

HEPATITIS B KNOWLEDGE, SCREENING, VACCINATION, AND INFECTION AMONG PREGNANT WOMEN IN NASARAWA STATE NIGERIA

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ABSTRACT

Background: Inadequate knowledge of hepatitis B virus (HBV), limited screening and incomplete vaccination can sustain mother-to-child transmission in high-endemicity settings. This study assessed HBV-related knowledge and preventive practices and their associations with HBV infection among pregnant women attending primary health-care facilities in Nasarawa State, Nigeria. **Methods:** A facility-based cross-sectional study enrolled 338 pregnant women from one primary health-care facility in each of the three senatorial zones between September and November 2024. Interviewer-administered structured questionnaires captured HBV awareness, screening, vaccination and selected clinical or exposure histories. HBV infection status was analysed against these variables. Prevalence was reported with an exact 95% confidence interval (CI). Associations were evaluated using Pearson chi-square or Fisher's exact test, as appropriate, and crude odds ratios (ORs) with 95% CIs. Statistical significance was set at $p < 0.05$. **Results:** Twenty-eight participants were HBV-positive, giving a prevalence of 8.3% (95% CI: 5.6–11.8%). Most had heard of HBV (88.8%), had received HBV sensitization during antenatal care (94.7%) and had been screened during the current antenatal visit (94.4%); however, only 27.2% reported HBV vaccination and 56.5% of vaccinated women had received three doses. HBV positivity was substantially higher among women who did not know their HBV status than among those who did (29.6% versus 1.6%; OR = 26.63, 95% CI: 8.89–79.75; $\chi^2 = 63.89$; $p < 0.001$). Body marks or tattoos were also associated with infection (13.5% versus 6.4%; OR = 2.27, 95% CI: 1.03–5.01; $\chi^2 = 4.30$; $p = 0.038$). **Conclusion:** General HBV awareness and antenatal sensitization were high, but vaccination uptake remained low. Not knowing one's HBV status and having body marks or tattoos were associated with HBV positivity. Antenatal services should link universal screening with result counselling, completion of vaccination among eligible women and risk-reduction education.

KEYWORDS: Antenatal Care; Hepatitis B Virus; Knowledge; Nigeria; Pregnancy; Vaccination.

INTRODUCTION

Hepatitis B virus (HBV) infection remains a major cause of cirrhosis and hepatocellular carcinoma. The World Health Organization (WHO) estimated that 254 million people were living with chronic HBV infection in 2022, with approximately 1.2 million new infections and 1.1 million deaths annually.^[1] The burden is disproportionately high in the WHO African Region, where gaps in diagnosis, timely birth-dose vaccination

and access to treatment continue to impede elimination efforts.^[1,2]

HBV is transmitted through infected blood and body fluids, including perinatal exposure during childbirth, sexual contact, unsafe injections and contaminated sharp instruments.^[1,2] Infection acquired perinatally or in early childhood is especially likely to become chronic. Among pregnant women who are positive for both hepatitis B surface antigen (HBsAg) and hepatitis B e antigen, the

risk of transmission without effective prophylaxis can be very high.^[3,4] Universal antenatal HBsAg screening, appropriate maternal antiviral prophylaxis when indicated, timely infant birth-dose vaccination and completion of the vaccine series are therefore central to prevention.^[3,4]

Nigeria remains highly endemic for HBV, although prevalence varies by population and location.^[5-7] Studies in Central Nigeria have documented multiple serological markers of infection and diverse circulating genotypes among young people.^[8,9] Among pregnant women, continuing transmission risk is shaped not only by biological exposure but also by awareness, access to screening, knowledge of test results and vaccine uptake. Recent evidence from Nasarawa State and elsewhere in Nigeria indicates persistent infection and uneven use of prevention services.^[6,7,10]

Knowledge-and-practice assessments can identify actionable gaps within antenatal services. However, high general awareness does not necessarily translate into vaccination completion, accurate knowledge of personal HBV status or avoidance of blood-borne exposures. This study therefore assessed HBV-related knowledge, screening and vaccination practices and examined their associations with HBV infection among pregnant women attending selected primary health-care facilities in Nasarawa State, Nigeria.

MATERIALS AND METHODS

Study Design and Setting

A facility-based cross-sectional study was conducted from September to November 2024 across the three senatorial zones of Nasarawa State, North-Central Nigeria. One primary health-care facility was purposively selected from each zone: Wamba Road Primary Health Care Centre in Akwanga Local Government Area (Nasarawa North), Angwan Woje Primary Health Care Centre in Keffi Local Government Area (Nasarawa West) and Doma Road Primary Health Care Centre in Lafia Local Government Area (Nasarawa South).

Study Population and Eligibility

The study population comprised pregnant women attending antenatal care at the selected facilities. Women were eligible if they were attending an antenatal visit, were able to respond to the questionnaire and provided informed consent. Women who were seriously ill at the time of recruitment or declined participation were excluded.

Sample Size and Sampling

The minimum sample size was estimated using the single-population proportion formula $n = Z^2p(1 - p)/d^2$, with $Z = 1.96$ for 95% confidence, an expected prevalence of 26.4% from a study conducted in the region,^[5] and a 5% precision. A total of 338 women were enrolled. Allocation by facility reflected antenatal

attendance with 131 participants from Wamba Road, 101 from Angwan Woje, and 106 from Doma Road. Eligible attendees were recruited systematically using an interval of two after selection of the starting participant.

Data Collection and Variables

Trained research personnel administered a structured questionnaire. Captured in the questionnaire were sociodemographic information, awareness of HBV and HBV vaccination, receipt of HBV education and screening during antenatal care, knowledge of personal HBV status, self-reported vaccination and number of doses, gestational trimester at first antenatal visit, and selected clinical or exposure histories, including miscarriage, blood transfusion, body marks or tattoos, caesarean delivery and other surgery. The outcome was HBV infection status as recorded for the study cohort.

Statistical Analysis

Data were analysed using IBM SPSS Statistics version 27 and independently checked from the reported cell frequencies. Categorical variables were summarized as frequencies and percentages. HBV prevalence was calculated with a two-sided exact binomial 95% confidence interval. Associations between HBV status and categorical variables were assessed using Pearson's chi-square test when expected cell counts were adequate and Fisher's exact test when sparse cells were present. Crude odds ratios (ORs) and 95% confidence intervals (CIs) were calculated for binary comparisons. For a zero cell, a Haldane–Anscombe correction of 0.5 was used for the OR and CI. Multi-category variables were evaluated using an overall chi-square test. All tests were two-sided, and $p < 0.05$ was considered statistically significant.

Ethical Considerations

Ethical approval was obtained from the Nasarawa State Health Research Ethics Committee (NHREC protocol number 18/06/2017, approval dated 25th July, 2024). Participation was voluntary, and informed consent was obtained from each participant before enrolment.

RESULTS

Participant Characteristics and HBV Prevalence

All 338 enrolled pregnant women were included in the analysis. The median age was 25 years (range: 17–45 years). Twenty-eight participants were HBV-positive, corresponding to an overall prevalence of 8.3% (95% CI: 5.6–11.8%).

HBV Knowledge Screening and Vaccination Practices

Most participants had heard of HBV infection (300/338, 88.8%) and the HBV vaccine (227/338, 67.2%). Antenatal HBV sensitization was reported by 320 women (94.7%), and 319 (94.4%) reported HBV screening during the current antenatal visit. Nevertheless, 81 women (24.0%) did not know their HBV status. Only 92 (27.2%) reported having received HBV vaccine; among these, 52 (56.5%) reported completing three doses. There was no evidence that general awareness,

antenatal sensitization, screening or self-reported vaccination was associated with HBV positivity (Tables 1 and 2).

Clinical and Exposure-related Factors

HBV positivity was higher among women reporting body marks or tattoos than among those without these exposures (13.5% versus 6.4%; OR = 2.27, 95% CI: 1.03–5.01; $\chi^2 = 4.30$; $p = 0.038$). History of miscarriage showed an elevated but imprecise association that did not reach statistical significance (OR = 1.98, 95% CI: 0.83–4.75; Fisher's exact $p = 0.125$). No statistically significant associations were observed for vaccination status, vaccine-dose category, trimester at first antenatal visit, blood transfusion, caesarean delivery or other surgery (Table 2).

DISCUSSION

This study found an HBV prevalence of 8.3% among pregnant women attending selected primary health-care facilities in Nasarawa State. Although general awareness, antenatal sensitization, and screening coverage were high, fewer than one-third of participants reported vaccination. Two factors were statistically associated with HBV positivity. They included not knowing one's HBV status and having a body mark or tattoo.

The observed prevalence confirms that HBV remains an important maternal and neonatal health concern in the study area. It is consistent with continuing transmission reported in Nigeria and with recent local evidence from the same antenatal population.^[6,7,10] Earlier research in Central Nigeria also demonstrated substantial exposure to HBV markers and the circulation of several viral genotypes, including genotype E.^[8,9] These findings reinforce the need to integrate diagnosis, prevention of mother-to-child transmission, and linkage to care within routine antenatal services.

Most women had heard of HBV and reported receiving sensitization during antenatal care. Therefore, the findings do not support a conclusion of generalized absence of knowledge. The more specific gap was knowledge of personal HBV status. For example, women who did not know their status had approximately 27-fold higher crude odds of testing positive. This association should be interpreted cautiously. The cross-sectional design does not establish temporality, and self-reported prior knowledge of status may be influenced by previous testing, recall, counselling or misunderstanding of test

results. Nevertheless, the finding highlights a practical service gap that makes clear the need that screening should be accompanied by clear communication of results and documented referral or follow-up.

Vaccination uptake was low despite relatively high awareness of the vaccine. Among vaccinated participants, just over half reported three doses. Awareness alone may therefore be insufficient to achieve protection. Antenatal and community programmes should assess prior vaccination, counsel eligible women, and establish systems that support completion of the recommended schedule. These actions are consistent with current global emphasis on expanded testing, vaccination, and prevention of perinatal transmission.^[1–4]

Body marks or tattoos were associated with approximately twice the odds of HBV infection. Procedures that breach the skin may transmit HBV when instruments are reused or inadequately sterilized, and similar associations have been reported in other settings.^[11] This finding supports culturally appropriate risk-reduction education and infection-prevention oversight for informal tattooing, scarification, and related practices. The associations with miscarriage, transfusion, caesarean delivery, and other surgery were not statistically significant. Their wide confidence intervals indicate limited precision and should not be interpreted as proof of no effect. Comparable antenatal studies and evidence syntheses likewise show that the importance and precision of individual exposure histories vary across populations.^[12–16]

The study has several limitations. Its cross-sectional design precludes causal inference, and self-reported knowledge, screening, and vaccination histories may be affected by recall or social-desirability bias. Purposive selection of one facility per senatorial zone and facility-based recruitment may limit generalizability to all pregnant women in Nasarawa State. The modest number of HBV-positive participants produced wide confidence intervals for uncommon exposures and limited multivariable modelling. In addition, the analysis assessed individual knowledge and practice indicators rather than a validated composite knowledge-attitude-practice score. Despite these limitations, the multi-zone sampling and linkage of questionnaire responses with HBV status provide locally actionable evidence for antenatal prevention.

Table 1: HBV Knowledge and Screening Indicators Associated with HBV Infection.

Variable	Category	HBV positive n/N (%)	OR (95% CI)	Test	p value
Heard of HBV	No	4/38 (10.5)	1.35 (0.44–4.13)	Fisher	0.537
	Yes	24/300 (8.0)			
Heard of HBV vaccine	No	11/111 (9.9)	1.36 (0.61–3.01)	$\chi^2 = 0.58$	0.448
	Yes	17/227 (7.5)			
HBV sensitization at ANC	Yes	27/320 (8.4)	1.57 (0.20–12.23)	Fisher	1.000
	No	1/18 (5.6)			
Screened for HBV at ANC	Yes	27/319 (8.5)	1.66 (0.21–12.95)	Fisher	1.000

	No	1/19 (5.3)			
HBV status known	No	24/81 (29.6)	26.63 (8.89–79.75)	$\chi^2 = 63.89$	<0.001
	Yes	4/257 (1.6)			

Note: OR, odds ratio; CI, confidence interval; ANC, antenatal care. Fisher indicates Fisher's exact test. Percentages are calculated within each category.

Table 2: Vaccination, Clinical and Exposure-related Factors Associated with HBV Infection.

Variable	Category	HBV positive n/N(%)	OR (95% CI)	Test	p value
Received HBV vaccine	Yes	8/92 (8.7)	1.08 (0.46–2.54)	$\chi^2 = 0.03$	0.867
	No	20/246 (8.1)			
Vaccine doses received	1 dose	3/19 (15.8)	—	Overall $\chi^2 = 1.68$	0.432
	2 doses	1/21 (4.8)			
	3 doses	4/52 (7.7)			
Trimester at first ANC	First	15/146 (10.3)	—	Overall $\chi^2 = 4.52$	0.104
	Second	8/157 (5.1)			
	Third	5/35 (14.3)			
History of miscarriage	Yes	8/60 (13.3)	1.98 (0.83–4.75)	Fisher	0.125
	No	20/278 (7.2)			
History of blood transfusion	Yes	2/23 (8.7)	1.06 (0.24–4.77)	Fisher	1.000
	No	26/315 (8.3)			
Body mark or tattoo	Yes	12/89 (13.5)	2.27 (1.03–5.01)	$\chi^2 = 4.30$	0.038
	No	16/249 (6.4)			
Previous caesarean delivery	Yes	2/22 (9.1)	1.12 (0.25–5.04)	Fisher	0.702
	No	26/316 (8.2)			
History of other surgery	Yes	0/20 (0.0)	0.25 (0.01–4.22)	Fisher	0.392
	No	28/318 (8.8)			

Note: OR, odds ratio; CI, confidence interval; ANC, antenatal care. Fisher indicates Fisher's exact test.

Vaccine-dose and trimester variables were evaluated using overall Pearson chi-square tests; category-specific ORs were not estimated for these multi-category comparisons. The Haldane–Anscombe correction was applied to the surgical-history comparison because one cell contained zero.

CONCLUSION

HBV infection remains common among pregnant women attending the selected primary health-care facilities. General awareness and reported antenatal sensitization were high, but vaccination coverage was low. Not knowing one's HBV status and having a body mark or tattoo were associated with HBV positivity. Antenatal programmes should ensure universal screening, clear communication of results, linkage to appropriate care, vaccination assessment and completion, and targeted education on blood-borne exposures.

RECOMMENDATIONS

Integrate routine HBV education, HBsAg screening, documented result counselling, and referral into every antenatal-care pathway; assess vaccination history at the first antenatal visit and support completion of vaccination among eligible women in accordance with national guidance; provide culturally appropriate education on the risks associated with unsterile tattooing, scarification, and other skin-piercing procedures; strengthen community outreach to women of reproductive age before pregnancy, when vaccination and preconception counselling can be completed;

conduct larger prospective studies using validated knowledge and practice scales and individual-level multivariable analysis.

Declarations

Competing interests: The authors declare that they have no competing interests.

Data availability: Data supporting the findings of this study are available from the corresponding author on reasonable request, subject to ethical and institutional requirements.

Authors Contributions

S.E.E.: Conceptualization, methodology, analysis, resources, and writing original draft. G.R.P.: Conceptualization, methodology, supervision, review, and editing. M.P.A.: Conceptualization, review, and editing. All authors read and approved the final manuscript.

What Is Already Known on This Topic

HBV is transmitted through infected blood and body fluids, including perinatal exposure and unsafe use of sharp instruments. Mother-to-child transmission is a major route of chronic HBV infection in high-endemicity settings. Antenatal screening, timely infant prophylaxis and vaccination are central to preventing perinatal transmission.

What This Study Adds

HBV prevalence among the participating pregnant women was 8.3% (95% CI: 5.6–11.8%). General awareness and antenatal sensitization were high, but only 27.2% reported HBV vaccination. Unknown personal HBV status and body marks or tattoos were crude correlates of HBV positivity and provide targets for antenatal counseling.

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