

Prevalence and factors associated with Hepatitis B virus infection among pregnant women attending antenatal clinic in Marigat Sub County Hospital, Kenya: A facility-based crosssectional study

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ABSTRACT

Introduction: Hepatitis B virus (HBV) infection is a global public health threat. In 2022, approximately 254 million chronic HBV cases, 1.1 million deaths and 1.2 million new infections were reported. This study aimed to estimate prevalence and identify factors associated with HBV infection among pregnant women attending antenatal care (ANC) clinic in Marigat Sub-County Hospital. Methods: We conducted a facilitybased cross-sectional study from August-September 2020. Systematic sampling was employed to enroll 384 study participants. A structured questionnaire was used to collect participants' data. Blood samples were collected for Hepatitis B surface antigen (HBsAg) testing using Diaspot rapid test and confirmatory Enzyme Linked Immuno-Sorbent Assay (ELISA) using Eti-max-3000 machine. Descriptive and analytical data analyses were done using Epi-Info Version 7.2.2. Variables with P-value ≤ 0.05 were considered statistically significant. Results: A total of 384 respondents were enrolled, their median age was 22 (IQR 22-26) years. Overall HBV prevalence was 6.3 % (95%CI: 4.24-9.13). Age category 25-34 years were most affected 10/138 (7.2%). Independent factors associated with HBV infection were history of traditional dental extraction (aOR: 11.3, 95% CI:1.86–58.5, P-value ≤0.005) and having multiple sexual partners (aOR: 39.6, 95% CI:8.13–220, P-value ≤ 0.001). Conclusion: The prevalence of HBV among pregnant women in Marigat Sub-County was high intermediate. History of traditional dental extraction and having multiple sexual partners were significant risk factors, therefore, we recommend a health education program on HBV infection, routine HBV screening in ANC clinics, community sensitization and discouragement of traditional dental extractions and other traditional surgical procedures in Marigat Sub-County.

KEYWORDS: Ante Natal Clinic, Hepatitis B Virus, HBsAg, Marigat Sub County, Pregnant Women

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Introduction

Hepatitis B viral (HBV) infection is an inflammation of the liver, specifically caused by Hepatitis B Virus (HBV). It is regarded as a virus which causes the risk of developing hepatocellular carcinoma (HCC) among the infected [1]. Globally HBV is a health threat. It is among the major causes of cancer of the liver, which is the second leading cause of cancer globally [2]. The infection with HBV has an acute and chronic phase, resulting in cirrhosis liver cancer, liver failure and death. Infection during infancy results into chronic hepatitis in around 90% of cases [3].

According to the World Health Organization (WHO), in 2022, HBV accounted for around 254 million individuals who were suffering from chronic hepatitis B virus infection, approximately 1.1 million deaths were attributed to HBV infections, and approximately 1.2 million people are infected each year with HBV [1]. The burden of HBV infection is highest in the WHO Western Pacific Region and the WHO African Region where 97 million and 65 million individuals are chronically infected with HBV respectively while in the WHO South-East Asia Region, WHO Eastern Mediterranean Region, WHO European Region and in the WHO Region of the Americas there are 61 million, 15 million, 11 million and 5 million persons are chronically infected with HBV infection respectively [1].

HBV infection in pregnancy could lead to high risks of a number of maternal complications which include prematurity, pre-eclampsia, placental separation, antepartum hemorrhage, and neonatal hepatitis in pregnancy, acute hepatitis B is associated with higher prevalence of low birth weight babies [4]. Several studies have shown that sharing piercing materials, having more than one sexual partner, ear piercing, female genital mutilation, abortion, history of tooth extraction and body tattooing were risk factors for being HBsAg positive among pregnant women [5,6].

Kenya in particular is classified by WHO as being a Hepatitis B virus endemic region [7]. According to the study done in 2018 Factors Associated with Hepatitis B Surface Antigen Seroprevalence amongst Pregnant Women in Kenya found out that HBV prevalence among pregnant women was 9.3% [8]. Marigat sub-county reported higher cases of Hepatitis B in 2018 at 63 cases compared to 6 cases reported in 2016 [9].

In Kenya, screening of HBV is never part of routine ANC profile tests and HBV birth dose vaccine is not given at birth as endorsed by WHO, however, it is given in pentavalent vaccine in 6th, 10th and 14th week after birth as part of Kenya Expanded Programme on Immunization (KEPI) from 2002. This puts infants born to HBV-positive mothers at an increased risk of infection before being vaccinated at the sixth week. This delays the early opportunity for intervention and counseling to prevent HBV transmission to their infants and to the other uninfected persons.

According to the Hepatitis data abstracted from the Kenya Health Information System [9], 127 cases of Hepatitis were reported in Baringo County in 2018; 63 (50%) of these cases were from Marigat Sub County. This data is not disaggregated by person; therefore, the burden of HBV infection and the knowledge on factors associated with the transmission among women who are pregnant is limited and not well known in the Sub County. There is also no known published study in Baringo to bridge this gap as HBV infected pregnant women contribute to the transmission of HBV. Therefore, this study determined the prevalence and risk factors associated with HBV infection among pregnant women attending ANC Clinic at Marigat Sub County Hospital in Baringo County.

Methods

Study site

The study was conducted at Marigat Sub County Hospital in Marigat Sub County in Baringo County. It was purposely selected for this study because of the gradual increase in HBV cases over years compared to other sub-counties in the county from 6 in 2016 to 63 cases in 2018 [9]. It has a population of 90,955 Women people (females=45,246 (50%), of reproductive age are about 25,434. (Census, 2019). Marigat Sub County Hospital (major referral facility) is located in this sub-county. During the period of study, the facility had a total of 42 healthcare workers (3 Medical officers, 8 Registered clinical officers, 12 nurses, 5 Medical Laboratory officers, 4 Public health officers, 2 Pharmaceutical technologists, 1 Dentist, 4 HIV Testing Service

providers and 3 social workers. This facility offers various health care services which include maternal and child health services including an ANC clinic. This facility offers free ANC, Maternity and postnatal services. There are adequate beds for pregnant women in the labor and maternity wards.

Study design

This study employed a hospital based, cross-sectional study design.

Study duration

Data collection was done from August to September 2020.

Study population

The study population comprised of pregnant women attending antenatal care (ANC) clinic in Marigat Sub County Hospital in Baringo. Pregnant women who attended the ANC clinic at Marigat Sub County Hospital who had not been vaccinated against HBV were included in the study while pregnant women who were: known to have HBV infection, or less than 18 years of age without parents/guardians to sign their assent forms, and mentally ill without parents/guardians to sign their consent forms were excluded in the study.

Sample size determination

Sample size of 384 was calculated for this study using the Cochran formula (1977).

The formula is:

$$n = \frac{z^2 p(1-p)}{d^2}$$

Where;

n =expected minimum sample

z = standard, corresponding to 95% confidence; 1.96

P = prevalence 50%

d = margin of error (0.05)

Sampling technique

This study employed a systematic sampling technique. On average, according to the KHIS data from January through to December of 2018, approximately 600 pregnant women are attended to at the Marigat Sub County Hospital ANC clinic per month. Therefore. for two (2) months, approximately 1200 pregnant women attended the ANC clinic. The sampling procedure was done as follows; the total number of pregnant women expected to attend the clinic during the study duration of two months (40 working days) was approximately 1200. These translate to 30 pregnant women seen in the clinic per day (1200 pregnant women divided by 40 days). To get the number of study participants to be recruited per day, the sample size was divided by the study duration in days (384/40=10). Therefore, 10 pregnant women were to be enrolled per day.

To calculate the sampling interval (Kth), the number of pregnant women seen per day was divided by study participants to be recruited per day (30/10=3), resulting in interval (kth) of 3. The first study participant was randomly selected between 1 and Kth (3). Then every third study participant was selected until 10 pregnant women were recruited every day. This was repeated daily until desired sample size of 384 was achieved.

Study variables

The dependent variable in this study was HBV infection status i.e. either HBsAg positive or HBsAg negative. Independent variables included age, marital status, education status, occupation, residence, traditional/tribal scarification, parity, multiple sexual partners, history of ever had blood transfusion, ever lived with someone with viral hepatitis, body tattooing/piercing, traditional tooth extraction, traditional circumcision, sexually transmitted infections, previous hospitalization, any surgical procedures.

Data collection procedure

The nursing officer in charge of the ANC clinic identified pregnant women at the clinic and escorted them to the nearby private room where eligibility was checked, pre-test counselling and informed consenting was done as well as administration of a structured questionnaire to collect data for those who consented to participate in the study by the investigator/trained research assistants.

Laboratory procedures

Five mls of blood was aseptically collected for Hepatitis testing for those whom ANC profile tests had been done previously, and for the pregnant women who were coming for the first visit, samples collected for ANC profile tests were used for Hepatitis B testing. Screening for HBsAg was done using a commercial test strip (Diaspot Rapid Diagnostic Test kit by Bresta Co., Ltd, Depok Indonesia) as per the standard operating procedure.

Serum was obtained by centrifuging the blood at 3000 rpm for 5 minutes and put in the Eppendorf tubes, stored at 40°C-80°C, triple packaged and shipped under cold chain to Nakuru Regional Blood Transfusion Centre for HBsAg Enzyme Immunosorbent Assay (ELISA) testing (Murex Elisa Kit of lot number E053710) for confirmation using ETI-MAX 3000 fully automated machine. Samples from all the 384(100%) study participants were retested using Elisa for confirmation. All the Elisa results 384 (100%) were concordant with rapid test kit results.

Quality assurance

The structured questionnaires were piloted and pretested at Marigat Catholic Mission Hospital among 39 pregnant women (i.e. 10% of the sample size) before the actual data collection commenced. Based on the gathered information, the questionnaire was further fine-tuned. The study assistants/laboratory technologists/nurses were trained. The performance of the Diaspot rapid HBsAg test kit was determined by in-built procedural quality control. During HBsAg ELISA testing, known positive and negative controls were run alongside the samples as a quality assurance measure.

Data management and analysis

All the filled questionnaires and laboratory request forms were assigned with unique codes for confidentiality. Data were cleaned by checking for any error, missing information, discrepancies and inconsistencies then corrected. The data was then double entered into Microsoft Excel (Microsoft Office, Seattle, USA) to check for completeness, consistency and accuracy before the data was analyzed using Epi-Info 7.2.2TM. (CDC Atlanta) [10]. Filled questionnaires were kept in lockable cabinets; data was stored under pass word protected computers to guarantee privacy, confidentiality and to restrict access. Descriptive statistics was performed on demographic profile of participants by calculating the measures of central tendencies and their 95% confidence interval and frequencies. Categorical variables were summarized using simple proportions and percentages while continuous variables were summarized using mean/median and standard deviations/Interquartile range.

HBV prevalence was calculated by dividing the total number of pregnant women who tested HBsAg positive by ELISA test by the total number of the enrolled study participants then multiplied by 100 to obtain the proportion. For factors associated with HBV among pregnant women, bivariate analysis was carried out whereby the prevalence odds ratio (pOR) and their 95% confidence intervals (CI) were calculated. Factors with P Value ≤ 0.2 were considered for multivariate analysis. At multivariate analysis, variables were entered into unconditional logistic regression (forward stepwise whereby analysis starts from the null model and adds a variable that improves the model the most, one at a time until the stopping criterion is met). When the unadjusted association between variables and done. multivariable outcome was model comparisons were done, this was followed by linearity assumption then interactions among covariates were done then finally fitted on the model and assessed. Factors with a P value ≤ 0.05 were considered significantly associated with HBV infection.

Ethical approval

Ethical approval (Ref: IREC/2019/214) number 0003493 was obtained from Moi University/Moi Teaching and Referral Hospital Institutional Research and Ethics Committee (MU MTRH-IREC). A research license was granted by National Commission for Science. Technology and Innovation (NACOSTI), License No: NACOSTI/P/20/3721 and permission to carry out research was granted by Baringo County Department of Health and Marigat Sub County

Hospital medical superintendent or hospital administrator where study participants were recruited. Written informed consent/assent was sought from all study participants. Respondents' data was recorded anonymously using only unique identifier codes. No data was released to anyone outside of the study for any reason. No individual identifiers were used in any reports from this study and more so, de-identification of questionnaires was done. Information in computers was stored in password-protected locations and in passwordprotected formats.

Results

Socio-demographic characteristics of the pregnant women at Marigat Sub County Hospital

A total of 384 ANC mothers were enrolled and all accepted to participate in the study. Their ages ranged from 15-49 years, their median age was 22 (IQR 20-26), 232 (60.4%) were aged 15-24 years; 269 (70.1%) were in a monogamous marriage, and 90 (23.4%) had at least partial primary education. Two hundred and ninety four (76.6%) were multigravida while 90 (23.4%) were primigravidae. Of the 384 study participants, 340 (88.5%) were from Marigat Sub County (Table 1). Two hundred and sixty three (68.4%) respondents were unemployed, 87 (22.7%) were business ladies, 19 (5%) were casual workers, and 15 (3.9%) were formally employed (Figure 1).

Prevalence of Hepatitis B infection among the pregnant women at Marigat Sub County Hospital per socio-demographic characteristics

Twenty-four participants out of 384 tested positive for Hepatitis B giving a prevalence of 6.3% (95% CI, 4.24-9.13) for ANC mothers attending Marigat Sub-County Hospital. Ten (7.2%) out of 138 ANC mothers in the 25-34 years age category tested positive for HBsAg. Notably, none of the 24 respondents in the 35+ years group tested positive for HBV. Among the respondents who were single, the prevalence was 8/76 (10.5%), and HBV prevalence was 7/79 (8.9%) among those with some secondary education, the prevalence among those who were multigravida was 18/294 (6.1%). All the HBV-positive cases 24/340 (7.1%) were from Marigat Sub County (Table 2). At bivariate analysis, respondents who underwent traditional circumcision had 8 times the odds of having Hepatitis B infection (pOR= 8, 95% CI: 3.38-20.4), P-Value <0.001 compared to those who did not. Those with traditional skin marks had 12 times the odds of Hepatitis B infection (pOR=12.3, 95% CI: 5.04-30.4), P-Value < 0.001 compared to those who did not. While those who had a history of traditional dental extraction had 16 times the odds of Hepatitis B infection (pOR=16.4, 95% CI: 6.21-43.3), P-Value <0.001. Those who engaged in unprotected sexual activity with multiple sexual partners in the past 12 months had 148 times the odds of acquiring HBV infection (pOR=148, 95% CI :44.7-611), P-Value <0.001 while those who had sexually transmitted infection had 72 times the odds of Hepatitis B (pOR =71.8, 95% CI :10.1-1440), P-Value <0.001 and among those who had ever had blood transfusion had 3 times the odds of HBV infection (pOR=2.9, 95%CI;0.64-9.46), P-Value <0.11 (<u>Table 3</u>).

In multivariate analysis, independent factors associated with Hepatitis B infection among the pregnant women were history of traditional dental extraction and history of unprotected sexual activity with multiple sexual partners in the past 12 months. Women who had a history of traditional dental extraction had eleven times the odds of Hepatitis B infection than the pregnant women who did not underwent traditional dental extraction (aOR=11.3, 95% CI: 1.86-58.5), P-Value < 0.005. Higher odds of Hepatitis B infection were observed in women who had a history of unprotected sexual activity where they had forty times the odds of being HBV infected compare to those without history of unprotected sexual activity with multiple partners in the past 12 months (aOR= 39.6, 95% CI: 8.13-220), P-Value <0.001 (<u>Table 3</u>).

Discussion

This study aimed to estimate the prevalence and identify factors associated with HBV infection among pregnant women attending Ante Natal Clinic (ANC) in Marigat Sub-County Hospital. According to the findings of this study, the overall Hepatitis B prevalence among pregnant women attending Marigat Sub-County Hospital was 6.3% and the risk factors for HBV infection were history of traditional dental extraction had and history of unprotected sexual practice with multiple sexual partners in the last one year.

A prevalence of 6.3% HBV infection represents a potential risk for mother to child transmission (MTCT) of HBV and transmission to their sexual partners. This necessitates HBV screening during pregnancy in all health care facilities and provision of post-exposure prophylaxis immediately after birth. There are four endemic HBV infection zones namely; high with HBV prevalence of >8%, high intermediate (5%-7%) low intermediate (2%-4%) and low (<2%) [11]. According to this classification, this study's prevalence indicates a high intermediate HBV infection zone.

These findings are comparable to recent studies done in the neighboring countries among the pregnant women. In Ethiopia for example, several studies were in agreement with this prevalence; the prevalence of 6.1% in West Hararghe public hospitals, Oromia region, and 6.0% at Jigjiga [12,13].

When compared to previous studies done in Kenya on HBV infection in pregnant women, the prevalence in this study was higher than the prevalence of 3.8% reported among the pregnant women at Mbagathi Hospital in Nairobi [14]. However, this study's prevalence was lower than the prevalence of HBsAg of 9.3% in a study done in six different sites to represent nine geographical regions in Kenya [8]. These differences could be attributed to differences in sampling and testing technique, geographical, cultural, socio-economic, healthseeking and, behavioral factors of study participants.

When compared to other sub-Saharan countries in Africa, this prevalence was lower than the prevalence of 9.2% in Southern Ethiopia, 11.8% in Uganda, 8.03% in Tanzania, 11% in Sudan and a prevalence 10.5% in Nigeria [15 - 19]. This prevalence was, however, higher than prevalence by two different studies in Uganda with similar a prevalence of 2.9% [20, 21]. It was also higher than the prevalence of 3% in Tanzania and 2.9% in Sudan respectively [22,23], it was also higher than two

similar and previously published studies in Ethiopia with the same prevalence of 4.7% [24, 25].

In relation to other low and middle-income countries of the world, this prevalence was higher than 1.16% in Pakistan [26], and also higher than a prevalence of 1.1% in India [27]. The difference could also be attributed to differences in sampling and testing technique, geographical, cultural, socio-economic, health-seeking and, behavioral factors of study participants.

Concerning the risk factors to HBV infection, this study found out that history of traditional dental extraction had eleven times the odds of Hepatitis B infection and history of unprotected sexual practice with multiple sexual partners in the last one year where higher odds of Hepatitis B disease were observed in women who had a history of unprotected sexual activity with multiple sexual partners in the last one year compared to their counterparts.

In regards to traditional dental extraction and HBV infection, this finding was in agreement with a study conducted in Garissa, Kenya on the prevalence and risk factors for Hepatitis B infection among pregnant women attending antenatal clinics in Garissa [28] and a study on the Prevalence of hepatitis B viruses and associated factors among pregnant women attending antenatal clinics in public hospitals of Wolaita Zone, South Ethiopia [29].

This could be as a result of the use of the unsterilized dental instrument, sharing tooth extraction instrument without prior sterilization for different people in the rural setting and, unhygienic tooth extraction practices.

However, this current finding contradicts the studies done at Deder Hospital, and in Eastern Ethiopia, [<u>30</u>] on the pregnant women which showed no association of traditional dental extraction and HBV infection. The reason may be due to education offered to members of the public by the health care providers, and discouragement of this practice.

Regarding the history of having had unprotected sexual activity with multiple sexual partners in the last one year and association with HBV infection. Studies with concordant findings on the history of having unprotected sexual activity with multiple sexual partners in the last one year and association with HBV infection are similar studies done in; Oromia region [13], and, Eastern Ethiopia [30]. However, a study done in South Darfur in Sudan on the same population disagreed with this study's finding [29]. HBV can be transmitted through sexual activity. Unvaccinated persons, who have multiple sex partners or sex partners of people with chronic HBV, are at increased risk for transmission/infection.

This study employed a cross-sectional design. This design can't assess causation (as both outcome and exposure are measured at a single point in time.

Despite this limitation, this study was able to find the HBV prevalence of 6.3% among pregnant women in Marigat and it also identified two factors to be associated with HBV infection among the pregnant women i.e. having history of traditional dental extraction had and history of unprotected sexual practice with multiple sexual partners in the last one year.

The study could not determine precisely those who had received prior vaccination and those who did not; as they were only asked if they had ever been vaccinated against Hepatitis B and they were not requested to provide evidence of any documentation regarding the vaccination. This might have led to some recall bias by the study participants. Some variables had wider confidence Intervals (CIs). This implies that there could be some uncertainty and less precision in estimating population parameters. This could have been possibly due to factors such as a small sample size or variability in the data, lower confidence levels (95%) or non-normal data distribution.

Conclusion

The prevalence of HBV infection among pregnant mothers attending ANC clinic in Marigat Sub County Hospital was high intermediate according to this study. History of traditional dental extraction and unprotected sexual practice with more than one partner in the last twelve months were independent factors associated with hepatitis B virus infection among pregnant women. Therefore, to reduce HBV infection and transmission among pregnant women and their infants, we recommend that Baringo County Department of Health Services to; introduce health education talks on HBV infection to ANC mothers on its consequences; discourage traditional tooth extraction methods and encourage safer sexual practices like avoidance of multiple sexual partners. Have a program of HBV screening in ANC clinics and means for contact tracing.

What is known about this topic

- HBV is prevalent in Sub Saharan and low and middle income countries and it's a major public problem
- HBV vaccination and health education helps prevent HBV transmission
- Cultural and tradition practices like traditional tooth extraction, ear piercing, body tattooing, traditional female circumcision, unprotected multiple sexual practice aids in HBV transmission

What this study adds

- This study's findings provide current information for health policymakers to instigate HBV infection prevention measures
- This study identified 24 pregnant women who were enrolled into care and treatment
- This study necessitated Marigat Sub County Hospital management to include HBV screening at ANC clinic
- Pregnant women who tested HBsAg positive and their positive contacts were put on treatment

Competing interests

The authors declare no competing interests.

Authors' contributions

Conceptualization: BKN. Data collection, and report writing: BKN. Data analysis: EK and CG. Drafting Manuscript: BKN, FS and ZG. Finalizing manuscript: BKN, FS, ZG, EK and CG. All authors read and approved the final version of this manuscript.

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Tables and figures

<u>**Table 1**</u>: Socio-demographic characteristics of the pregnant women at Marigat Sub County Hospital

<u>**Table 2**</u>: Prevalence of Hepatitis B infection among the pregnant women at Marigat Sub County Hospital

Table 3:Multivariate Analysis of factors associatedwith HBV Infection among the pregnant women atMarigatSubCountyHospital

Figure 1: Occupation of the pregnant women at Marigat Sub County Hospital

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Table 1: Socio-demograp	hic characteristics of pregnant wo	men at Marigat Sub Co	ounty Hospital	
Characteristic		Frequency, N=384	Percentage (%)	
Age: Median 22 (IQR20	-26)			
	15–24 Years	232	60.4	
Age Group	25–34 Years 128		33.3	
	5 Years and above 24		6.3	
	Married (Monogamous)	269	70.1	
Manital status	Single	76	19.8	
Iviantal status	Married (Polygamous)	37	9.6	
	Separated/Divorced	2	0.5	
	Partial Primary School	90	23.4	
	Completed Primary	86	22.4	
Loval of Education	Partial Secondary School	79	20.6	
Level of Education	Completed Secondary	78	20.3	
	Tertiary	42	10.9	
	No formal education	9	2.3	
Domitre	Multigravidae	294	76.6	
Failty	Primigravidae	90	23.4	
	Marigat	340	88.5	
Sub County of	Baringo North	27	7.0	
Residence	Mogotio	7	1.8	
	Tiaty	7	1.8	
	Baringo Central	3	0.8	

Table 2: Prevalence of Hepatitis B infection among the pregnant women at Marigat Sub County
Hospital

nospital						
		Total	HBsAg ELISA	A test results	Prevalence	
Variable			Negative	Positive	6.3	
		N=384	(n=360)	(n=24)	(Overall)	
			Frequency	Frequency		
A go Crown	15–24	232	218	14	6	
(Years)	25–34	138	128	10	7.2	
	35 and above	24	24	0	0	
	Married					
	(Monogamous)	269	255	14	5.2	
Marital	Single	76	68	8	10.5	
status	Married					
	(Polygamous)	37	35	2	5.4	
	Separated/Divorced	2	2	0	0	
	Some Primary	90	84	6	6.7	
	Completed Primary	86	80	6	7	
L aval of	Some Secondary	79	72	7	8.9	
Education	Completed					
Education	Secondary	78	75	3	3.8	
	Tertiary	42	40	2	4.8	
	No formal education	9	9	0	0	
Dority	Multigravida	294	276	18	6.1	
Fainy	Primigravidae	84	84	0	0	
	Marigat	340	316	24	7.1	
Sub	Baringo North	27	27	0	0	
County of	Mogotio	7	7	0	0	
Residence	Tiaty	7	7	0	0	
	Baringo Central	3	3	0	0	

Table 3: Factors	associate	d with HBV Inf	fection among	g the pregnant wome	n at Marigat	Sub County H	ospital
Variable		HBsAg ELISA test Results		Crude pOR (95% CI)	P Value	aOR (95% CI)	P Value
		Negative Freq (%)	Positive Freq (%)				
Traditional	No	288 (97)	8 (2.7)	Ref			
Circumcision	Yes	72 (82)	16 (18)	8 (3.38–20.4)	< 0.001	2.7 (0.65– 10.2)	0.2
Traditional	No	333 (97)	12 (3.5)	Ref			
Marks/tattoos	Yes	27 (69)	12 (31)	12.3 (5.04– 30.4)	<0.001	3.1 (0.40– 25.9)	0.3
Traditional	No	345 (96)	14 (3.9)	Ref			**
dental extraction	Yes	15 (60)	10 (40)	16.4 (6.21– 43.3)	<0.001	11.3 (1.86– 58.5)	0.005
History of	No	156 (96)	7 (4.3)	Ref			
traditional ear Piercing	Yes	204 (92)	17 (7.7)	1.9 (0.78–4.9)	0.2	0.6 (0.15– 2.09)	0.4
Received	No	302 (95)	15 (4.7)	Ref			
injection/s in the last 6 months	Yes	58 (87)	9 (13)	3.1 (1.26–7.37)	0.01	1.1 (0.12– 6.9)	0.9
Ever had	No	343 (94)	21 (5.8)	Ref			
blood transfusion	Yes	17 (85)	3 (15)	2.9 (0.64–9.46)	0.11	0.2 (0.1–3.3)	0.3
Unprotected	No	356 (98)	9 (2.5)	Ref			
sexual practice with >1 partner in the last 12 months	Yes	4 (21)	15 (79)	148 (44.7–611)	<0.001	39.6 (8.13– 220)	<0.001**
Ever had STI	No	359 (95)	20 (5.3)	Ref			
	Yes	1 (20)	4 (80)	71.8(10.1– 1440)	<0.001	19.5 (0.52– 106.5)	0.14
pOR= Prevalence in multivariate as	e Odds Ra nalysis wi	atio, AOR= Ac th P≤0.05	ljusted Odds]	Ratio, Ref= reference	e category, *	*= Significant v	variables



Figure 1: Occupation of the pregnant women at Marigat Sub County Hospital