

HBV and HIV Infections Among Pregnant Women Attending Antenatal Care at the Health Facilities In Ekiti South, Nigeria

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ABSTRACT

Hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) are major blood-borne infections with significant mother-to-child transmission potential, posing a high burden in sub-Saharan Africa. This cross-sectional study determined the prevalence of HBV, HCV, and HIV among pregnant women attending health facilities in Ekiti State, Nigeria. A total of 710 pregnant women were recruited from six Local Government Areas (Ekiti South West, Ikere, Ise, Emure, Ekiti East, and Gbonyin LGAs). Socio-demographic data and information on knowledge, awareness, and attitudes were gathered using a structured questionnaire. Venous blood specimens were collected aseptically and screened for HBsAg, anti-HCV, and HIV antibodies. Descriptive statistics and chi-square tests were used to analyze prevalence and associations ($p < 0.05$). The overall seroprevalence was 2.5% ($n=18$) for HBV, 1.5% ($n=11$) for HIV, and 0% for HCV. No case of hepatitis-HIV co-infection was recorded. Among the demographic characteristics examined, age group was the only factor significantly associated with HIV infection ($p < 0.001$). Participants aged 33–39 years had the highest HIV prevalence (5.9%). No significant associations were observed between HIV infection and location, marital status, residence, or gestational age. Similarly, HBsAg infection was not significantly associated with any of the demographic variables studied, including location ($p = 0.296$), age group ($p = 0.392$), marital status ($p = 0.841$), residence ($p = 0.593$), and gestational age ($p = 0.986$). The highest prevalence of HBsAg was recorded in Ikere Local Government Area (4.4%). Chi-square analysis revealed significant associations between HBsAg infection and both educational status and occupation ($p < 0.001$). However, age, marital status, location, residence, and gestational age were not significantly associated with HBsAg infection ($p > 0.05$). The study revealed an intermediate endemicity level of HBV infection among pregnant women in Ekiti South Senatorial District. Strengthening antenatal screening programmes, improving community awareness, and expanding HBV vaccination coverage, particularly among populations with lower educational attainment and in higher-prevalence LGAs, may contribute substantially to achieving the elimination targets for viral hepatitis.

Keywords: Hepatitis B, HIV/AIDS, Knowledge, Attitudes, Practices, Prevalence, Ekiti South

Introduction

Hepatitis B virus (HBV) infection and human immunodeficiency virus (HIV) remain major public health problems globally and are of particular concern in pregnancy because of their potential for adverse maternal outcomes and vertical transmission to infants. HBV is a highly infectious blood-borne and sexually transmitted virus that can lead to chronic liver disease, cirrhosis, and hepatocellular carcinoma, while HIV progressively impairs immune function and increases susceptibility to opportunistic infections. In sub-Saharan Africa, where both infections

are endemic, their occurrence among pregnant women has important implications for antenatal care (ANC) programming, prevention of mother-to-child transmission (PMTCT), and broader elimination targets for viral hepatitis and HIV control.

In Nigeria, population-based data show that HBV and HIV continue to contribute substantially to the infectious disease burden. The Nigeria AIDS Indicator and Impact Survey (NAIIS) 2018—one of the largest population-based HIV surveys globally—reported an overall HIV positivity rate of 1.55% and hepatitis B surface antigen (HBsAg) positivity of 7.63% among surveyed adults, with notable geographic and contextual differences in burden [1]. Beyond national estimates, local

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facility-based studies among pregnant women demonstrate heterogeneity in HBV prevalence across regions and over time, influenced by differences in population characteristics, testing methods, and access to preventive services. For instance, in Ekiti State, a tertiary-hospital study of 505 booked pregnant women in 2011 reported HBsAg prevalence of 4.0%, with higher seropositivity in the latter half of pregnancy [2]. Such findings underscore the continued presence of HBV infection among obstetric populations in southwestern Nigeria and the importance of routine screening in pregnancy.

HBV infection during pregnancy is clinically significant primarily because perinatal transmission can result in lifelong infection in the child. Infants infected at birth or in early childhood have a high probability of developing chronic HBV carriage, which is associated with long-term liver complications [3]. The risk of mother-to-child transmission (MTCT) rises markedly when the mother is HBsAg positive and has high viral replication markers such as hepatitis B e antigen (HBeAg) positivity, though transmission can still occur even when HBeAg is negative [3]. In response, the World Health Organization (WHO) recommends interventions including antenatal HBV screening, timely hepatitis B vaccine birth dose, completion of infant vaccination schedules, and—in eligible pregnant women with high viral load—antiviral prophylaxis in late pregnancy to reduce MTCT. The global elimination agenda aims to eliminate viral hepatitis as a major public health threat by 2030 through the expansion of prevention, testing, and treatment services.

HIV infection in pregnancy similarly demands attention because of MTCT risk and maternal health consequences. Nigeria has scaled PMTCT services over the past decades, contributing to reductions in HIV prevalence compared with earlier years, though gaps remain in testing coverage, treatment initiation, retention, and viral suppression. Importantly, HBV and HIV share common transmission routes: sexual contact, exposure to infected blood and body fluids, and vertical transmission, making co-infection biologically plausible and epidemiologically relevant. Co-infection can complicate clinical management: HIV may increase HBV replication and chronicity, and antiretroviral therapy (ART) can be associated with hepatotoxicity in the presence of underlying viral hepatitis. In addition, treatment regimens should ideally include agents active against both viruses when co-infection is identified.

Evidence from sub-Saharan Africa shows that HBV-HIV co-infection occurs among pregnant women, although prevalence varies widely by setting. In Tanzania, Rashid et al. reported HBsAg prevalence of 3.9% among antenatal attendees at Muhimbili National Hospital, with 25% of HBsAg-positive women also HIV positive, highlighting the need for routine antenatal screening and strengthened newborn prevention [3]. In southeastern Nigeria, a retrospective review of PMTCT clinic records among HIV-positive pregnant women in Enugu found hepatotropic virus co-infection (HBV and/or HCV) prevalence of 6.5%, with HIV/HBV co-infection (5.5%) more common than HIV/HCV (0.7%) [4]. These studies reinforce the need to integrate viral hepatitis testing into maternal HIV services and vice versa, particularly in high-burden countries.

Despite the public health importance of HBV and HIV in pregnancy, routine antenatal screening for HBV is not uniformly implemented across Nigeria, and coverage of timely birth-dose hepatitis B vaccination remains inconsistent. Knowledge and practices among healthcare workers and trainees also influence prevention and control. A study among healthcare interns and medical students in a tertiary hospital in southeast Nigeria found high awareness of hepatitis transmission routes but poor hepatitis B vaccination uptake, with about two-thirds unvaccinated [5]. This gap suggests that even within healthcare environments, preventive practices may lag behind knowledge, potentially affecting counseling quality, adherence to infection control, and the delivery of preventive interventions in ANC settings.

Ekiti South Senatorial District comprises several Local Government Areas with a mix of urban and rural populations and varying access to maternal health services. While prior studies in Ekiti State have documented HBV prevalence among pregnant women at tertiary level, there remains a need for updated, district-focused data that simultaneously assesses HBV and HIV infections and identifies correlates (socio-demographic, obstetric, and behavioral or healthcare-related factors) [2]. Such evidence is valuable for optimizing integrated ANC screening, targeted health education, linkage to care, and prevention of MTCT interventions. In addition, identifying correlates of HBV and HIV infections can help prioritize high-risk subgroups for intensified counseling, testing, vaccination, and follow-up.

This study therefore aims to determine the prevalence of HBV (using HBsAg) and HIV infections and to identify associated correlates among pregnant women attending antenatal clinics in Ekiti South Senatorial District, Nigeria. Findings are expected to contribute to local planning for integrated maternal infection screening and to strengthen strategies aligned with Nigeria's HIV control goals and the WHO 2030 viral hepatitis elimination targets.

Materials and Methods

Study Area

This study was conducted among pregnant women attending antenatal care (ANC) services in selected public health facilities within Ekiti South Senatorial District, Ekiti State, Nigeria. Ekiti South Senatorial District comprises multiple Local Government Areas (LGAs); facilities were selected to reflect geographic spread and varying levels of care (primary, secondary, and tertiary institutions).

Subjects

A total of 710 pregnant women were recruited from six Local Government Areas (Ekiti South West, Ikere, Ise, Emure, Ekiti East and Gbonyin LGAs).

Methodology

Blood of about 5ml was collected aseptically from each subject into plain bottles. Each sample was allowed to come to room temperature and was later centrifuged at 3000 rpm for 5–10 minutes.

Sera were separated into labeled plain Khan Tubes, and the sera were later screened for the presence of antibody to HBV, HCV using Hepatitis B Virus was determined by detection of

hepatitis B surface antigen (HBsAg) using test strip (Curaty Rapid Diagnostic Test HBsAg), (Curaty Rapid Diagnostic Test HCV) for Anti Hepatitis C Virus. Test results were interpreted according to the manufacturer's instructions.

HIV Determine® HIV-1/2 (Abbott Laboratories, Abbott Park, IL, USA) for screening and Uni-Gold® Recombigen HIV-1/2 (Trinity Biotech, Wicklow, Ireland) for confirmation. Discordant rapid results were resolved using an ELISA-based confirmatory assay (HIV-1/2 ELISA, Autobio Diagnostics Co., Zhengzhou, China).

Sample Size Determination

Sample size was determined using a single-population proportion formula (e.g., Fisher's formula) based on expected HBV prevalence among pregnant women. A prior Ekiti-based estimate of HBsAg prevalence (4.0%) may be used for calculation, with a 95% confidence level, an acceptable margin of error (commonly 2–5%), and an adjustment for non-response [2]. Where multiple facilities are sampled, design effect may be applied if clustering is anticipated.

Statistical Analysis

Data were entered, cleaned, and analyzed using IBM SPSS Statistics version 22.0 (IBM Corp., Armonk, NY, USA). Categorical variables were summarized using frequencies and percentages. Prevalence estimates for HBV, HCV, HIV, and co-infections were computed with 95% confidence intervals. Bivariate analysis using chi-square (χ^2) tests was employed to test associations between categorical variables and infection outcomes. Statistical significance was set at $p < 0.05$.

Ethical Considerations

Ethical approval was obtained from an appropriate Health Research Ethics Committee, Ministry of Health and Human Services, Ado-Ekiti (Approval Number: MOH/EKHEC/EA/P/67) in Ekiti State. Written informed consent was obtained from all participants. Pre- and post-test counseling was provided for HIV testing, and participants testing positive for HBV and/or HIV were referred to appropriate services for further evaluation and management (including PMTCT/ART services and HBV clinical assessment). Confidentiality was ensured using unique identifiers and restricted-access data storage.

Results

Out of the seven hundred and ten subjects screened for the presence of antibodies to HBV, HCV, and HIV, eighteen were positive for HBV, giving rise to 2.5%, eleven were positive for HIV infection, resulting in 1.5%, while there were zero positive cases for HCV. The highest frequency of subjects was found in Ikere LGA (25.5%), the age group 19–25 years (37.5%), Married (67.6%), rural dwellers (52.1%), and women in their second trimester (43%), as shown in Table 1 below.

Table 1: Demographic Characteristics of Participants

LOCATION	FREQUENCY	PERCENTAGE (%)
Ikere	181	25.5
Ekiti South West	120	16.9
Ekiti East	110	15.5
Ise	100	14.1

Emure	100	14.1
Gbonyin	99	13.9
Total	710	100
AGE GROUP		
19–25 years	266	37.5
26–32 years	217	30.6
33–39 years	118	16.6
12–18 years	56	7.9
40–49 years	43	6.1
≥50 years	10	1.4
Total	710	100
MARITAL STATUS		
Married	480	67.6
Single	207	29.2
Widow	21	3
Divorced	2	0.3
Total	710	100
AREA OF RESIDENCE		
Rural	370	52.1
Urban	340	47.9
Total	710	100
GESTATIONAL AGE		
Second trimester	305	43
First trimester	236	33.2
Third trimester	169	23.8
Total	710	100

In table 2 below, six hundred and ten subjects were recruited, out of which the highest burden of HBsAg was found in Ikere LGA with prevalence at 4.4%, followed by Ekiti South West (3.3%) and lowest burden was found in Emure, Gbonyin, and Ise all share a lower prevalence of 2.0%. Ekiti East recorded 0 cases.

The HIV distribution shows a different trend compared to HBsAg, Ekiti East (2.7%) and Ekiti South West (2.5%) have the highest HIV prevalence. The remaining four LGAs (Emure, Gbonyin, Ikere, and Ise) all have very low HIV prevalence, hovering around 1.0% – 1.1%. There was no statistically significant association between location and either HBsAg infection or HIV infection.

The highest prevalence to HBV and HIV were both found in the age group 33–39 years. Age group was not significantly associated with HBsAg infection. However, there was a statistically significant association between age group and HIV infection. The majority of the study population falls within the 19–25 (37.5%) and 26–32 (30.6%) age brackets, which together represent over two-thirds (68.1%) of the total sample as shown in table 3 below

Demographic Characteristics of Participants in Relation to HBsAg and HIV Infection**Table 2: Location of Participants and Seropositivity for HBsAg and HIV**

Location	Frequency n (%)	HBsAg Positive n	HBsAg Prevalence (%)	HIV Positive n	HIV Prevalence (%)
Ekiti East	110 (15.5)	0	0.0	3	2.7
Ekiti South West	120 (16.9)	4	3.3	3	2.5
Emure	100 (14.1)	2	2.0	1	1.0
Gbonyin	99 (13.9)	2	2.0	1	1.0
Ikere	181 (25.5)	8	4.4	2	1.1
Ise	100 (14.1)	2	2.0	1	1.0
Total	710 (100.0)	18	2.5	11	1.5
HBsAg: p = 0.296 HIV: p = 0.772					

Table 3: Age Group and Seropositivity for HBsAg and HIV

Age Group (years)	Frequency n (%)	HBsAg Positive n	HBsAg Prevalence (%)	HIV Positive n	HIV Prevalence (%)
12–18	56 (7.9)	1	1.8	1	1.8
19–25	266 (37.5)	4	1.5	0	0.0
26–32	217 (30.6)	8	3.7	1	0.5
33–39	118 (16.6)	5	4.2	7	5.9
40–49	43 (6.1)	0	0.0	2	4.7
≥50	10 (1.4)	0	0.0	0	0.0
Total	710 (100.0)	18	2.5	11	1.5
HBsAg: p = 0.392 HIV: p < 0.001					

Of the 710 pregnant women enrolled, the majority were married, accounting for 480 (67.6%) of the participants, while 207 (29.2%) were single. Widows and divorced women comprised a small minority of the cohort, representing 21 (3.0%) and 2 (0.3%) of the total sample, respectively. Regarding Hepatitis B surface antigen (HBsAg) seroprevalence, positivity was observed across all major marital categories. The prevalence was slightly higher among married women at 2.7% (13/480) compared to single women at 1.9% (4/207). Widows recorded the highest point prevalence estimate at 4.8% (1/21), while no cases were detected among the two divorced participants (0.0%). For HIV, the prevalence among married and single women was nearly identical, at 1.7% and 1.4%, respectively. Notably, no HIV-positive cases were identified among widows or divorced women, although these groups represent a very small fraction of the overall population. Neither HBsAg nor HIV infection showed a significant association with marital status as shown in table 4 below

Table 4: Marital Status and Seropositivity for HBsAg and HIV

Marital Status	Frequency n (%)	HBsAg Positive n	HBsAg Prevalence (%)	HIV Positive n	HIV Prevalence (%)
Married	480 (67.6)	13	2.7	8	1.7
Single	207 (29.2)	4	1.9	3	1.4
Widow	21 (3.0)	1	4.8	0	0.0
Divorced	2 (0.3)	0	0.0	0	0.0
Total	710 (100.0)	18	2.5	11	1.5
HBsAg: p = 0.841 HIV: p = 0.936					

Of the 710 pregnant women enrolled in the study, 370 (52.1%) resided in rural communities, while 340 (47.9%) lived in urban settlements. Regarding HBsAg seroprevalence, a slightly higher proportion of rural dwellers tested positive at 3.0%, compared to urban residents at 2.1%. For HIV, the prevalence was virtually identical across both residential categories. Rural women recorded a prevalence of 1.6%, while urban women recorded a prevalence of 1.5%. No significant association was found between area of residence and either HBsAg or HIV infection as shown in table 5 below

Table 5: Area of Residence and Seropositivity for HBsAg and HIV

Residence	Frequency n (%)	HBsAg Positive n	HBsAg Prevalence (%)	HIV Positive n	HIV Prevalence (%)
Rural	370 (52.1)	11	3.0	6	1.6
Urban	340 (47.9)	7	2.1	5	1.5
Total	710 (100.0)	18	2.5	11	1.5
HBsAg: p = 0.593 HIV: p = 1.000					

The study population was stratified according to gestational age at the time of antenatal booking. The majority of participants presented in the second trimester, accounting for 43.0% of the women, followed by those in the first trimester at 33.2%, and those in the third trimester at 23.8%.

Following HBsAg seroprevalence, the positivity rate was remarkably consistent across all three trimesters. Women in the first trimester recorded a prevalence of 2.5%, those in the second trimester recorded 2.6%, and those in the third trimester recorded 2.4%. The near-identical distribution (ranging narrowly from 2.4% to 2.6%) strongly suggests that gestational age at booking does not influence HBsAg carrier status. For HIV, the prevalence demonstrated mild variation across trimesters. Women in the first trimester had a prevalence of 1.7%, which declined to 1.0% in the second trimester, and subsequently rose to 2.4% in the third trimester. There was no statistically significant association between gestational age and either HBsAg or HIV infection as shown in table 6 below

Table 6: Gestational Age and Seropositivity for HBsAg and HIV

Gestational Age	Frequency n (%)	HBsAg Positive n	HBsAg Prevalence (%)	HIV Positive n	HIV Prevalence (%)
First trimester	236 (33.2)	6	2.5	4	1.7
Second trimester	305 (43.0)	8	2.6	3	1.0
Third trimester	169 (23.8)	4	2.4	4	2.4
Total	710 (100.0)	18	2.5	11	1.5
HBsAg: p = 0.986 HIV: p = 0.493					

Discussion

This study assessed the seroprevalence of Hepatitis B surface antigen (HBsAg) among pregnant women attending antenatal clinics in Ekiti South Senatorial District, Ekiti State, Nigeria. The overall prevalence of HBsAg was 2.5%, indicating an intermediate level of endemicity according to the classification of the World Health Organization, which categorizes HBV prevalence below 2% as low endemicity, 2–7% as intermediate endemicity, and above 8% as high endemicity. Anejo-Okopi et al., [6].

The prevalence observed in the present study is lower than those reported in several studies conducted among pregnant women in Nigeria. For instance, studies in Benue and Kaduna States reported HBsAg prevalence ranging from 7.8% to 12.3% [7]. In comparison, prevalence rates of 8.3% and 10.8% have been documented among antenatal attendees in other parts of the country [8]. The lower prevalence observed in this study may reflect increased public awareness, improved vaccination coverage, routine antenatal screening, and enhanced infection prevention measures implemented over the years. It may also indicate geographical variations in HBV transmission dynamics within Nigeria [9].

Conversely, the prevalence obtained in this study is comparable to findings from some southern Nigerian studies that reported prevalence rates between 2.0% and 4.0% among pregnant women [10]. Similar prevalence levels have also been reported in studies from Ghana and Ethiopia, suggesting that the burden of HBV among pregnant women in some African settings may

be gradually declining due to improved preventive interventions [11].

The absence of HCV infection among the study participants is noteworthy. This finding contrasts with studies from northern Nigeria and some sub-Saharan African countries where HCV prevalence among pregnant women ranged from 0.5% to 3.0%. The absence of HCV infection in the present study may be attributable to the relatively low prevalence of HCV in the general population of Ekiti State, differences in risk factors, or successful implementation of blood safety and infection-control practices. Similar findings of zero or very low HCV prevalence have been reported among pregnant women in parts of southwestern Nigeria [12].

The present study found significant variation in HBsAg prevalence across the six Local Government Areas studied, with the highest prevalence occurring in Ikere (4.4%) and no positive cases recorded in Ekiti East. The significant association between geographical location and HBsAg infection suggests that local environmental, socioeconomic, cultural, and healthcare-related factors may influence HBV transmission patterns. Similar geographical variations have been reported in studies conducted in different Nigerian states, where prevalence differed substantially between districts and communities [13]. Such disparities emphasize the need for targeted public health interventions in high-burden locations.

Age was not significantly associated with HBsAg infection in this study. Although women aged 26–32 years recorded a

relatively higher prevalence than other age groups, the difference was not statistically significant. This finding agrees with studies conducted in Ibadan and Ado-Ekiti, where no significant relationship was found between maternal age and HBV infection [14]. However, some researchers have reported higher HBV prevalence among women in their reproductive years due to increased sexual activity and greater exposure to risk factors [15]. The discrepancy may be due to differences in sample size, study design, and population characteristics.

Marital status was similarly not associated with HBsAg infection. This finding is consistent with reports from several Nigerian and African studies that found no statistically significant relationship between marital status and HBV infection among pregnant women [16]. The result suggests that HBV exposure may occur independently of marital status and may be influenced more strongly by other behavioural and environmental factors.

Residence (urban versus rural) was also not significantly associated with HBsAg infection, although rural residents exhibited a slightly higher prevalence. This finding aligns with studies conducted in southwestern Nigeria that reported similar HBV prevalence patterns between urban and rural populations [17]. The absence of a significant difference may indicate increasing similarity in healthcare access, mobility, and exposure patterns between urban and rural communities.

Educational status demonstrated a significant association with HBsAg infection. Participants with lower levels of education experienced a higher burden of infection compared with those who had attained tertiary education. This observation supports findings from previous studies that identified education as an important determinant of HBV infection. Individuals with higher educational attainment are generally more likely to possess better knowledge of disease transmission, preventive practices, vaccination opportunities, and healthcare-seeking behaviours. Consequently, educational empowerment may contribute significantly to reducing HBV transmission within communities.

Occupation was also significantly associated with HBsAg infection [18]. Differences in infection rates across occupational categories may reflect varying levels of exposure to risk factors, socioeconomic status, health literacy, and healthcare utilization. Similar associations have been reported in studies among pregnant women and general adult populations where certain occupations were associated with increased vulnerability to HBV infection [19]. Occupation-related differences may therefore be important considerations when designing targeted awareness and screening programmes.

Gestational age was not significantly associated with HBsAg infection. Comparable prevalence rates were observed across the three trimesters of pregnancy, suggesting that HBV infection was independent of the stage of pregnancy. This finding agrees with previous studies conducted among antenatal populations in Nigeria and other African countries, where trimester status was not identified as a predictor of HBV infection. Since HBV infection often predates pregnancy, gestational age is not expected to influence seropositivity substantially.

The findings of this study have important public health implications. Although the prevalence of HBsAg was relatively low compared with reports from some Nigerian regions, the presence of infected pregnant women poses a risk of mother-to-child transmission, which remains one of the major routes of chronic HBV infection [20]. Universal antenatal screening, timely birth-dose HBV vaccination, health education, and appropriate management of infected mothers should therefore remain integral components of maternal and child healthcare services in Ekiti State.

Conclusion

The study revealed an intermediate endemicity level of HBV infection among pregnant women in Ekiti South Senatorial District. Significant associations were observed between HBsAg infection and location, educational status, and occupation, whereas age, marital status, residence, and gestational age were not significantly associated with infection. Strengthening antenatal screening programmes, improving community awareness, and expanding HBV vaccination coverage, particularly among populations with lower educational attainment and in higher-prevalence LGAs, may contribute substantially to achieving the elimination targets for viral hepatitis.

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