0)
	Atheist	2(100.0)	0(0.0)	0(0.0)	2(100.0)
χ^2, *p*-value		1.534, 0.674		3.962, 0.266	
Marital status	Single	219(88)	30(12)	117(47)	132(53)
	Married	4(80.0)	1(20.0)	2(40.0)	3(60.0)
χ^2, *p*-value		0.289, 0.591		0.096, 0.757	
Undergraduate level	200 level	31(86.1)	5(13.9)	3(8.3)	33(91.7)
	300 level	25(78.1)	7(21.9)	11(34.4)	21(65.6)
	400 level A	55(93.2)	4(6.8)	24(40.7)	35(59.3)
	400 level B	47(90.4)	5(9.6)	21(40.4)	31(59.6)
	500 level	34(83.0)	7(17.0)	32(78.0)	9(22.0)
	600 level	31(91.2)	3(8.8)	28(82.4)	6(17.6)
χ^2, *p*-value		6.104, 0.296		58.461, **<0.001**	
Educational level of - parents	Primary	3(60.0)	2(40.0)	1(20.0)	4(80.0)
	Secondary	13(86.7)	2(13.3)	7(46.7)	8(53.3)
	Tertiary	207(88.5)	27(11.5)	111(47.4)	123(52.6)
χ^2, *p*-value		3.720, 0.156		1.480, 0.477	
Have you ever received Hepatitis B vaccination	No	101(87.8)	14(12.2)	30(26.1)	85(73.9)
	Yes	122(87.8)	17(12.2)	89(64.0)	50(36.0)
χ^2, *p*-value		0.000, 0.989		36.383, **<0.001**	

** χ^2: Pearson chi-square, p-value >0.05 is significant.*

Table 6 shows the level of knowledge of the students about HBV infection and vaccine. Majority (87.7%) of the students had good knowledge of hepatitis B virus infection while more than half (53.1%) had poor knowledge of hepatitis B vaccination.

Table 7 shows the association between demographic characteristics of the students and HBV screening status and vaccination. Age and level of study were significantly associated with both hepatitis B screening (age: $\chi^2 = 23.280$, $p < 0.001$; level: $\chi^2 = 48.047$, $p < 0.001$) and vaccine uptake (age: $\chi^2 = 16.306$, $p < 0.001$; level: $\chi^2 = 44.997$, $p < 0.001$).

Table 8 shows the association between demographic characteristics of students and knowledge of HBV infection and vaccination. None of the demographic characteristics was found to be significantly associated with knowledge of hepatitis B infection among the students. Moreover, the demographic characteristics significantly associated with the knowledge of hepatitis B vaccine among the students were the students' age ($\chi 2$, p-value: 28.252, <0.001) and undergraduate level ($\chi 2$, p-value: 58.461, <0.001). Also, there is a significant association between the knowledge of hepatitis B vaccination and actual hepatitis B vaccination.

Table 9 shows the binary logistic regression on the determinants of screening status of hepatitis B infection and actual hepatitis B vaccination. With regard to hepatitis B screening status, respondents who were in 300 level were about 27 times (AOR 26.562, 95% CI 5.113-137.996) more likely to have undergone hepatitis B screening compared to those that were in 200 level (p=<0.001). Also, those in 400 level A were about 16 times (AOR: 15.937, 95% CI 3.813-66.606) more likely to have undergone hepatitis B screening compared to those that were in 200 level (p=<0.001). Furthermore, those in 400 level B were 13 times (AOR 13.056, 95% CI 3.503-48.661) more likely to have undergone hepatitis B screening compared to those that were in 200 level (p=<0.001). Respondents in 500 level were 16 times (AOR 16.404, 95% CI 4.138-65.033) more likely to have undergone hepatitis B screening compared to those that were in 200 level (p=<0.001). Moreover, those in 600 level were 6

Table 9: Binary logistic regression on the determinants of screening status of hepatitis B infection and actual hepatitis B vaccination

Variables	Screening status of hepatitis B infection				Actual hepatitis B vaccination			
	B	AOR	95% C.I	*p*-value	B	AOR	95% C.I	*p*-value
Age (years)								
15-19 years (ref)				0.484				0.472
20-24 years	0.870	2.386	0.468-12.178	0.296	-1.014	0.363	0.060-2.181	0.268
25-29 years	0.491	1.634	0.364-7.332	0.521	-0.668	0.513	0.097-2.726	0.433
Undergraduate level								
200 level (ref)		1.000				1.000		
300 level	3.279	26.562	5.113-137.996	**<0.001**	-3.115	0.044	0.009-0.226	**<0.001**
400 level A	2.769	15.937	3.813-66.606	**<0.001**	-0.818	0.441	0.098-1.991	0.287
400 level B	2.569	13.056	3.503-48.661	**<0.001**	-2.482	0.084	0.022-0.311	**<0.001**
500 level	2.798	16.404	4.138-65.033	**<0.001**	-2.056	0.128	0.033-0.503	**0.003**
600 level	1.803	6.069	1.564-23.559	**0.009**	-1.885	0.152	0.039-0.588	**0.006**
Constant	-2.728	0.065		**0.002**	2.876	17.748		**0.002**

B – Regression Coefficient AOR – Adjusted Odd Ratio ref – Reference Category, *p*-value is significant at $p \leq 0.05$

times (AOR 6.069, 95% CI 1.564-23.559) more likely to have undergone hepatitis B screening compared to those that were in 200 level (p=<0.001).

Regarding the actual hepatitis B vaccination, respondents who were in 300 level were about 23 times (AOR 0.044, 95% CI 0.009-0.226) less likely to have taken hepatitis B vaccination compared to those that were in 200 level (p=<0.001). Also, those in 400 level B were about 12 times (AOR 0.084, 95% CI 0.022-0.311) less likely to have taken hepatitis B vaccination compared to those that were in 200 level (p=<0.001). Respondents in 500 level were about 8 times (AOR 0.128, 95% CI 0.033-0.503) less likely to have taken hepatitis B vaccination compared to those that were in 200 level (p=0.003). Moreover, those in 600 level were 6.6 times (AOR 0.152, 95% CI 0.039-0.588) more likely to have undergone hepatitis B screening compared to those that were in 200 level (p=<0.006).

Table 10 shows the binary logistic regression on determinants of knowledge of hepatitis B vaccination. Respondents who were in 300 level were about 19.7 times (AOR 19.698, 95% CI 3.533-109.830) more likely to have knowledge of hepatitis B vaccination compared to those that were in 200 level (p=0.001). Also, those in 400 level A were 7.5 times (AOR: 7.556, 95% CI 2.216-25.767) more likely to have knowledge of hepatitis B vaccination compared to those that were in 200 level (p=0.001). Furthermore, those in 400 level B were 3.4 times (AOR 3.392, 95% CI 1.121-10.265) more likely to have knowledge of hepatitis B vaccination compared to those that were in 200 level (p=0.031). Moreover, respondents in 500 level were 3.7 times (AOR 3.715, 95% CI 1.166-11.836) more likely to have knowledge of hepatitis B vaccination compared to those that were in 200 level (p=0.026). Interestingly, respondents who have received hepatitis B vaccination were 4.2 times (AOR 4.211, 95% CI 2.214-8.007) more likely to have knowledge of hepatitis B vaccination compared to those who have not received the vaccination (p=<0.001).

Table 10: Binary logistic regression on the determinants of knowledge of hepatitis B vaccination

Variables	B	AOR	95% C.I. for AOR		*p*-value
			Lower	Upper	
Age (years)					
15-19 years (ref)		1.000			0.792
20-24 years	0.547	1.729	0.358	8.350	0.496
25-29 years	0.445	1.561	0.373	6.528	0.542
Undergraduate level					
200 level (ref)		1.000			**<0.001**
300 level	2.981	19.698	3.533	109.830	**0.001**
400 level A	2.022	7.556	2.216	25.767	**0.001**
400 level B	1.221	3.392	1.121	10.265	**0.031**
500 level	1.312	3.715	1.166	11.836	**0.026**
600 level	-0.345	0.708	0.207	2.426	0.583
Have you ever received hepatitis B vaccination?					
No (ref)		1.000			
Yes	1.438	4.211	2.214	8.007	**<0.001**
Constant	-2.079	0.125			**0.006**

B – Regression Coefficient, AOR – Adjusted Odd Ratio ref – Reference Category, *p*-value is significant at $p \leq 0.05$

Discussion

In this study among medical students in Afe Babalola University, Ado-Ekiti, we determined their knowledge of risk factors for hepatitis B infection, risk of exposure from clinical activities, awareness and knowledge of vaccination, and vaccination status. Majority of the participants perceived themselves to be at high risk of exposure to hepatitis B infection. This is similar to studies done by Ogundele et al. in Ondo, Nigeria[24] and Chingle et al. in Jos, Nigeria[10]. This perception may be partly attributed to their exposure to hepatitis B-related content within the medical curriculum, which may have influenced their awareness of occupational risk.

There was a significant relationship between age

and knowledge of hepatitis B vaccination. Participants aged 25–29 years demonstrated better knowledge compared to other age groups. This may be explained by the fact that students within this age range are predominantly in higher class levels (300–600 level), where they are more likely to have been taught virology and related clinical content and to have greater clinical exposure. This finding is consistent with the study by Ahmad et al. in Malaysia[25] but contrasts with the findings of Asadpour et al. in Rafsanjan, Iran[26], which reported no significant association between age and knowledge of hepatitis B vaccination. Importantly, this difference also reflects the influence of curriculum progression, as junior students who are yet to receive formal teaching in virology are likely to have lower baseline knowledge compared to senior students.

Regarding awareness, most respondents had heard about hepatitis B virus infection, with the primary sources of information being the school, followed by online sources and hospital exposure. This underscores the central role of educational institutions in disseminating health-related knowledge. In terms of knowledge, the majority of participants demonstrated good understanding of hepatitis B infection, with about 92.1% recognising it as a potentially deadly disease. Respondents also showed good awareness of transmission routes, including blood transfusion, contact with infected blood or body fluids, needle-stick injuries, sexual transmission, and mother-to-child transmission. This indicates generally strong foundational knowledge among the students, likely influenced by formal medical training and clinical exposure.

With regard to screening status, 45.3% of students reported having been screened for HBV, and only 0.8% tested positive. This is lower than findings from a similar study among medical students in Sierra Leone, where 10.2% tested positive[27]. The lower prevalence observed in this study may reflect differences in population characteristics, exposure risks, or screening practices.

In relation to hepatitis B vaccination, 89.8% of respondents were aware of the vaccine, and 97.2% agreed that it prevents the disease. However, despite this high level of awareness, only 55% had been vaccinated. This is comparable to findings by Asif M. et al.[28] (57%), higher than Ghana[29] (22.5%), but lower than Nepal (60.8%) and Kanchipuram, India[30] (72%). Variations in vaccination uptake may be due to differences in socioeconomic status, healthcare access, sample sizes, health service delivery systems, and vaccine availability across settings. Although more than half of respondents had received at least one dose, only about a quarter were fully vaccinated. This contrasts with findings from Obafemi Awolowo University[47], where full vaccination rate was 79% but is similar to findings from Kenya[9] (20.2%).

Despite these figures, a considerable proportion of students remained unvaccinated due to reasons such as lack of knowledge about where to receive the vaccine, time constraints, unawareness, cost, and perceived lack of need. However, many expressed willingness to be vaccinated if the vaccine was free, recommended by healthcare providers, clearly explained, or made compulsory within the curriculum.

Notably, respondents who had received hepatitis B vaccination demonstrated better knowledge of the vaccine compared to those who had not been vaccinated. This suggests that vaccination status may reinforce knowledge acquisition or that higher knowledge may promote vaccine uptake. Overall, knowledge of hepatitis B vaccination among students appears to be strongly influenced by both vaccination status and level of academic exposure, particularly as virology and related content are typically taught in senior years of medical training. This highlights the importance of curriculum timing in shaping preventive health knowledge and practices among medical students.

The study revealed a clear difference between knowledge of hepatitis B infection and knowledge of hepatitis B vaccination. While 87.8% of respondents demonstrated good knowledge of hepatitis B infection, only 46.9% had good knowledge of the vaccine. This suggests that students have stronger general knowledge of the disease compared to specific knowledge of immunisation practices.

This discrepancy may be due to differences in curriculum exposure, as information on hepatitis B infection is typically taught earlier and reinforced more frequently than detailed vaccination schedules and duration of protection. This is supported by Table 3, where although 89.8% were aware of the

vaccine and 97.2% believed it is preventive, many lacked accurate knowledge of key details such as dosing and duration of immunity, with 61.0% reporting they did not know how long protection lasts.

Also, worthy of note is the fact that the medical students are exposed to Hepatitis B lectures from 200 level especially as they interact with cadavers in their Anatomy labs, though the scope increases as they progress. Also, with access to internet and other related materials, pre-medical school education, personal experiences, just to mention a few, the level of Hepatitis B knowledge and their awareness of Hepatitis B vaccine is not exclusively proportionate to the level of the medical students

Overall, the findings indicate a gap between general disease knowledge and practical vaccination knowledge, highlighting the need for stronger and more continuous integration of immunisation education within the medical curriculum.

Limitation of study

The data obtained on the vaccination status was based on self-report by the respondents and not by measuring the hepatitis B surface antibody titer of the participants or reviewing vaccination registers. It is possible that the study design suffered recall bias, leading to an over- or underestimation of vaccination status of the medical students.

Strengths and limitations of the study

This study provides valuable insight into hepatitis B screening and vaccination uptake among medical students, as well as the factors influencing these behaviours. A key strength lies in its focus on a high-risk population, generating context-specific evidence that is relevant for targeted public health interventions. Additionally, the study captures both behavioural outcomes and associated determinants, offering a more comprehensive understanding of vaccine uptake within this group.

However, the findings should be interpreted in light of certain limitations. The vaccination status was based on self-reported data rather than objective verification through hepatitis B surface antibody titres or vaccination records, which may affect accuracy. Furthermore, the study design is subject to recall bias, potentially leading to overestimation or underestimation of vaccination and screening status among respondents.

Conclusion

This study identified multiple factors influencing hepatitis B vaccine uptake among medical students at Afe Babalola University, Ado-Ekiti, including lack of knowledge of where to access the vaccine, time constraints, limited awareness, and, to a lesser extent, cost and perceived lack of need. However, respondents indicated willingness to be vaccinated if the vaccine was free, recommended by a healthcare provider, clearly explained, or made compulsory within the curriculum.

While most respondents demonstrated good knowledge of hepatitis B infection, less than half had good knowledge of the vaccine, despite recognising its importance in prevention. Although socio-demographic factors did not influence knowledge of the infection, age (25–29 years) and level of study were associated with better knowledge of vaccination.

Despite good awareness of the disease, vaccination uptake remained low. These findings highlight the need to address barriers to vaccine uptake and promote a supportive environment that encourages vaccination among medical students and the wider population.

Recommendations

1. Routine screening and mandatory vaccination of medical students against this highly contagious infection before they start clinical attachments.
2. Training of students on universal precautions and preventive measures against the risk factors for hepatitis B infection.
3. Vaccines should be made free or prices should be subsidized.
4. Frequent notifications on the availability of the vaccine and where to receive it.

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