



DETERMINANTS OF HEPATITIS-B VACCINE UPTAKE AMONG ANTENATAL CARE ATTENDEES AT PRIMARY HEALTH CARE FACILITIES IN AN URBAN LGA OF NIGERIA

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ABSTRACT: *Despite the proven efficacy of the Hepatitis B vaccine (HBV) in preventing Hepatitis B disease and its adverse health outcomes for mother and child, the vaccination coverage among pregnant women remains alarmingly low in sub-Saharan countries, including Nigeria. This study assessed the Hepatitis B vaccine uptake and associated factors among pregnant women attending antenatal care at primary health care facilities in Obio/Akpor, Rivers State, Nigeria. A facility-based cross-sectional survey was conducted across eight primary healthcare facilities from August to September 2024 using an interviewer-administered questionnaire. Data were collected from 352 participants and analysed using proportion, chi-square, and binary logistic regression with statistical significance set at $p \leq 0.05$ and a 95% confidence interval not including unity. The prevalence of HBV uptake is 24.1% (95% CI = 19.63 – 28.56). Women aged 29-36 years have the highest prevalence, 32% (95% CI = 27.33-36.66), while pregnant women aged 20-28 years have the lowest prevalence, 13.4% (95% CI = 9.84-16.95). Major reasons for not taking the vaccine include fear of side effects (24.4%), reluctance (18.7%), fear of injection (18.4%), vaccine inaccessibility (13%), and cost (11.6%). HBV uptake was significantly influenced by age, marital status, educational level, employment status, the influence of the partner's decision, and gestational age. There is a low uptake of the HBV vaccine among pregnant women seeking care at the primary healthcare facilities in Obio/Akpor LGA, Rivers State, Nigeria. This can be mitigated through health education, training of primary health workers, and integration of free HBV into the antenatal care components.*

KEYWORDS: Hepatitis-B vaccine, Vaccine uptake, Pregnant women, Antenatal care, Vaccine hesitancy.



INTRODUCTION

Hepatitis B virus (HBV) infection is a serious public health concern. It is especially prevalent among pregnant women in sub-Saharan Africa, where the incidence of chronic infection remains significant [1]. Acute and chronic HBV infections contribute substantially to global morbidity and mortality through complications such as cirrhosis and hepatocellular carcinoma [2]. The World Health Organisation (WHO) says that in 2019, about 296 million people had chronic HBV infection and that about 900,000 people died from HBV each year [3].

Nigeria is recognised as a highly endemic country for HBV infections, with national prevalence estimates ranging from 8% to 12% in the general population, among the highest in sub-Saharan Africa [4]. A systematic review reported a prevalence of 14.1% among pregnant women in Nigeria, underscoring their vulnerability to infection and the potential for mother-to-child transmission (MTCT) [5]. Nigeria also accounts for the highest global burden of chronic HBV infection in children, largely driven by perinatal and early childhood transmission [6]. Overall, it is estimated that about 19 million Nigerians currently live with chronic hepatitis B and C infections [7]. Unlike countries such as Brazil and Japan, which have achieved low endemicity (<2% and <1%, respectively), Nigeria's high transmission setting presents substantial challenges for prevention and control [8].

To address the global burden, the WHO aims to eliminate viral hepatitis as a public health threat by 2030, with key targets including reducing the mother-to-child transmission (MTCT) of HBV to less than 0.1% and achieving 90% of the hepatitis B birth-dose vaccine coverage [9]. Achieving these goals in high-burden settings like Nigeria requires a clear understanding of the factors that shape HBV prevention behaviours, especially among pregnant women who are at increased risk of transmission to their infants [10, 11].

Despite the proven effectiveness of hepatitis B vaccination in preventing HBV infection and its long-term complications, international and national policies do not recommend routine hepatitis B vaccination during pregnancy. According to the WHO position paper, hepatitis B vaccination may be administered during pregnancy only when a woman is at high risk of infection or exposure and when the benefits outweigh potential risks [12]. Similarly, Nigeria's National Guidelines for Viral Hepatitis Prevention and Control and the National Immunisation Policy exclude hepatitis B vaccination from routine antenatal care, recommending it only for HBV-negative pregnant women who are susceptible and considered at risk, or for post-exposure prophylaxis [13]. This policy context is particularly critical given Nigeria's high HBV endemicity, low levels of antenatal HBV screening, and the substantial risk of MTCT. Late initiation of antenatal care and poor awareness of HBV status among pregnant women further limit opportunities for timely preventive interventions [14].

Although hepatitis B vaccination is safe and effective, uptake among pregnant women in Nigeria remains low. Existing studies have identified barriers such as low awareness, persistent misconceptions, and concerns about adverse reactions, cost, and limited access to vaccination services [15, 16]. While HBV vaccination has been studied extensively among healthcare workers and other adult populations, evidence focusing on pregnant women, especially those receiving care in primary health care (PHC) settings, is limited. Most existing studies are hospital-based and conducted in tertiary health facilities, leaving a significant evidence gap at the primary care level, where the majority of women receive antenatal services [14].



Therefore, this study aims to assess the prevalence of hepatitis B vaccine uptake and identify associated factors among antenatal care attendees in primary health care centres in Obio/Akpor Local Government Area, Rivers State, Nigeria. Findings from this study are expected to provide evidence to inform targeted interventions, strengthen antenatal screening and counselling services, and support policy decisions aimed at reducing mother-to-child transmission of HBV in high-burden settings.

METHODS

Study setting

This study was conducted in the primary health facilities in the Obio/Akpor Local Government Area, Rivers State, Nigeria. Rivers State is one of the 36 states of Nigeria, located within latitude 4° 18' 58.294" N - 5° 43' 15.652" N and longitude 6° 24' 7.883" E - 7° 35' 58.683" E in the south-southern part of Nigeria [17]. Obio/Akpor is an urban local government and is bounded by the Port Harcourt local government area to the south, Oyigbo to the east, Ikwerre to the north, and Emohua to the west. It is located between latitudes 4°45'N and 4°60'N and longitudes 6°50'E and 8°00'E. The LGA has about 17 model primary healthcare centres [18].

Study Design and Population

This study adopted a facility-based cross-sectional study design, which involved the administration of a well-structured questionnaire among pregnant women attending a primary health care centre in an urban LGA, Rivers State, Nigeria. The calculated sample size of 352 (minimum sample size of 258 plus 50% for non-response) was estimated using the Cochran formula for cross-sectional studies at a 95% confidence level, a 5% error margin, and 13.1% prevalence [14].

Nine (9) facilities were randomly selected, and a systematic sampling method was employed to select participants. Pregnant women attending these facilities for antenatal care within the study period who refused to give their consent were not included in the study. Pregnant women below 18 years were also not included in the study because of difficulty in obtaining consent from their parents or caregivers.

Data collection instruments and procedures

Data were gathered between August 15 and September 27, 2024, using a semi-structured questionnaire. The questionnaire had two parts: socio-demographics and vaccine uptake. The demographic characteristics section had 9 questions, including gender, age, marital status, occupation, educational level, monthly income, gestational week, decision-making, and cultural belief, and 8 questions relating to vaccine uptake. The validity and reliability of the instrument were evaluated by conducting a pre-test among 25 pregnant women. Corrections were done to improve the quality of the instrument, and Cronbach's Alpha (CA) was calculated at 0.78, which indicated an acceptable internal consistency [19].



Statistical analyses

Data was analysed using the STATA software. Descriptive statistics (frequencies and percentages) were used to summarise participants' baseline characteristics, and a chart illustrated the reasons for accepting or declining the hepatitis B vaccine. The association between vaccine uptake and socio-demographic factors was tested using the chi-square test. Binary logistic regression was fitted to identify the factors influencing the vaccine uptake, and statistical significance was considered at p-values < 0.05 and at a 95% confidence interval not including unity.

RESULTS

Socio-demographic characteristics

Table 1: Distribution of respondents according to their socio-demographic characteristics

Characteristics	Number(N=352)	Percentage (%)
Age as at last birthday		
20-28	149	42.3
29-36	203	57.7
Marital status		
Married	212	60.2
Unmarried	140	39.8
Educational level		
Basic education	175	49.7
Higher education	177	50.3
Occupational status		
Employed	152	43.2
Unemployed	200	56.8
Monthly income		
#30,000-100,000	156	44.3
Above #100,000	94	26.7
Below #30,000 monthly	102	29
Pregnancy trimesters		
First trimester	33	9.4
Second trimester	286	81.3
Third trimester	33	9.4
Decision-making		
Both of us	136	38.6
Mostly me	160	45.5
Mostly my partner	56	15.9
Cultural influence		
No	201	57.1
Yes	151	42.9



The study included 352 participants. Table 1 outlines the respondents' socio-demographic profiles. The age distribution showed that the majority, 203 (57.7%), were aged between 29 and 36 years, while 149 (42.3%) were within the ages of 20-28 years. The majority of the respondents, 57.4%, were married, while 140 (39.8%) were unmarried. For educational attainment, 49.7% of participants obtained a basic education, and 50.3% had a higher education. Occupational status showed that 56.8% of respondents were unemployed, while 43.2% were employed. The distribution of monthly income indicated that 44.3% earned between ₦30,000 and ₦100,000, 29% earned below ₦30,000, and 26.7% earned above ₦100,000.

In terms of pregnancy trimesters, most respondents 81.3% were in their second trimester, with 9.4% in the first trimester and 9.4% in the third trimester. Decision-making within the household revealed that 45.5% of respondents made decisions mostly by themselves, 38.6% reported joint decision-making with their partners, and 15.9% indicated that their partners made most of the decisions. The mean age (with standard deviation) of the respondents is 28.88 ± 2.88 years.

Hepatitis B vaccine uptake among pregnant women in Obio/Akpor LGA, Rivers State

Table 2: Distribution and proportion of Hepatitis B vaccine uptake among participants

Characteristics	Total number n(%)	No n(%)	Yes n(%)	p-value	95% CI for prevalence
Overall	352(100)	267(75.9)	85(24.1)		19.631-28.568
Maternal Age (years)				0.000	
20-28	149(42.3)	129(86.6)	20(13.4)		9.841-16.958
29-36	203(57.7)	138(68)	65(32)		27.334-36.665
Educational status				0.000	
Basic education	175(49.7)	155(88.6)	20(11.4)		8.079-14.720
Higher education	177(50.3)	112(63.3)	65(36.7)		31.664-41.735
Marital status				0.000	
Married	212(60.2)	178(84)	34(16)		12.170-19.829
Not Married	140(42.6)	89(63.6)	51(36.4)		31.373-41.426
Monthly Income				0.000	
#30,000-#100,000	156(44.3)	101(64.7)	55(35.3%)		30.307-40.292
Above #100,000	94(26.7)	80(85.1)	14(14.9)		11.180-18.619
Below #30,000	102(29)	86(84.3)	16(15.7)		11.899-19.500
Occupation				0.000	
Employed	152(43.2)	101(66.4)	51(33.6)		28.665-38.534
Unemployed	200(56.8)	166(83.0)	34(17)		13.075-20.924
Gestational week				0.032	
First trimester	33(9.4)	23(69.7)	30.3(2.8)		1.076-4.535
Second trimester	286(81.3)	213(74.5)	73(25.5)		20.946-30.053
Third trimester	33(9.3)	31(93.9)	2(6.1)		3.599-8.600
Decision making				0.000	
Both of us	136(38.6)	86(63.2)	50(36.8)		31.761-41.838



Mostly me	160(45.4)	137(85.6)	23(14.4)		10.732-18.067
Mostly my partner	56(16)	44(78.6)	12(21.4)		17.115-25.684
Cultural influence				0.000	
No	201	168(83.6)	33(16.4)		12.531-20.268
Yes	151	99(65.6)	52(34.4)		29.437-39.362

Figure 1: Frequency Distribution of Hepatitis B Vaccine Doses Received

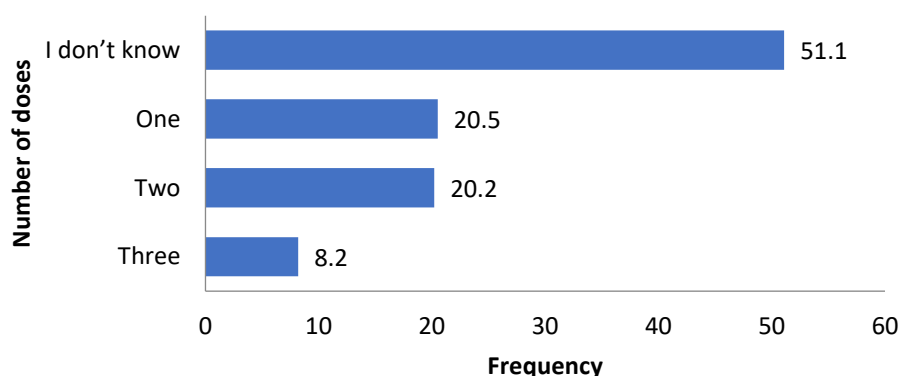


Table 2 presents the proportion of hepatitis B vaccine uptake among participants and its association with various demographic characteristics. Of the 352 respondents, 85 (24.1%) reported having received the vaccine, while 267 (75.9%) had not, with an overall prevalence confidence interval (CI) of 19.631–28.568. Among those who had taken the vaccine, 58.8% had taken only one (1) dose of the vaccine, 12.9% had taken two (2) doses, 15.3% had taken three doses (3), while 12.9% didn't know how many doses they had taken, as shown in Figure 1. These findings suggest that vaccine uptake is relatively low among the respondents. Maternal age was closely linked to vaccine uptake ($p=0.000$). Women aged 29–36 years had the highest prevalence (32%, CI: 27.334–36.665), followed by those aged 20–28 years (13.4%, CI: 9.841–16.958).

Educational status also showed a close link to vaccine uptake ($p=0.001$). Participants with higher education recorded the highest uptake (36.7%, 95% CI: 31.373–41.426), while those with basic education had the lowest uptake (11.4%, 95% CI: 8.079–14.720). Marital status further had a significant association with the uptake of Hepatitis-B vaccine ($p=0.000$). Respondents who were not married had the highest prevalence (36.4%, 95% CI: 31.373–41.426), whereas married respondents showed lower uptake (16.0%, 95% CI: 12.170–19.829). Similarly, income levels were significantly associated ($p=0.001$), with the highest uptake observed among participants earning between ₦30,000–₦100,000 (35.3%, 95% CI: 30.307–40.292). Additionally, in the second trimester, decision-making by both couples and cultural influence has higher vaccine uptake (25.5%, 95% CI: 20.946–30.053), (36.8%, 95% CI: 31.761–41.838) and (34.4%, 95%CI: 29.437–39.362), respectively.

Reasons associated with vaccine uptake and refusal

Figure 2: Reasons for taking Hepatitis B vaccine among respondents

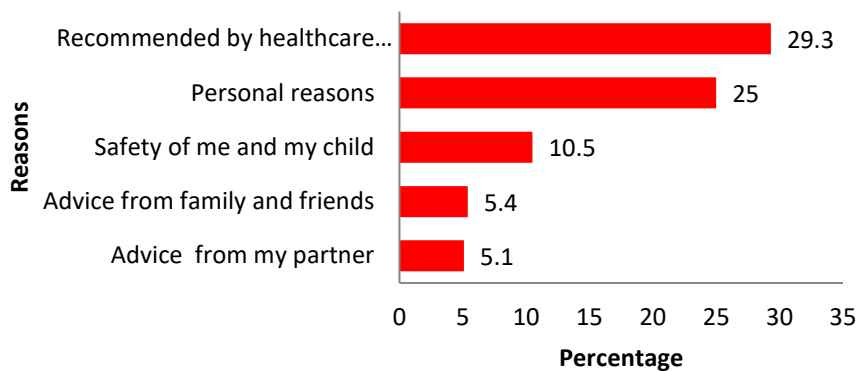


Figure 3: Reasons for not taking Hepatitis B vaccine among respondents

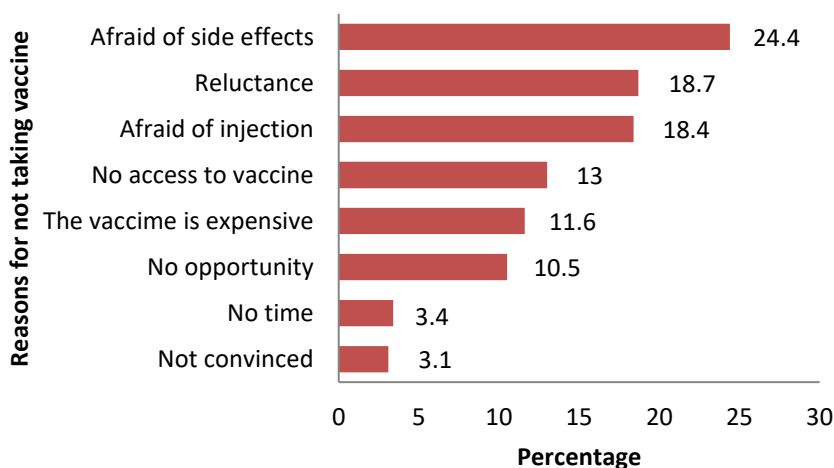


Figure 2 showed that the primary reasons for taking the Hep-B vaccine among the study participants are as follows: Recommendation by the healthcare provider (29.3%), personal reasons (25%), and safety of self and child (10.5%). Influence from social networks, such as advice from family and friends (5.4%) and partner advice (5.1%), was the least common reason for taking the vaccine.

Some participants refused to take the Hepatitis B vaccine due to various reasons, as shown in Figure 3. The most frequently mentioned reason was fear of side effects, which accounted for 24.4%. Reluctance to take the vaccine (18.7%), fear of the injection (18.4%), lack of access to the vaccine (13%), cost (11.6%), and a lack of opportunity (10.5%). Other reasons included lack of time (3.4%) and not being convinced of the efficacy of the vaccine (3.1%).



Factors influencing Hepatitis B vaccine uptake among pregnant women in Obio/Akpor LGA, Rivers State

Table 4: Factors associated with Hepatitis B vaccine uptake among Antenatal care women

Variables	Crude Odd Ratio (95% CI)	<i>p</i> -value	Adjusted Odd Ratio (95% CI)	<i>P</i> -value
Age				
20-28	1.00		1.00	
29-36	3.038(1.743-5.296)	0.000	3.710(1.902-7.237)	0.000
Marital status				
Unmarried	1.00		1.00	
Married	0.333(0.202-0.551)	0.000	0.551(0.262-1.162)	0.118
Educational level				
Basic education	1.00		1.00	
Higher education	0.222(0.127-0.388)	0.000	3.815(1.671-8.710)	0.001
Occupational status				
Unemployed	1.00		1.00	
Employed	2.465(1.496-4.063)	0.000	2.575(1.108-5.984)	0.028
Income				
Below #30,000 Monthly	1.00		1.00	
#30,000-#100,000	2.927(1.564-5.477)	0.001	0.462(0.197-1.086)	0.144
Above #100,000	0.941(0.432-2.050)	0.878	0.459(0.191-1.100)	0.045
Gestational Age (Weeks)				
First trimester	1.00		1.00	
Second trimester	0.788(0.358-1.734)	0.554	0.281(0.103-0.763)	0.013
Third trimester	0.148(0.030-0.743)	0.020	0.109(0.018-0.643)	0.014
Decision making				
Mostly my partner	1.00		1.00	
Mostly me	0.616(0.283-0.1338)	0.221	0.541(0.224-1.308)	0.173
Both of us	2.132(0.1030-4.412)	0.041	0.109(0.299-1.251)	0.178
Partners influence on Hepatitis B vaccine				
No	1.00		1.00	
Yes	2.182(1.238-3.845)	0.007	0.496(0.224-1.308)	0.051
Influence of culture				
No	1.00		1.00	
Yes	2.674(1.1619-4.417)	0.000	0.896(0.432-1.855)	0.766

Table 4 revealed the factors influencing the uptake of Hep-B vaccine among respondents. The results revealed the influence of several variables on Hep-B vaccine uptake among the antenatal (ANC) participants. In the bivariate analysis, age, marital status, educational level, income, gestational age, decision-making, partner's influence, and cultural influence were identified as significant variables.

In the multivariate analysis, all the factors had a positive influence on Hep-B vaccine uptake among respondents except for income, decision-making, and culture. Age was a key factor,



with respondents in the 29-36 years category being significantly more likely to take the vaccine compared to those in the 20-28 years age group ($aOR=3.710$, $p=0.000$). The educational level also emerged as a strong predictor, with individuals with higher education having a significantly higher likelihood of getting vaccinated ($aOR=3.815$, $p=0.001$).

Additionally, employed individuals were more likely to opt for vaccination after adjusting for other variables, ($aOR=2.575$, $p=0.028$), indicating that occupational status is a significant factor. In terms of gestational age, respondents in the second and third trimester were more likely to get vaccinated than respondents who were in their first trimester ($aOR=0.281$, 0.109 , $p=0.013$, 0.014), respectively.

In conclusion, the multivariate analysis highlighted that age, educational level, occupational status and income were the most significant factors influencing Hepatitis B vaccination decisions, while marital status, partners' influence, and cultural influence had no influence.

DISCUSSION

This study represents a comprehensive assessment of hepatitis B vaccine (HBV) uptake among pregnant women attending primary healthcare (PHC) facilities in Obio-Akpor Local Government Area (LGA), Nigeria. Primary healthcare facilities serve as the first and most accessible point of contact for most Nigerians seeking healthcare. While numerous studies have examined HBV vaccination among healthcare workers (HCWs) and medical students in Nigeria and other African countries, there remains a significant gap in research focusing on pregnant women, particularly those utilizing primary healthcare services. Only a pilot study has previously explored this topic among Nigerian pregnant women in tertiary hospitals [14], making this investigation both timely and essential for informing public health strategies.

The findings revealed a low overall uptake of the HepB vaccine, with fewer respondents completing the full three-dose regimen. Although vaccine uptake in this study was higher than that previously observed in a tertiary hospital in Nigeria, the rates are strikingly lower than those among HCWs, health science students, and the adult population in Nigeria [14, 15]. Similarly, higher uptake rates have been reported in Nguru, Nigeria [20], in Tanzania and Somalia [21], and in the United Kingdom [22]. Even higher coverage levels have been reported exclusively among HCWs and students in London [23], Uganda [24], Jos, Nigeria [25], and Ghana [26].

These variations may be linked to differences in study populations, such as greater awareness and access to vaccination among healthcare workers, variations in national vaccination policies (as seen in Somalia, Ghana, and Uganda), the standard of healthcare services, and differences in study populations and belief systems. The low prevalence of complete vaccination observed in this study highlights the necessity for stronger public health interventions to ensure that pregnant women complete the full hepatitis B vaccination schedule [14, 21-26].

The result of this study revealed that the primary reason for Hepatitis B vaccination was healthcare provider recommendation, followed by personal reasons and safety concerns, while influence from family and friends and partner's advice played a minimal role. This aligns with previous research which highlighted the significant role of social influence, particularly from healthcare workers, friends, and partners, in shaping vaccination decisions [27, 28].



However, the present study suggests that while social networks may contribute to vaccine uptake, professional medical advice remains the strongest motivator. The dominance of healthcare provider recommendations underscores their pivotal role in health education and vaccine advocacy. This finding reinforces the need for targeted interventions that enhance healthcare workers' ability to effectively communicate the benefits of vaccination [14].

Regarding barriers to vaccination, this study revealed that fear of side effects, reluctance, fear of injections, lack of access to vaccines, cost, and lack of opportunity were the primary reasons for hep-B vaccine non-uptake among the respondents in Nigerian primary healthcare facilities. This is consistent with findings from previous literature across different populations and regions. The fear of side effects and the cost of the vaccine in this study align with the reports of previous studies that similarly identified fear of vaccine side effects and the high cost of the vaccine as major reasons for not taking the vaccine [29-31]. Similarly, authors in Uganda and Ethiopia highlighted the high cost of the vaccine as a key impediment to vaccination among respondents [32, 33]. The issue of vaccine access was similarly identified by [20], who noted lack of access to vaccines as a primary reason for non-vaccination. The relatively high proportion citing no opportunity for vaccination echoes findings in Nigeria, highlighting that systemic gap in healthcare delivery continue to limit vaccination opportunities. These findings underscore the urgent need to address these barriers to improve vaccine uptake among pregnant women [34].

The study identified various socio-demographic and socio-cultural factors associated with hepatitis B vaccine uptake. The results showed that age, occupational status, marital status, educational level, partner influence, and gestational age significantly affected vaccine uptake. It also found that these factors were strongly linked to vaccination status. Specifically, women aged 29–36 years had higher odds of receiving the vaccine compared to younger women. This aligns with previous studies reporting higher vaccination rates among individuals aged 26 years and older [35]. Similarly, other research has found better hepatitis B vaccine protection among younger adults (<40 years) [36], while higher vaccination coverage among those aged 30 and above has been documented elsewhere [15, 37]. These consistent findings highlight age as a key factor in hepatitis B vaccine uptake and highlight the need for targeted strategies to increase vaccination among younger pregnant women.

Employment status was also positively associated with vaccine uptake, consistent with findings from Brazil, where paid employment increased the likelihood of having a documented hepatitis B vaccination record [38]. Another study also reported a significant association between occupation and vaccination status [29]. Marital status and occupation have also been identified as predictors of hepatitis B vaccination in previous Nigerian and international studies [15, 39–41].

Furthermore, educational attainment emerged as a strong predictor of vaccine uptake in this study, with women who had a tertiary education demonstrating the highest odds of vaccination compared to those with primary or secondary education. This finding aligns with studies conducted in Ghana and China, which reported significant associations between education level and hepatitis B vaccine uptake [41, 42]. Similar results have been reported in Nigeria, where individuals with tertiary education were more likely to be vaccinated than those with lower levels of education [15]. Women with higher education levels and better access to healthcare facilities were more likely to receive the vaccine, highlighting the importance of educational interventions to increase vaccine coverage. The consistent link between education



level and vaccine uptake, supported by these findings, underscores the influence of education on health-seeking behaviour [29].

Despite its strengths, this study has some limitations. Vaccination status was self-reported and not verified using vaccination cards or medical records, which introduces the possibility of recall bias and potential misclassification of vaccination status. Additionally, vaccine uptake was assessed based solely on the number of doses received, without considering the timing or intervals between doses, which may affect interpretation of complete immunization status.

Another limitation is that all participants resided in urban areas with relatively better access to healthcare services and basic amenities; therefore, the findings may not be generalizable to pregnant women living in rural settings. Nevertheless, the strength of this study lies in its focus on PHC facilities, which represent the primary entry point into the healthcare system for most pregnant women in Nigeria. As such, the findings are applicable to urban populations in Nigeria and other West African countries with similar healthcare structures.

CONCLUSION

This study demonstrates that hepatitis B vaccine uptake among pregnant women attending primary healthcare facilities in Obio-Akpor LGA remains critically low. Uptake is hindered by multiple barriers, including fear of side effects, financial constraints, limited access to vaccines, and missed opportunities for vaccination, all of which impede completion of the recommended three-dose regimen. Strengthening healthcare provider-led counselling, improving vaccine accessibility and affordability, and integrating hepatitis B prevention more effectively into antenatal care services are essential steps toward reducing mother-to-child transmission of hepatitis B in high-burden settings.

Author Contributions: A.I.W. and Z.N. contributed to the conception and study design. Project administration and supervision were performed by Z.N., S.A.I-W, and O.M.N. The statistical analysis was performed by Z.N., S.A.I-W, and O.M.N., and reviewed by A.I.W. All authors interpreted the results. All authors drafted the first manuscript. All authors have read and agreed to the published final version of the manuscript.

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Data Availability Statement: The raw data used for this article will be available on reasonable request by the authors.



Conflict of interest: There is no conflict of interest with respect to the study.

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