



# Sero-prevalence of Hepatitis B Infection and Its Risk Factors among Women Admitted for Delivery in Ucth, Calabar, Nigeria

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## Authors' contributions

*This work was carried out in collaboration between all authors. Author CUI designed the study, wrote the protocol, and wrote the first draft of the manuscript. Author CIE managed the literature searches, analyses of the study and contributed in writing the first draft of the manuscript. Author BUA did the patient counseling, data collection and collation' while author CON assisted the laboratory scientist and in data analysis. All authors read and approved the final manuscript.*

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## ABSTRACT

**Background:** Vertical transmission of hepatitis B virus infection during pregnancy and delivery remains the major route of transmission in low resource areas.

The objectives of this study were to determine the sero-prevalence of hepatitis B infection (HBsAg) and the potential risk factors among pregnant women admitted for delivery.

**Materials and Methods:** This cross-sectional study of 300 women admitted for delivery was conducted at University of Calabar Teaching Hospital, Calabar, Nigeria. A pretested questionnaire was used for the collection of socio-demographic data and possible risk factors. Blood sample was collected from each consented woman and the plasma tested for the presence of HBsAg using rapid ELISA test Kits in the laboratory of the hospital. All the data were analyzed using microsoft

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SPSS version 17 statistical program.

**Results:** Out of the 300 women studied, positive HBsAg was detected in 14 women, giving a seroprevalence rate of 4.7%. The age of the women studied varied from 16 to 43 years with mean age of 27.9±4.6 years and mean parity of 1.1±1.5. Hepatitis B viral infection was significantly higher among pregnant women who did not attend any antenatal care (unbooked women) than pregnant women who attended antenatal care (booked women). There were statistically significant relationships between HBV infection and 2 or more sexual partners and previous history of induced abortion. Previous histories of blood transfusion, previous surgeries/dental manipulations, tribal marks/tattoos, previous contact with somebody with hepatitis B infection were not statistically significant. The data are related to 14 (4.7%) of HBV infected women in the study.

**Conclusion:** An intermediate prevalence of hepatitis B virus infection was identified which justifies the need for routine screening in pregnancy especially among unbooked women in order to identify and treat the infection.

*Keywords: Sero-prevalence; HBsAg; pregnant women; vertical transmission.*

## 1. INTRODUCTION

Hepatitis B virus (HBV) infection is one of the global public health problems. It is however an endemic disease in Sub Saharan Africa and Asia [1,2]. Transmission of the hepatitis B virus from asymptomatic carrier mothers to their off springs during the perinatal period is believed to be a major mode of transmission of HBV [3]. Various studies have shown that the vertical transmission rate varies between 10 to 50% in high endemic areas [1-3]. However, when the carrier mothers are also positive for hepatitis B envelope antigen (HBeAg) which is indicative of active viral replication, vertical transmission rates to their babies may be as high as 75% to 90% [3].

The prevalence of HBsAg positivity in various populations ranged from 0.5% to rates in excess of 17% [4,5]. The endemicity varies geographically, from high (>7%), intermediate (2-7%), to low (<2%) [4]. Hepatitis B infection is endemic in Nigeria with an estimated 3-12% of the total Nigerian population being chronic carriers [4,6]. In Asian countries where there is a high prevalence of HBsAg carriers, the prevalence of carrier mothers has been reported to vary from 3-15% [4].

HBV infection is transmitted by exposure to infected blood or body fluid, unprotected sexual contacts, through blood transfusion and vertically from mother to child [1,2,6-8]. Hepatitis B viral infection can also be transmitted between family members within households possibly by contacts of non-intact skin or mucus membranes with secretions or saliva containing Hepatitis B virus. Unlike in developed countries where infections occur predominantly in adults, in resource - poor settings, high numbers of infants and children are

infected [3]. Most people with chronic Hepatitis B in Nigeria were infected vertically at birth or during early childhood [9] and may remain asymptomatic for as long as 20 or 30 years [8].

Hepatitis B viral infection has many complications in the acute and chronic phases. Many of the afflicted persons remain chronic carriers who are prone to developing chronic liver diseases such as cirrhosis and hepatocellular carcinoma [8]. Between one quarter and one - third of people infected chronically with HBV are expected to develop progressive liver failure [8]. Acute hepatitis in pregnancy has been shown to induce premature labour and prematurity with the associated complications [9]. Studies have shown an increase in the incidence of prematurity over that seen in the general population [9]. There is higher rate of birth asphyxia (low Apgar scores) in newborn of HBsAg carrier, and there was a higher risk of intraventricular haemorrhage as well, which may be related to higher incidence of preterm delivery [9]. Also, antepartum and postpartum haemorrhage is higher due to coagulation failure from lack of production of vitamin k-dependent clotting factors, especially if the prothrombin time is prolonged as in fulminant hepatic failure from chronic hepatitis B viral infection [9].

In developed countries, pregnant women are routinely screened for HBV infection. However, in developing countries the case is different as many women are unbooked and not screened during pregnancy [9]. A demographic health survey (DHS) by WHO in 2003 showed that in developing countries of Africa, 68% of women report only once for antenatal care and a substantial proportion present only in the third trimester [10]. Several pregnant women do not

screen for hepatitis B before labour and even where antenatal screening is established, the unbooked group is usually missed out [9]. Even though routine universal vaccination of all persons has been established in several countries of high and intermediate endemicity [11], there is neither a screening policy in our environment nor routine vaccination or measures to protect the at risk population. Hepatitis B is a serious illness which is worthwhile to screen for as the prevention of vertical transmission is extremely important [3,9].

The intervention to stop vertical transmission can only be instituted when the status of the pregnant woman is known even during labour. Although studies have been carried out on HBV in different regions of Nigeria in different subgroups, information regarding HBV infection in pregnancy is sparse especially among the unbooked pregnant women and during labour, even though Nigeria falls within a high endemic region as regards the prevalence of HBV infection.

Thus the aim of this study is to determine the prevalence and risk factors among pregnant women admitted for delivery and to identify the target group for postpartum immunization.

## **2. MATERIALS AND METHODS**

### **2.1 Study Design and Setting**

This cross-sectional study was carried out at the Obstetrics and Gynaecology Department of the University of Calabar Teaching Hospital (UCTH), Calabar, Nigeria. UCTH is a tertiary health facility located in Calabar, south-south geopolitical area of Nigeria and provides tertiary health care services for about 3 million people in Cross River State.

### **2.2 Sampling and Recruitment**

The study included pregnant women who met the inclusion criteria and consented to participate in the study. The study was performed over a 5 months period with an average of 15 participants being selected weekly based on the estimated annual, monthly and weekly delivery rate in UCTH, using systematic random sampling. Three hundred pregnant women were enrolled into the study from 5<sup>th</sup> November, 2013 to 7<sup>th</sup> April, 2014.

### **2.3 Inclusion**

The Inclusion criteria were pregnant women who presented in the hospital either for normal delivery or caesarean section.

### **2.4 Exclusion Criteria**

The exclusion criteria were women immunized against hepatitis B infection and refusal to participate in the study.

### **2.5 Consent**

The pregnant women who met the inclusion criteria were recruited into the study after written informed consents were obtained from the participating women.

### **2.6 Ethical Consideration**

The research was conducted after approval was obtained from the ethics and research committee of the hospital.

### **2.7 Data Collection**

Data on socio-demographic characteristics and risk factors were obtained from participants using a structured questionnaire. Data on demographic characteristics included age, parity, booking status, gestational age, occupation, marital status and educational status. The risk factors obtained were previous blood transfusion, multiple sexual partner, tattoos/tribal marks, previous surgery and previous dental manipulation. Others were previous contact with infected people, sharing of sharps/needles, circumcision, previous induced abortion and previous delivery with traditional birth attendant.

About 4 ml of venous blood was collected from each woman with a 5ml syringe. The blood was collected into ethylene di-amine tetra-acetic acid (EDTA) containing tube. Parallel testing for HBsAg was used for the testing. Parallel testing involved the use of two rapid Enzyme Linked Immuno-Sorbent Assay (ELISA) test kits simultaneously on each woman's blood sample for HBsAg. The two rapid test kits used in the study were hepatitis B surface antigen ELISA kits produced by Abbott Laboratories (USA) and hepatitis B surface antigen rapid test kit by Zhengzhou Gem Medic Electric & Technology, China. The HBsAg screening was done by applying the plasma onto the kits and observed after 15 minutes. Two simultaneously positive test results were interpreted as positive. When one result was positive and one negative, a third kit was used as a tie breaker to resolve this difference (enzyme immunoassay rapid test kit from Green Cross Life Science Corp, Kyonggi-

do, Korea). The screening tests were performed by a laboratory scientist and the researcher in the hospital laboratory using the procedure as recommended by the manufacturers of the test kit.

Unbooked woman is defined as a pregnant woman who has not attended any antenatal clinic session throughout the pregnancy with a skilled attendant (trained medical personnel) before presentation in labour [12]. Booked pregnant woman is one who attended at least one antenatal clinic section during pregnancy by trained personnel [12].

## 2.8 Analysis

The data on demographic characteristics and risk factors for hepatitis B viral infection were analyzed using SPSS version 17 windows. Statistical comparison was done using independent t-test and Chi - square ( $X^2$ ) test at 95% confidence and level of significance of less than 0.05.

## 3. RESULTS

Out of 300 pregnant women tested, 14 tested positive to HBsAg, giving a sero-prevalence rate of 4.7% of the study population. Of the 14 women that screened positive to hepatitis B surface antigen (HBsAg) in this study, 5 (35.7%) were aware of their status before labour from their antenatal screening while 9 (68.3%) were not aware of their hepatitis B viral status. The age of the women studied ranged from 16 to 43 years (mean age =  $27.9 \pm 4.6$  years).

Table 1 shows the socio-demographic characteristics of the pregnant women. Majority of the participant; have had booking (83.7%), and married (88.7%). Most of the women were; at age group 26-30 years (41%), primi gravida (48.3%), with secondary school attainment (46%), and are traders (26%).

In respect to the HBsAg sero positivity status and its relation to the Socio-demographic factors, our study found that the prevalence of HBsAg was highest among the age group 21-25 years (8.4%), nulliparous (9.5%), unbooked women (10.4%), and housewife (7.6%). More single women also tested positive to HBsAg (8.8%) than the married women (4.1%). However, the difference was not statistically significant ( $P = 0.222$ ).

The mean ages of mothers with HBsAg positive and HBsAg negative were  $24.86 \pm 4.036$  and  $28.03 \pm 4.619$  years respectively (Table 2). The difference in mean age was not statistically significant ( $P = 0.051$ ). The mean difference in birth weight of babies of HBsAg positive and HBsAg negative women were was not statistically significant ( $P = 0.572$ ).

Table 3 shows the risk factors for HBV infection. Seven out of the 14 women that were seropositive to HBsAg had history of multiple sexual partners of 3 or more in the past and this was statistically significant ( $P = 0.006$ ). A total of 71 (23.7%) of the pregnant women gave history of previous induced abortion; of these 8 were seropositive to HbsAg. This was statistically significant ( $P = 0.003$ ).

Logistic regression carried out on the risk factors to remove the influence of confounding variables and determine the significant independent variables showed that the independent variables found to be significant risk factors for hepatitis B viral infection in the logistic regression model were only the history of multiple sexual partners of three or more and history of induced abortion (Table 4).

## 4. DISCUSSION

The results of this study showed that the prevalence of HBsAg among pregnant women admitted for delivery was 4.7%. According to the WHO classification of Hepatitis B endemicity [4], the prevalence of 4.7% showed that Calabar is an intermediate endemicity for hepatitis B virus infection. This prevalence is lower than 8.3% in Zaria [13], Nigeria, 8.3% in Nnewi [9], 11% in Makurdi [14] and 6% in Port Harcourt, Nigeria [15]. It is higher than the prevalence of 2.2% in Southeast Nigeria [16] and 2.9% in the South-South Nigeria [17]. However, it is comparable to 4.6% in Enugu [3], 3.9% in Ado Ekiti [18], Southwest Nigeria. A study from the Middle East reported a rate of 2.4% from Saudi Arabia [19]. Higher prevalence rates were reported from Ghana 10.5% and 8.0% in Mali [20,21]. Sero-epidemiological studies of different populations show marked variations and differences [9]. This difference may be as a result of the type of population studied, different geographical regions, socioeconomic status, differences in educational level, seeking of health-care assistance, and utilization of health-care facilities [18].

**Table 1. The socio-demographic characteristics and its relation to HBsAg Sero status of the participants**

Socio-demographic characteristics	Total number (%)	Serum HBsAg status		X <sup>2</sup>	P-value
		+ve No (%)	-ve No (%)		
<b>Age (years)</b>					
16-20	14 (4.7)	1 (7.1)	13 (92.9)		
21-25	83 (27.6)	7 (8.4)	76 (91.6)		
26-30	123 (41.0)	5 (4.1)	118 (95.9)		
31-35	69 (23.0)	1 (1.4)	68 (98.6)		
36-40	9 (3.0)	0 (0.0)	9 (100)		
>40	2 (0.7)	0 (0.0)	2 (100)		
<b>Parity</b>					
0	145 (48.3)	6 (4.1)	139 (95.9)		
1-2	115 (38.4)	6 (5.2%)	109 (94.8)		
3-4	21 (7.0)	2 (9.5%)	19 (90.5)		
5 and above	19 (6.3)	0 (0.0%)	19 (100)		
<b>Booking status</b>					
Booked	251 (83.7)	9 (3.6)	242 (96.4)	4.04	0.045
Unbooked	49 (16.3)	5 (10.2)	44 (89.8)		
<b>Occupation</b>					
Civil servant	57 (19.0)	3 (5.3)	54 (94.7)		
Hair dresser	23 (7.7)	1 (4.3)	22 (95.7)		
Seamstress	11 (3.7)	0 (0.0)	11 (100)		
Health worker	9 (3.0)	0 (0.0)	9 (100)		
Trader	78 (26.0)	2 (2.6)	76 (97.4)		
Public servant	23 (7.7)	1 (4.3)	22 (95.7)		
Housewife	66 (22.0)	5 (7.6)	61 (92.4)		
Student	33 (11.0)	2 (6.1)	31 (93.9)		
<b>Educational status</b>					
No formal education	7 (2.3)	0 (0.0)	7 (100)		
Primary	48 (16.0)	3 (6.3)	45 (93.7)		
Secondary	138 (46.0)	7 (5.1)	131 (94.9)		
Tertiary	107 (35.7)	4 (3.7)	103 (96.3)		
<b>Marital status</b>					
Single	34 (11.3)	3 (8.8)	31 (91.2)	1.49	0.222
Married	266 (88.7)	11 (4.1)	255 (95.9)		

**Table 2. The mean age, parity, gestational age, birth weight and HBsAg status of the pregnant women**

Characteristics	Mean (s.d)	HBsAg (+) mean (s.d)	HBsAg (-) mean (s.d)	t-test	P-value
Age (years)	27.88±4.636	24.86±4.036	28.03±4.619	6.369	0.051
Parity	1.12±1.515	1.36±1.447	1.11±1.520	0.349	0.555
Gestational age (weeks)	39.09±1.856	39.43±1.284	39.07±1.880	0.488	0.486
Birth weight(kg)	3.25±0.474	3.18±0.507	3.25±0.473	0.321	0.572

In this study, HBsAg was highest among the 21-25 years age group. A similar finding was noted in the study by Alegebeye et al in Port Harcourt, Nigeria who observed that the age range of women infected with the Hepatitis B virus was 20-24 years [15]. The reason for this finding is not very clear. But may be because this is the age group in which most women in South-South

Nigeria are most likely to become pregnant and present for screening in the hospital. It is also the age when they are likely to present for the first time for antenatal care. Hence, those positive to HBsAg are likely to be picked up when screened as was noted from this study. This finding was not in agreement with the findings from the study by Ajayi et al. [18] in Ado-Ekiti and Yakasai et al.

[22] in Kano, Nigeria, where majority of those that tested positive to HBsAg were in the age range of 25-30 years. This difference may be multi-factorial such as different geographical regions, cultural factors and socioeconomic status which influences the age of marriage, antenatal attendance and screening coverage [3,18]. This study also showed that HBV infection prevalence in pregnant women decreased after

the third decade. This may be due to small number of these group of women in this study and the fact that majority of these women would have completed their families size by the end of their third decade and usually do not present for screening for hepatitis B in pregnancy, hence the observed decrease in hepatitis B infection rate after the third decade.

**Table 3. The risk factors to hepatitis B viral infection**

Variables	Number (%)	Serum HBsAg		X <sup>2</sup>	P-value
		HBsAg (+)	HBsAg (-)		
		No (%)	No (%)		
<b>Blood transfusion</b>					
Yes	21 (7.0)	2 (9.5)	19 (90.5)	1.20	0.274
No	279 (93)	12 (4.3)	267 (95.7)		
<b>Number of sexual partners</b>					
1	117 (39.0)	3 (2.6)	114 (97.4)	10.23	0.006
2	129 (43.0)	4 (3.1)	125 (96.9)		
3 or more	54 (18.0)	7 (13.0)	47 (87)		
<b>Tattoos/tribal marks</b>					
Yes	17 (5.7)	2 (11.8)	15 (88.2)	2.04	0.153
No	283 (94.3)	12 (4.2)	271 (95.8)		
<b>Previous surgery</b>					
Yes	57 (19)	2 (3.5)	55 (96.5)	0.21	0.645
No	243 (81)	12 (4.9)	231 (95.1)		
<b>Previous contact with hepatitis B infected people</b>					
Yes	17 (5.7)	0 (0.0)	17 (100)	1.47	0.479
No	197 (65.7)	11 (5.6)	186 (94.4)		
I don't know	86 (28.6)	3 (3.5)	83 (96.5)		
<b>Sharing of harps/needles</b>					
Yes	28 (9.3)	1 (3.6)	27 (96.4)	0.08	0.773
No	272 (90.7)	13 (4.8)	259 (95.2)		
<b>Dental procedure</b>					
Yes	49 (16.3)	2 (4.1)	47 (95.9)	0.05	0.832
No	251 (83.7)	12 (4.8)	239 (95.2)		
<b>Female circumcision</b>					
Yes	61 (20.3)	3 (4.9)	58 (95.1)	0.01	0.917
No	239 (79.7)	11 (4.6)	228 (95.4)		
<b>History of intravenous drug abuse</b>					
Yes	8 (2.7)	1 (12.5)	7 (87.5)	1.13	0.287
No	292 (97.3)	13 (4.5)	279 (95.5)		
<b>Previous delivery with traditional birth attendant</b>					
Yes	16 (5.3)	2 (12.5)	14 (87.5)	2.33	0.127
No	284 (96.7)	12 (4.2)	272 (95.8)		
<b>Polygamous marriage setting</b>					
Yes	9 (3.0)	1 (11.1)	8 (88.9)	0.87	0.352
No	291 (97.0)	13 (4.5)	278 (95.5)		
<b>Induced abortion</b>					
Yes	71 (23.7)	8 (11.3)	63 (88.7)	9.110	0.003
No	229 (76.3)	6 (2.6)	223 (97.4)		

**Table 4. Significant risk factors for HBV infection based on logistic regression**

Variable	Odds ratio	95% C.I. for odds ratio	P-value
History of multiple sexual partners of 3 or more	0.202	0.051 - 0.795	0.022
History of induced abortion	0.245	0.063 - 0.951	0.042

The prevalence of HBV infection in this study increased from para 0 to para 1-2 and peaked at para 3-4 and then decreased after para 4. However, there was no statistically significant difference in parity of the women. This is similar to the findings in some studies [9,8]. However, the finding is contrary to the study by Dwivedi et al. [23] who found increased prevalence rate of hepatitis B infection with increasing parity which may be because of repeated risk of exposure to contaminated surfaces and instruments during delivery and number of sexual partners.

The link between the level of education of the pregnant women and the acquisition of HBV showed a decreasing trend with increasing level of education. However, the difference was not statistically significant. This is similar to the finding in Kano [22] and Lagos [24] which found an inverse association between educational status and HBsAg positivity, with less educated women showing the highest prevalence of HBsAg, indicating the positive influence of education and public enlightenment/awareness on the carrier rate of HBV infection. This may be due to reduction of high risk behaviors amongst the educated and knowledge and acceptability of barrier contraceptive. A total of 97.7% of the women studied had at least elementary education. This finding was in keeping with the study in Akure, Nigeria [25], which showed that the educational status of the population was high since 99% of the women studied had at least elementary education.

A higher prevalence of HBsAg was revealed among single women 8.8% compared to married women 4.1%. However, the difference was not statistically significant. This could be due to the fact that single women are more likely to have multiple sexual partners, unsafe abortion and pelvic inflammatory disease [9]. Hepatitis B infection is sexually transmitted and the duration of sexual activity, number of sexual partners, and history of sexually transmitted infections determine the prevalence of HBV infections [9]. However, the finding was in contrast to the findings in Lagos [24] and Kano [22], Nigeria where hepatitis B infection was more prevalent among married women than single women. This difference may be due to the characteristics of

population studied, different geographical regions and the proportion of single women in the study.

Hepatitis B infection was commonest among housewives in this study although there was no significant association between occupation and hepatitis B infection. Occupation of the subjects is a known risk factor for HBsAg infection in a study in Nnewi, Nigeria where significant number of health care workers (HCWs) involved in the study tested positive to HBsAg [9]. Those in high risk health departments like midwives, surgeons, blood transfusion services and theatres staffs were more predisposed to acquiring the infection. This study did not prove the above findings among HCWs as only few HCWs were involved in the study. Also, the awareness and vaccination for hepatitis B infection is more likely to be high among the HCWs resulting in low infection rate as observed in this study.

Hepatitis B infection was significantly higher among unbooked participants in this study. Fowcus et al. [26] reported that unbooked mothers were significantly younger, single mothers, illiterate or low educated, low socioeconomic status and had more unplanned pregnancy. Some of these factors may have played a role for the high prevalence of hepatitis B infection observed among unbooked women in this study.

It was noted from this study that only previous histories of induced abortion and multiple sexual partners were statistically significant predisposing factor to hepatitis B infection. This is not an uncommon finding as it is similar to the findings in Ethiopia [1] and Kano [22] where abortion was reported as significant risk factor for hepatitis B infection among pregnant women. Abortion is related to unprotected sexual intercourse which results in unplanned pregnancies and also increases the risk of HBV infection if such partners are infected. Also, instrumentation during abortion and related activities may serve as sources of exposure since most terminations are done by unskilled personnel using contaminated instruments and surfaces [1,27]. Previous histories of blood transfusion, previous surgeries/dental manipulations, tribal marks/tattoos, previous

contact with somebody with hepatitis B infection and previous delivery outside the hospital were not statistically significantly associated with HBV infection in this study. Though, this study showed an intermediate prevalence of hepatitis B infection among the pregnant women, only few of the known predisposing factors to HBV infection showed statistically significant association. This finding was in contrast to the study in Newi, Nigeria [9] where tribal marks/tattoos, occupation of the subjects and previous contact with somebody with hepatitis B infection were statistically significant predisposing factor to hepatitis B infection. Also, it differs from the finding in Port Harcourt where significant risk factors identified included previous history of surgical procedures, previous delivery outside the hospital and previous blood transfusion [15]. This observations in risk factors clearly indicates the inconsistency of these risk factors and as such, screening pregnant women on the basis of risk factors may be of little help in the detection of hepatitis B infection and prevention of neonatal transmission; hence the need for routine screening of all pregnant women.

## 5. CONCLUSION

This study indicates that the sero-prevalence of HBsAg among pregnant women admitted for delivery in UCTH, Calabar, South-south Nigeria was 4.7% which is an intermediate endemicity of HBV infection. The findings underscore the need for routine screening of the virus in all pregnant women and during labour especially among unbooked women for appropriate management. Advocacy should be stepped up for universal free HBsAg screening for all pregnant women. Universal sensitization and education on the need for booking during pregnancy is recommended to increase the opportunity for screening and management. Sensitization on the risk factors and preventive measures should be taken especially against unwanted pregnancies, induced abortion and multiple sexual partners as these are significant routes of transmission of the hepatitis B infection in this study. Contraceptive options aimed at prevention of pregnancy and sexually transmitted infection should be encouraged. Availability, accessibility and free or reduced cost of hepatitis B immuno-globulin by Government and Non-governmental organizations for babies born to HBsAg-positive mothers and hepatitis B vaccine as post exposure prophylaxis for such newborns is suggested. Owing to the intermediate

prevalence of hepatitis B infection at delivery in this study, there is need for the implementation of universal precautions in health institutions to prevent infection to the health care workers. In addition there is need for routine HBV vaccination for neonates and susceptible health care workers and provision of post exposure prophylaxis for HBV.

This study have some limitations and some issues attracting criticisms. The study was done in a single tertiary hospital and in a low resource centre in Nigeria. Even though the study was done in a single tertiary hospital in a low resource centre, it is a very big referral hospital for urban and rural pregnant women in South-south Nigeria. So, it is a good place to do research because of the diversity of patients managed in this hospital and it is a low resource region not previously studied. In future, when funds become available, a prospective multi-centre study would be carried out to further validate our findings. The study also highlighted the risk factors for hepatitis B virus infection in this low resource setting in Nigeria, however, the data are based on the small population of HBV infected women in the study. Data on the numbers of women who were previously immunized for HBV were not included in the calculation. This may probably imply that the sero-prevalence of this hospital population may be higher. However, HBV vaccination is not a routine practice in Nigeria and majority of people are not vaccinated [9,11,28]. The authors believed that this limitations will not significantly impact the results and conclusions of the study. These shortcomings will be addressed in further studies.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES

1. Awole M, Gebre-Selassie S. Sero-prevalence of HBsAg and its risk factors among pregnant women in Jimma, Southwest Ethiopia. *Ethiop J Health Dev.* 2005;19(1):45-50.
2. Lavanchy D. Hepatitis B virus epidemiology, disease burden, treatment, and current and emerging prevention and control measures. *J Viral Hepat.* 2004; 11(2):97-107.



3. Obi SN, Onah HE, Ezugwu FO. Risk factors for hepatitis b infection during pregnancy in a Nigerian Obstetric population. *J Obstet Gynaecol.* 2006;26(8): 770-772.
4. World health organization (WHO). Hepatitis B surface Antigen Assay: Characteristics (Phase 1) report 2; 2004.
5. Maynard JE. Hepatitis B: global importance and the need for control. *Vaccine.* 1990;8(suppl):18.
6. Bukbuk DN, Bassi AP, Mangoro ZM. Seroprevalence of Hepatitis B surface antigen among primary school pupils in rural Hawal Valley Borno State, Nigeria. *J. Community Med and primary health Care.* 2005;7(1):20-23.
7. Alrowaily MA, Abolfotouh MA, Ferwanah MS. Hepatitis B virus Sero - prevalence among pregnant female in Saudi Arabia. *Saudi J Gastroenterol.* 2008;14(2):70-72.
8. Centers for Disease Control and Prevention: Hepatitis B information for the public. Available: <http://www.cdc.gov/hepatitis/B/bfAQ.htm>. Page last updated: June 9, 2009.
9. Ahizechukwu CE, Uzoamaka AE, Charles IO, Ifeanyichukwu UE, Chukwuanugo O. Prevalence, Correlates And Pattern of Hepatitis B Surface Antigen In Low Resource Setting. *Virology Journal.* 2011; 8:12.
10. Abuo-Zahr CL, Tessa W. Antenatal Care In Developing Countries: Promises, Achievements And Missed Opportunities: An Analysis Of Trends Levels And Differentials. *World Health Organisation (WHO).* 2003;1-32.
11. Aggarwal R, Ghoshal UC, Naile SR. Assessment of cost - effectiveness of universal hepatitis B immunization in low income country with intermediate endemicity using a marker model. *J Hepatol.* 2004;38(2):215-222.
12. Iklaki CU, Inaku JU, Ekabua JE, Ekanem EE, Udo AE. Perinatal Outcome in Unbooked Teenage Pregnancies in the University of Calabar Teaching Hospital, Calabar, Nigeria. *ISRN Obstetrics and Gynaecology.* 2012;246983.
13. Luka SA, Ibrahim MB, Iliya SN. Sero-prevalence of Hepatitis B surface antigen among pregnant women attending Ahmadu Bello University Teaching Hospital, Zaria, Nigeria. *Nigerian Journal of Parasitology.* 2008;29(1):38-41.
14. Mbaawuaga EM, Enenebeaku MNO, Okopi JA, Damen JG. Hepatitis B virus infection (HBV) among pregnant women in Makurdi, Nigeria. *African Journal of Biomedical Research.* 2008;11:155-159.
15. Alegbeleye JO, Nyengidiki TK, Ikimalo JI. Maternal and neonatal seroprevalence of hepatitis B surface antigen in a hospital based population in South-South, Nigeria. *International Journal of Medicine and Medical Sciences.* 2013;5(5):241-246.
16. Mbamara SU, Obiechina N. Seroprevalence of hepatitis B surface antigen among antenatal clinic attendees in a private specialist hospital in Onitsha, Southeast Nigeria. *Niger Med J.* 2010; 51:152-154.
17. Obi RK, Umeh SC, Okurede OH, Iroagba II. Prevalence of hepatitis B virus infection among pregnant women in antenatal clinic in Port Harcourt, Nigeria. *Afr J Clin Exp Micro.* 2006;7:78-82.
18. Ajayi AO, Ade-Ojo IP, Ajayi EA, Adegun PT, Ojo A, Aduloju OP, Olofinbiyi B. Seroprevalence of hepatitis B infection in pregnant women at the Ekiti State University Teaching Hospital, Ado-Ekiti, Southwest Nigeria. *African Journal of Internal Medicine.* 2013;1(4):23-25.
19. Khalil MKM, Al-Mazrou YY, Al-Jeffri M, Al-Ghamdi YS, Mishkhas A, Bakhsh M, Eisa M, Nageeb M, Tumash S. Seroprevalence of hepatitis B surface antigen in pregnant Saudi women. *Eastern Mediterran Health J.* 2005;11:640-647.
20. Damale NKR, Lassey AT, Bekoe V. Hepatitis B virus seroprevalence among patients in Accra, Ghana. *Inter J Gynecol and Obstet.* 2005;90:240-241.
21. MacLean B, Hess RF, Bonvillian E, Kamate J, Dao D, Cosimano A, Hoy S. Seroprevalence of hepatitis B surface antigen among pregnant women attending the Hospital for Women & Children in Koutiala, Mali. *S Afr. Med. J.* 2012;102:47-49.
22. Yakasai IA, Ayyuba R, Abubakar IS, Ibrahim SA. Sero-prevalence of hepatitis B virus infection and its risk factors among pregnant women attending antenatal clinic at Aminu Kano Teaching Hospital, Kano, Nigeria. *J Basic Clin Reprod Sci.* 2012;1: 49-55.
23. Dwivedi M, Misra SP, Misra V, Pandey A, Pant S, Singh R. Sero-prevalence of hepatitis B infection during pregnancy and

- risk of perinatal transmission. *Indian J Gastroenterol.* 2011;30(2):66-71.
24. Rabiou KA, Akinola OI, Adewunmi AA, Omolulu OM, Ojo TO. Risk factors for hepatitis B virus infection among pregnant women in Lagos, Nigeria. *Acta Obstet Gynecol.* 2010;89:1024-8.
25. Ojo OO, Anibijuwon II. Determination of antibodies to hepatitis B virus in pregnant women in Akure, Ondo State, Nigeria. *Continental J. Microbiology.* 2009;3:6-10.
26. Fawcus SR, Crowther CA, Van Baleen P, Marumahoko J. Booked and unbooked mothers delivering at Harare maternity hospital, Zimbabwe: A comparison of maternal characteristics and foetal Outcome. *Cent Afr J Med.* 1992;38:402-8.
27. Jatau ED, Yabaya A. Seroprevalence of hepatitis B virus in pregnant women attending a clinic in Zaria, Nigeria. *Sci. World J.* 2009;7-9.
28. Odusanya O.O: Hepatitis B Virus (HBV) Vaccine- The Nigeria Story *IFEMED Journal.* 2008;14(1):4-5.

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