

Prevalence of Hepatitis B Virus Infection among Attendees of Antenatal Care Clinics at Primary Health Care Centres in North-Central, Nigeria

¹A.R. Yusuf, ²O.I. Musa, ³A.A. Yusuf, ⁴A.T. Adebayo-Ayanda

1. Department of Family Medicine, University of Ilorin Teaching Hospital, Nigeria

2. Department of Epidemiology and Community Health, University of Ilorin

3. Ministry of Health, Kwara, Nigeria.

4. Department of Epidemiology and Community Health, University of Ilorin Teaching Hospital, Nigeria.

Abstract

Background: Hepatitis B virus (HBV) is a *Hepadnavirus* that infects liver cells, and causes an infectious disease of global significance. Several factors predisposes to HBV infection, some of these are peculiar to pregnant women, and infection in them could lead to maternal to child transmission of the disease.

The main objective of this study was to assess the prevalence and risk factors for hepatitis B Virus infection among pregnant women attending antenatal clinic (ANC).

Material and Methods: This hospital based cross-sectional study was conducted among 340 pregnant women attending antenatal care between February and March 2024. The respondents were selected using multistage sampling technique and interviewer administered semi-structured questionnaires were used to obtain information from them, after which blood samples were collected for HBsAg detection. Data was collated and analyzed using the Statistical Product and Service Solutions version 28 (SPSS-28).

Results: Respondent's age ranged from 18 to 44 years with a mean of 25 ± 5.45 years. The majority were between 20-24 years of age. The prevalence of HBV infection in the study was 12.6%. The factors found to have a statistically significant association with prevalence of HBV infection were: age, family type, previous blood transfusion, multiple sexual partner, previous hospital procedure, having a spouse with HBV infection, history of abortion, previous check of HBV status and previous result of HBV infection status.

Conclusion/Recommendations

The prevalence of HBV infection is increasing in our community and certain factors have been identified as determinants. There is a need to address risk factors. More efforts needs to be put towards preventive strategies such as increased awareness and routine screening among others. These will help to ensure adequate prevention and control of the disease.

Keywords: *Hepatitis B Virus, pregnant women, Infection, prevention.*

Background

Hepatitis is an inflammation of the liver that is caused by a variety of infectious agents (i.e., viral, bacterial, fungal, and parasitic organisms) and noninfectious agents (e.g., alcohol, drugs, autoimmune diseases, and metabolic diseases) leading to a range of health problems, some of which can be fatal.¹ There are five main strains of the hepatitis virus, referred to as types A, B, C, D and E. While they all cause liver disease, they differ in important ways including modes of

transmission, severity of the illness, population affected and prevention methods.² In particular, types B and C lead to chronic disease in hundreds of millions of people and together are the most common cause of liver cirrhosis, liver cancer and viral hepatitis-related deaths.¹ Horizontal transmission is possible in children, families and 'close personal contact'. Vertically transmission occurs perinatally from a carrier mother to her baby, through the placenta and during delivery.³

An estimated 3.6% of the global population is affected by chronic HBV infection.⁴ In Cameroon, the prevalence of HBV among pregnant women were 5.7% and 7.5% in two health care facilities.⁵ Nigeria accounts for 8.3% of the global burden of chronic HBV infection.⁶ A meta-analysis in Nigeria reported a prevalence of 14.0% among blood donors and 14.1% among pregnant women attending antenatal clinics.⁷

Correspondence to:

Yusuf Adebayo Ramat
Family Medicine Department,
University of Ilorin Teaching Hospital, Ilorin.
Email: adebayo.yusuf@npmcn.edu.ng
[ORCID: 0000-0003-3078-5294](https://orcid.org/0000-0003-3078-5294)

Studies in Abuja and Ilorin Nigeria, among the general population revealed prevalence of 12.9% and 10.9% respectively.^{8,8} About 10% of pregnant women who are positive for HBsAg will become chronic carriers, and 10% of these chronic carriers will develop cirrhosis and hepatocellular carcinoma.¹⁰

In highly endemic areas, HBV is most commonly spread from mother to child at birth from exposure to maternal blood and secretions at delivery, or from person to person in early childhood.¹¹ In areas of low endemicity, perinatal or early childhood transmission of HBV may be responsible for over a third of chronic infections. Transmission early in life is also associated with a higher risk of (lifelong) chronic infection.¹¹ As a result of the poor screening and low vaccination rate, the vertical transmission of HBV has become a major route of transmission of the virus. This leaves the children born at risk of developing chronic liver disease later in life.¹² It is therefore important that the most effective interventions to prevent mother-to-child transmission (MTCT) of HBV are identified and utilized. In-utero transmission is relatively rare and is not the major means of transmission of HBV from mothers to infants, although it may occur if intrauterine placental leakage arises as a result of threatened preterm labour.

A number of risk factors have been shown to be predictors of HBV carrier state in the general population and these include ethnicity, history of sexually transmitted infections (STI), blood transfusion, hepatitis exposure and occupational exposure.¹³ Risk factors identified in pregnant women include: multiple sexual partners, early age at sexual debut, past history of STI, and poor knowledge of HBV infection.^{14,15} A study in South-Western, Nigeria among pregnant women revealed that multiple sexual partners (MSP) and early age at sexual debut were independent risk factors for HBV infection.¹⁶

This study set out to determine the prevalence of hepatitis B Virus infection among pregnant women attending antenatal care (ANC) clinics at primary health care (PHC) centers in Kwara central zone and to identify risk factors associated with HBV infection among them.

Methodology

Description of the Study Area

The study was done in Kwara central zone, Kwara State, Nigeria. The projected population of the state based on 2006 census is 3,438,079. There are PHC facilities located within the local governments in Kwara Central where ANC take place along with provision of other health care services. Routine ANC takes place at PHCs in Kwara central daily except

weekends. The prevalence of HBV infection of 11.2% was found in a cross sectional study among pregnant women in Kwara State.³

The study was a descriptive cross-sectional study carried out using quantitative method of data collection. This involved questionnaire administration and sample collection. The study population comprised of pregnant women 18 years and above, attending ANC clinics at PHC centers in Kwara Central senatorial district. Very sick pregnant women who were not able to answer the questionnaire were excluded.

Sample Size Determination

The sample size was calculated using Fisher's formula:

$$n = z^2 pq/d^2$$

Final sample size calculated was **340**.

Sampling technique

Multistage sampling technique was used.¹

Stage 1: Selection of local government areas (LGAs): Two LGAs (Ilorin East and Asa) were randomly selected from the four LGAs in Kwara Central zone using simple random technique (balloting).

Stage 2: Selection of PHC centre: From each of the two LGAs selected, two PHC centres (one rural and one urban) were selected from the twenty and twelve PHC in Ilorin East and Asa respectively using simple random technique (balloting). Proportional allocation was then used to distribute the sample size across the health facilities.

Stage 3: Selection of Respondents: at the PHC facilities, systematic random sampling technique was used to select patient after a list daily clinical attendance of the patients in the clinic was obtained and used as the sampling frame. Double sampling was prevented by putting an identifier on the folder. Also regular data cleaning and validation was done to identify and remove any duplicate entries or potential cases of double sampling.

Proportional allocation to calculate sample size for each health facility.

Using proportional allocation: 120 participants were recruited from Okelele health centre, 55 from Oke Oyi Health, 85 from Afon District Health Centre and 80 from Ogele PHC Afon.

$$\text{Sampling interval} = \frac{\text{Population size}}{\text{Sample size}}$$

$$\text{Sampling interval} = 1840$$

340=5.4. i.e.6

Hence, sampling interval of six was used at the four facilities.

Samples were collected between February and March 2024.

Data Collection Instrument

The data was collected using the following instruments:

- 1) Semi-structured interviewer administered questionnaires
- 2) Hepatitis B Surface Antigen Test Strip (by Atlas Link Biotech Co., LTD USA)

The questionnaire was structured to have four sections: Section A was used for respondent's socio-demographic data. Section B was used to collect data on obstetrics and gynaecology history while section C was used to collect data on the potential risk factors associated with HBV infection. Section D was used to document the respondent's hepatitis B status.

Hepatitis B Surface Antigen (HBsAg) Detection

Blood sample (4 ml) was collected aseptically by the researcher from all participants from the ante-cubital vein, using sterile plastic disposable syringes. The sera collected was tested for HBsAg using NOVA test® HBsAg serum strip Kit manufactured by Atlas Link Biotech Co., LTD USA, in the laboratory at the facilities within 15-30 minutes of sample collection. The relative sensitivity and specificity of the rapid test kit have been found to be greater than 99.9% and 99.6% for serum or plasma specimens; and greater than 99.9% and 99.5% for whole blood specimens.^{17,18}

Preparation for Data Collection, Pretesting and Data Collection Procedure

Advocacy visits were paid to the hospitals of the selected local governments, intimating them with the research and soliciting for their support. The tool of data collection was pretested using 10% of the sample size, at Offa LGA.

Four trained research assistants participated in the data collection process. A detailed explanation as to the purpose of the study was given to all the eligible respondents. Data collection was done within 8 weeks.

Data Analysis

Data collected was checked daily for correctness and completeness. Then it was coded and analyzed using statistical package for social science (SPSS version 28.0). Inferential statistics to test for associations between categorical variables was done using Chi-square test. Summary of the statistics has been presented using frequency tables, charts, means and rates. Logistic regression analysis was done to identify independent factors for HBV infection. Level of

statistical significance was set at $p < 0.05$ at 95% confidence level.

Ethical Approval and consent to participate

Ethical approval was obtained from the Ethical Review Committee of Faculty of Clinical Sciences, University of Ilorin.

Results

A total of 340 pregnant woman participated in the study. Respondent's age ranged from 18 to 44 years with a mean of 25 ± 5.45 . In figure 1, forty-one of the respondents tested positive for HBV infection, thus giving a prevalence rate of 12.6%. As shown in table 2a, 112 (32.9%) of respondents were aware of HBV infection. About 77 (22.6%), 147 (43.2%) and 8 (2.4%) had tonsillectomy, scarification arks and tattoo in the past respectively.

Table 1: Socio-demographic characteristics of respondents n=340

Variables	Frequency (%)
Age groups (years)	
< 20	25 (7.4)
20 – 24	126 (37.1)
25 – 29	106 (31.2)
30 – 34	48 (14.1)
35 – 39	28 (8.2)
≥ 40	7 (2.0)
Mean ± SD	25 ± 5.45
Range	18 – 44
Ethnicity	
Yoruba	326 (95.9)
Igbo	3 (0.9)
Hausa	4 (1.2)
Others	7 (2.1)
Marital Status	
Married	303 (89.1)
Separated/Divorced/Widowed/Never Married	37 (10.9)
Type of marriage	N=303
Monogamy	269 (88.8)
Polygamy	34 (11.2)
Level of education	
Tertiary	70 (20.6)
Secondary	214 (62.9)
Primary	36 (10.6)
No formal education	20 (5.9)
Occupation	
Unemployed	21 (6.2)
Self employed	145 (42.6)
Civil servant	120 (35.3)
Others ^a	54 (15.9)
Income in one month^b	n=312
≤ 30,000	210 (67.3)
> 30,000	102 (32.7)
Family type	
Nuclear	178 (52.4)
Extended	162 (47.6)

^a Including private company workers, labourers

^b The cut-off of thirty thousand naira per month was based on the national minimum wage

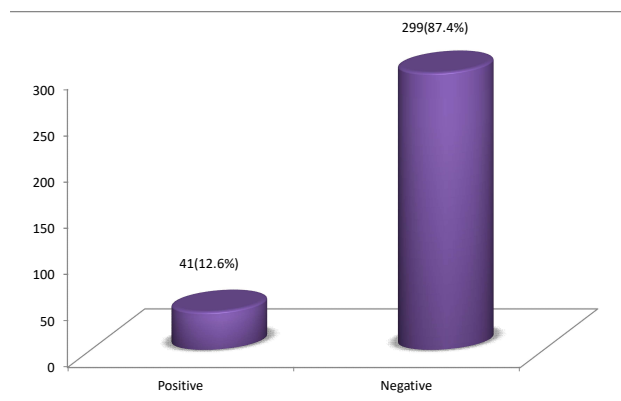


Figure 1: Prevalence of HBV Infection.
Table 2a: Potential risk factors of HBV infection among pregnant women n=340

Variables	Frequency (%)
Aware of the infection viral HBV	
Yes	112 (32.9)
No	228 (67.1)
Past history of Local Tonsillectomy	
Yes	77 (22.6)
No	263 (77.4)
History of Local Scarification	
Yes	147 (43.2)
No	193 (56.8)
Tattoo	
Yes	8 (2.4)
No	332 (97.6)
Previous blood transfusion	
Yes	10 (2.9)
No	330 (97.1)
Number of blood transfusion	n=10
Once	7 (70.0)
More than once	3 (30.0)
Purpose of transfusion	
Cesarean section	2 (20.0)
Sickness	6 (60.0)
Others	2 (20.0)
More than one current sexual partner	
Yes	23 (6.8)
No	317 (93.2)
Number of current sexual partners	n=23
Two	2 (8.7)
Three	19 (82.6)
Four or more	2 (8.7)

Table 2b revealed that 261 (76.8) of participants had a previous check of their HBV status mostly due to previous pregnancies. Among these, positive results were seen in 12 (4.6%) of the women. Table 2c shows that 224 (65.9) had more than one pregnancies with 147 (64.8) having more than one child. Participants with gestational age greater than 24 weeks constituted 211 (62%) of respondents. Furthermore, participants with

Table 2b: Potential risk factors of HBV infection among pregnant women n=340

Variable	Frequency (%)
Previous check of HBV status	
Yes	261 (76.8)
No	79 (23.2)
Outcome of result of previous check	
Positive	12 (4.6)
Negative	249 (95.4)
Spouses HBV status known	
Yes	10 (2.9)
No	126 (37.1)
Don't know	204 (60.0)
Spouse is positive to HBV	
Yes	2 (20.0)
No	8 (80.0)
Sharing of sharp Objects	
Yes	132 (38.3)
No	208 (61.2)
Intravenous drug use	
Yes	0 (0)
No	340 (100)
Hospital Procedure in the past	
Yes	26 (7.6)
No	314 (92.4)

Table 2c: Obstetric and gynecological factors of Hepatitis B virus infection among pregnant women

Variables	Frequency (%)
Gravidity	N=340
One	116 (34.1)
> 1	224 (65.9)
Parity	n=224
One	80 (35.7)
> 1	144 (50.9)
Gestational age	N=340
≤ 24 weeks	129 (38)
> 24 weeks	211 (62)
History of abortion	
Yes	47 (13.8)
No	293 (86.2)

positive history of abortion constituted 47 (13.8%) of respondents. In table 3 prevalence of HBV infection was highest among participants above and equal to 40 years of age (57.1%) and least (7.5%) among those with ages 25-29. Prevalence of HBV was highest in the participants with extended family set up. This was seen in 33 (20.4%). These associations were statistically significant.

Table 3: Association between hepatitis B status and socio-demographic variables n=340

Variables	HBV Status		χ^2	p-value
	Positive (%)	Negative (%)		
Age groups (years)			16.157	0.024^f
< 20	4 (16.0)	21 (84.0)		
20 – 24	15 (11.9)	111 (88.1)		
25 – 29	8 (7.5)	98 (92.5)		
30 – 34	7 (14.6)	41 (85.4)		
35 – 39	3 (10.7)	25 (89.3)		
≥ 40	4 (57.1)	3 (42.9)		
Mean ± SD	27 ± 6.83	25 ± 5.25	1.382	0.168
Marital Status			0.061	0.850
Married	37 (12.2)	266 (87.8)		
Separated/Divorced/Widowed/Never married	4 (10.8)	33 (89.2)		
Ethnicity			1.995	0.574
Yoruba	38 (11.7)	288 (88.3)		
Igbo	1 (33.3)	2 (66.7)		
Hausa	1 (25.0)	3(75.0)		
Others	1 (14.3)	6 (85.7)		
Type of marriage		N=303	0.66	0.417
Monogamy	34 (12.6)	235 (87.4)		
Polygamy	6 (17.6)	28 (82.4)		
Level of education			1.142	0.767
Tertiary	8 (11.4)	62 (88.6)		
Secondary	27 (12.6)	187 (87.4)		
Primary	5 (13.9)	31 (86.1)		
No formal education /Quranic	1 (5.0)	19 (95.0)		
Occupation			1.649	0.648
House wife/ Unemployed	2 (9.5)	19(90.5)		
Self employed	16 (11.0)	129 (89.0)		
Civil servant	18 (15.0)	102 (85.0)		
Others	5 (9.3)	49 (90.7)		
Family type			20.158	0.001
Nuclear	8 (4.5)	170 (95.5)		
Extended	33 (20.4)	129 (79.6)		
Income			0.860	0.354
≤ 30	25 (11.9)	185 (88.1)		
> 30	16 (15.7)	86 (84.3)		
> 30	16 (15.7)	86 (84.3)		

% = percentage of respondents in category; X^2 = Chi square test; p = significance; f=Fisher's exact

As shown in table 4a, previous blood transfusion had a statistically significant association with hepatitis B status as 40% of those with previous blood transfusion were positive for HBV infection. Similarly, 34.8% of participants who had MSP were positive for HBV infection. In table 4b, a higher prevalence of HBV was seen among participants who had not taken HBV screening in the past 15 (19%). Those who had initial positive HBV result 12 (100.0) as well as those whose spouse were positive for HBV infection 2(100.0), all

had a positive HBV result. Among participants who had hospital procedure in the past, 13(50%) had HBV infection. In table 4c, 23.4% of participants with previous history of abortion were positive for HBV infection. These associations were statistically significant. In table 5, family type was a strong predictor of HBV infection with P of less than 0.05. History of previous blood transfusion, multiple sexual partner, hospital procedure in the past, having a positive spouse and history of abortion all had a p value below 0.05 and odd ratio above 1.

Table 4a: Association between potential factors of HBV infection and HBV infection Status

Variables	HBV Status		χ^2	p-value
	Positive (%)	Negative (%)		
Aware of the infection viral HBV			0.280	0.597
Yes	15 (13.4)	97 (86.6)		
No	26 (11.4)	202 (88.6)		
Local Tonsillectomy as previous procedure			0.013	1.000
Yes	9 (11.7)	68 (88.3)		
No	32 (12.2)	231 (87.8)		
Scarification			1.211	0.271
Yes	21 (14.3)	126 (85.7)		
No	20 (10.4)	173 (89.6)		
Tattoo			1.294	0.255
Yes	2 (25.0)	6 (75.0)		
No	39 (11.7)	293 (88.3)		
Previous blood transfusion			7.585	0.006
Yes	4 (40.0)	6 (60.0)		
No	37 (11.2)	293 (88.8)		
Number of blood transfusion			3.750	0.053
Once	2 (25.0)	6 (75.0)		
More than once	2 (100.0)	0 (0.0)		
More than one sexual partner			12.012	0.001
Yes	8 (34.8)	15 (65.2)		
No	33 (10.4)	284 (89.6)		

% = percentage of respondents in category; X^2 = Chi square test; p = significance; f=Fisher's exact

Table 4b: Association between potential factors of HBV infection and HBV infection

Variables	HBV Status		χ^2	p-value
	Positive (%)	Negative (%)		
Previous check of HBV status			4.659	0.031
Yes	26 (10.0)	235 (90.0)		
No	15 (19.0)	64 (81.0)		
Result of previous check of HBV status			113.69	0.001
Positive	12 (100.0)	0 (0.0)		
Negative	14 (5.6)	235 (94.4)		
Spouse is positive to HB			4.727	0.030^f
Yes	2 (100.0)	0 (0.0)		
No	0 (0.0)	8 (100.0)		
Sharing of sharp objects			1.792	0.181
Yes	12 (9.1)	120 (90.9)		
No	29 (13.9)	179 (86.1)		
Intravenous drug use			0.007	0.933
Yes	0 (0)	0 (0)		
No	41 (13.9)	299 (86.1)		
Hospital Procedure in the past			38.216	0.001
Yes	13 (50.0)	13 (50.0)		
No	28 (8.9)	286 (91.1)		

% = percentage of respondents in category X^2 = Chi square test p = significance f=Fisher's exact

Table 4c: Association between HBV status and Obstetrics and Gynaecological factors

Variables	HBV Status		χ^2	p-value
	Positive (%)	Negative (%)		
Gravidity			0.121	0.861
One	13 (11.2)	103 (88.8)		
> 1	28 (12.5)	196 (87.5)		
Parity			0.807	0.369
One	12 (15.2)	67 (84.8)		
> 1	16 (11.0)	129 (89.0)		
Gestational age			1.489	0.222
≤ 24 weeks	12 (9.3)	117 (90.7)		
> 24 weeks	29 (13.7)	182 (86.3)		
History of abortion			6.620	0.010
Yes	11 (23.4)	36 (76.6)		
No	30 (10.2)	263 (89.8)		

% = percentage of respondents in category

X² = Chi square test

p = significance

Table 5: Predictors of HBV status

Variables	B	p-value	Odd ratio	95 % C I
Age groups				
< 20	-1.571	0.107	0.208	0.031 – 1.404
20 – 24	-1.834	0.029	0.158	0.030 – 0.825
25 – 29	-2.387	0.006	0.092	0.016 – 0.513
30 – 34	-1.652	0.071	0.197	0.034 – 1.149
35 – 39	-1.964	0.052	0.140	0.019 – 1.0202
≥ 40	RC			
Family type				
Nuclear	-1.581	0.001	0.206	0.091 – 0.466
Extended	RC			
Previous blood transfusion				
Yes	1.664	0.013	5.279	1.424 – 19.577
No	RC			
More than one sexual partner				
Yes	1.524	0.001	4.590	1.810 – 11.641
No	RC			
Previous check of HBV status				
Yes	-0.751	0.034	0.472	0.236 – 0.944
No	RC			
Outcome of result of previous check				
Positive	-24.006	0.998	0.010	0.001 – 0.100
Negative	RC			
Hospital Procedure in the past				
Yes	2.324	0.001	10.214	4.317 – 24.166
No	RC			
Spouse is positive to HB				
Yes	3.584	0.001	36.00	7.336 – 176.655
No	RC			
History of abortion				
Yes	0.985	0.013	2.679	1.236 – 5.807
No	RC			

β = Regression coefficient; p = significance; CI = Confidence interval; RC: Reference Category

Discussion

There were 340 participants recruited into the study with a mean age of 25 ± 5.45.

In this study, the prevalence of HBV infection was found to be 12.6% as 41 of the respondents had positive

hepatitis B test result. This means approximately, one out of eight pregnant women have hepatitis B virus infection. This is comparable to a prevalence of 11.2% found in a cross sectional study among pregnant women in Kwara State.³ Although this study was carried out about two years prior to the index study, prevalence of HBV infection has increased despite efforts by governmental and non-governmental organizations. The prevalence is not too far from prevalence of 10.5%, 10.2%, 9.2%, 8.0%, 7.89%, and 7.2% in South-West Nigeria, Benue, Gambia, Eastern Ethiopia, China, and Jos Nigeria^{-10,19,22}. It is however different from prevalence of 4.4% and 4.98% found in cross sectional studies among pregnant women attending ANC in Ghana and Cameroun.^{15,23} The similarities in the study population, and study design may be reasons for the close range of prevalence.

Prevalence of HBV infection was highest among women equal and above 40 years of age (57.1%) and least among pregnant women between 25-29 years (7.5%). This association was statistically significant. This finding is similar to findings in a cross-sectional study in China where prevalence of hepatitis was more at advanced age (greater than 35 years).²⁰ The finding is however different from findings in a cross sectional study in Jos, Nigeria where a higher prevalence of hepatitis was found in pregnant women between 15 and 30 years.²⁴ The possibility that older women had more exposure overtime than young women could be possible reasons for the course observed in the index study and similar studies.

The family type had a statistically significant association with prevalence of hepatitis. The highest prevalence of hepatitis were found in the participants who lived in an extended type of family 33 (20.4%). This means a family type with more members living together. This association was statistically significant. However Talla et al, in Benue Nigeria did not find a statistically significant association between family type and prevalence of HBV infection.²⁵ Findings in the index study may be due to increase in the incidence of transfer of communicable diseases like hepatitis through various means within the family. Previous studies in Oman and Indonesia showed that HBV carriers in the household significantly increase the risk of interfamilial transmission.^{26,27} In a retrospective chart review of all adult Omani patients diagnosed with chronic hepatitis at two tertiary hospitals in Oman, Busafi et al concluded that direct contact of infected individuals within a family is a main reported risk factor for HBV infection.²⁶ Hence, this facts may be possible reasons for the high prevalence observed in the extended family type with more family members compared to the nuclear type.

History of previous blood transfusion had a statistically significant association with prevalence of HBV infection as 4 (40%) of those with previous blood transfusion were positive for HBV infection compared with 11.2% of those without initial blood transfusion. This is similar findings in South-Western Nigeria, Eastern Ethiopia and Jos, Nigeria where a higher prevalence of hepatitis was found in pregnant women with initial blood transfusion.^{19,22,24} However, it is different from findings in North-West Ethiopia, where prevalence of hepatitis was more among participants who had not receive blood transfusion in the past.²⁸ Findings from the index study can be explained by the fact that HBV can be transmitted through any fluid/mucosal/blood contact from infected patients to others.

In this study, 34.8% of participants who had MSP were positive for HBV infection compared to 10.4% of those who had a single partner. This is comparable to findings in two tertiary hospitals in Uganda and Bauchi, Nigeria where participants with MSP had a higher prevalence of hepatitis compared to those with single partners.^{29,30} Bittaye et al in Bauchi Nigeria, however, did not find a statistically significant association between number of sexual partners and prevalence of HBV infection.¹⁰ According to WHO, sexual transmission of HBV is more prevalent in persons with MSP.³¹ This may be the reason for the consistent statistically significant finding in the index study and similar ones done in various regions of the world.

In the index study, a higher proportion of participants who had no previous check of their HBV infection status had a positive HBsAg result. This is similar to findings in South-West Nigeria, where a higher proportion of participants with no previous screening had a positive HBsAg result.¹⁹ It is however different from findings in Ghana where a higher proportion of participants who had HBV screening prior, had a positive HBs Ag result.²³ The findings in the index study might indicate that prior screening is a positive initiative as such persons may have taken further preventive measures to prevent infection hence a lower proportion compared to the initially unscreened participant.

Furthermore, all participants with previous positive hepatitis B status had a positive HBV test in the index study. This is similar to a study in South-West Nigeria where 100% of initially positive participant also had a positive HBsAg result.¹⁹ This may indicate a high level of sensitivity in the kit used.

This study revealed that all participants whose spouse had a positive hepatitis B result were positive for HBsAg test. A study by Talla et al in Benue Nigeria,

revealed a similar finding of increased prevalence of hepatitis B among women with spouse who had a positive hepatitis result.²¹ Possible reason for this finding could be increased risk of transmission among the couples from sexual as well as other forms of contact.

Participants in this study who had previous hospital procedure had a higher prevalence of HBV infection (50%) compared to those that did not (8.9%). This is consistent with findings in Eastern Ethiopia and Jos, Nigeria, where participants with previous hospital procedure had higher prevalence of hepatitis compared to those without previous hospital procedure.^{22,24} However, finding in North-West Ethiopia and Bauchi, Nigeria, did not reveal a statistically significant association between HBV prevalence and presence of hospital procedure in the past.^{28,30} Improper sterilization of hospital equipment and improper screening of transfused blood may be risk factors for transmission of HBV infection following hospital procedures.

A larger proportion of participants with previous history of abortion had a higher prevalence of hepatitis 11 (23.4%) compared to those without history of abortion (10.2%). This is comparable to findings in Eastern Ethiopia where a higher proportion of participants with previous history of abortion had a positive hepatitis B test result (22.2%).²² Possible source of infection in such cases might include: procedures like dilatation and curettage or blood transfusion in cases of associated moderate to severe blood loss.

The introduction of significant variables into logistic regression further showed that the family type was a stronger predictor of HBV infection. Likewise history of previous blood transfusion, multiple sexual partner, hospital procedure in the past, having a positive spouse and history of abortion. This further showed the strength of the associations.

The study had a descriptive cross-sectional study design, hence the outcome may not necessarily carry a causal relationship with the tested variables. A longitudinal study design would be required to establish causal relationships. This study is however intended to add to the body of knowledge that will form a template for future studies.

Conclusion

The prevalence of HBV infection is 12.6% among the study population. The main risk factors to HBV infection were: age, family type, previous blood transfusion, multiple sexual partner, previous positive HBV status, previous hospital procedure and history of abortion among others. These findings calls for

increasing need to improve the prevention and control of HBV infection. Measures need to be put in place to reduce the risk factors in order to allow for effective control. These strategies may help to reduce the prevalence of HBV infection and eventually lead to adequate prevention and control of the disease, and hopefully meet the goal of eliminating viral hepatitis as a public health problem by 2030.

There is a need to address risk factors. More efforts need to be put towards preventive strategies such as increased awareness and routine screening among others. These will help to ensure adequate prevention and control of the disease.

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

References

1. World Health Organization. Hepatitis. 2023. Accessed: 6 February, 2023. Available from: https://www.who.int/health-topics/hepatitis#tab=tab_1
2. World Health Organization. Hepatitis. 2021. Accessed: 12 February, 2023. Available from: https://www.who.int/health-topics/hepatitis#tab=tab_1
3. Omosigho PO, Izevbuwa OE, Osasona A. Seroprevalence of hepatitis B and C viruses among pregnant women in Ilorin , Kwara State , Nigeria. *Microbes Infect Dis.* 2022;3(3):566-77.
4. Naghavi M, Wang H, Lozano R, Davis A, Liang X, Zhou M, et al. Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990-2013: A systematic analysis for the Global Burden of Disease Study 2013. *Lancet.* 2015;385(9963):117-71.
5. Eyong EM, Yankam BM, Seraphine E, Ngwa CH, Nkfusai NC, Anye S, et al. The prevalence of HBsAg, knowledge and practice of hepatitis B prevention among pregnant women in the Limbe and Muyuka Health Districts. *Pan Afr Med J.* 2019;32:122.
6. Federal Ministry of Health. National AIDS/STIS control program. 2016. Accessed: 6 February, 2023. Available from: <https://www.hepb.org/assets/Uploads/Nigeria-Hepatitis-Guidelines-TX-guidelines.pdf>.
7. Musa BM, Bussell S, Borodo MM, Samaila AA, Femi OL. Prevalence of hepatitis B virus infection in Nigeria, 2000-2013: A systematic review and meta-analysis. *Niger J Clin Pract.* 2015;18(2):163-72.
8. Olayinka AT, Oyemakinde A, Balogun MS, Ajudua A, Nguku P, Aderinola M, et al. Seroprevalence of Hepatitis B infection in Nigeria: A national survey. *Am J Trop Med Hyg.* 2016;95(4):902-7.
9. Shittu AO, Olawumi HO, Issa BA, Nwabuisi C, Durotoye IA, Yussuf AD et al. Risk Factors And Sero-

- Prevalence of Hepatitis B Surface Antigen among Blood Donors in University of Ilorin Teaching Hospital, Ilorin, Nigeria. *East Afr Med J*. 2014;91(2):57-61.
10. Bittaye M, Idoko P, Ekele BA, Obed SA, Nyan O. Hepatitis B virus sero-prevalence amongst pregnant women in the Gambia. *Infect Dis (Auckl)*. 2019;19:259.
 11. World Health Organization. Guidelines for the prevention, care and treatment of persons with chronic hepatitis b infection. 2015. Accessed: 26 July, 2023. Available from: http://apps.who.int/iris/bitstream/handle/10665/154590/9789241549059_eng.pdf;jsessionid=17C531906491F385EC6C30156CE1DFDC?sequence=1
 12. Ojiegbe NO, Eleje GU, Nduka EC. Hepatitis B virus infection and infectivity status among pregnant women in Nigeria. *Hong Kong J Obs Gynae*. 2018;1:6-13.
 13. Rabi KA, Akinola OI, Adewunmi AA, Omololu OM, Ojo TO. Risk factors for hepatitis B virus infection among pregnant women in Lagos, Nigeria. *Acta Obstet Gynecol*. 2010;(89):1024-8.
 14. Anaedobe CG, Fowotade A, Omoruyi CE, Bakare RA. Prevalence, socio-demographic features and risk factors of Hepatitis B virus infection among pregnant women in Southwestern Nigeria. *Pan Afr Med J*. 2015;20:406.
 15. Nlinwe NO, Lungle D. Risk factors associated with hepatitis B virus infection among pregnant women attending the antenatal care unit of the Bamenda Regional Hospital. *Public Heal Pract*. 2021;2:100160.
 16. MacLachlan JH, Locarnini S, Cowie BC. Estimating the global prevalence of hepatitis B. *Lancet*. 2015;386(10003):1515-7.
 17. Lei Z, Feng Y. Diagnostic Effectiveness of All Test HBsAg Rapid Test Kit Compared with ELISA Serology Abst. *Heal Sci J*. 2022;16(8):963.
 18. Zion M. Nova Hepatitis B Test Strips, 100 Test (whole Blood). 2023. Accessed: 10 September, 2023. Available from: <https://zionmedicalsolutions.com/product/nova-hepatitis-b-test-strips-100-test-whole-blood/>
 19. Atilola G, Tomisin O, Randle M, Isaac KO, Odutolu G, Olomu J, et al. Epidemiology of HBV in Pregnant Women, South West Nigeria. *J Epidemiol Glob Health*. 2018;8(3-4):115-23.
 20. Jihong L, Jue L, Min L, Qian P, Ying W. Prevalence of hepatitis B virus infection and its associated factors among 15,461 pregnant women in Yunnan province, China. *Ann Epidemiol*. 2020;49:13-9.
 21. Talla C, Itanyi IU, Tsuyuki K, Stadnick N, Ogidi AG, Olakunde BO, et al. Hepatitis B infection and risk factors among pregnant women and their male partners in the Baby Shower Programme in Nigeria?: a cross-sectional study. *Trop Med Int Heal*. 2021;26(3):316-26.
 22. Umer A, Teklemariam Z, Ayele F, Mengesha M. Prevalence of hepatitis B infection and its associated factors among pregnant mothers attending antenatal care at public hospitals at Hararghe, Eastern Ethiopia. *Front Glob Women's Heal*. 2023;4:1-11.
 23. Boachie J, Pidah D, Eshun H, Jingbeja E, Adjei PF, Adu P. Prevalence of Hepatitis B Viral Infection in Pregnant Women at the Suhum Municipality, Ghana. *J Pregnancy*. 2024;1-7.
 24. Magaji FA, Okolo MO, Hassan Z, Shambe IH, Pam VC, Ocheke AN et al. Prevalence of hepatitis B virus infection among pregnant women in Jos, Nigeria. *Ann Afr Med*. 2020;19(3):176-81.
 25. Talla C, Itanyi IU, Tsuyuki K, Stadnick N, Grace A, Olakunde BO, et al. Hepatitis B infection and risk factors among pregnant women and their male partners in the Baby Shower Program in Nigeria: a cross-sectional study. *Trop Med Int Heal*. 2022;26(3):316-26.
 26. Al-busafi SA, Al-harhi R, Al-naamani K, Al-zuhaibi H, Priest P. Risk Factors for Hepatitis B Virus Transmission in Oman I. *Oman Med J*. 2021;36(4).
 27. Hartono G, Melanie YI, Turyadi, Susan II, Pramita GD, Rino AG et al. Hepatitis B virus infection in children of HBV-related chronic liver disease patients: a study of intra-familial HBV transmission. *Hepatol Int*. 2017;11:96-104.
 28. Gedefaw G, Waltengus F, Akililu A, Gelaye K. Risk factors associated with hepatitis B virus infection among pregnant women attending antenatal clinic at Felegehiwot referral hospital, Northwest Ethiopia, 2018: An institution based cross sectional study. *BMC Res Notes*. 2019;12(1):1-7.
 29. Bayo P, Ochola E, Oleo C, Mwaka AD. High prevalence of hepatitis B virus infection among pregnant women attending antenatal care?: a cross-sectional study in two hospitals in northern Uganda. *BMJ Open*. 2014;4:1-7.
 30. Mustapha GU, Ibrahim A, Balogun MS, Umeokonkwo CD, Mamman AI. Seroprevalence of hepatitis B virus among antenatal clinic attendees in Gamawa Local Government Area, Bauchi State, Nigeria. *Infect Dis (Auckl)*. 2020;20:194.
 31. World Health Organization. Hepatitis. 2024. Accessed: 31 May, 2024. Available from: <https://www.who.int/news-room/fact-sheets/detail/hepatitis-b>