FACTORS ASSOCIATED WITH HEPATITIS-B INFECTION AMONG KRACHI
SENIOR HIGH SCHOOL STUDENTS IN THE KRACHI WEST DISTRICT OF THE
VOLTA REGION.

BY

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THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF
MASTER OF PUBLIC HEALTH DEGREE.

JULY, 2017
DECLARATION

I, Atakli Alex Kwasi Kumah Dzidzinyo declare that this work submitted to the school of public health is my own work. I further declare that citations and ideas in this thesis are duly acknowledged, and that this work has not been previously submitted in whole or part to any other institution or board for an award of any degree.

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DEDICATION
To my lovely wife, Senoo Mawuenya Atakli and my family, especially Emmanuela Mawufemor Atakli”, who were of tremendous support throughout the course of my study. It is also dedicated to the headmaster and all students and staffs of Krachi Senior High school who made this study possible.
ACKNOWLEDGEMENT

First of all, I thank God for His special grace and the opportunity to enroll in the Master of Public Health Epidemiology and Disease Control Program, and also for the wisdom and strength to successfully complete it.

I am grateful indeed to my academic supervisor, Dr. Bismark Sarfo, Head of Epidemiology and Disease Control Department, School of Public Health and Mr. Francis Djabeng a research scientist of the Kintapo Health Research Institute for their suggestions, encouragements, constructive criticisms and corrections. I would also like to thank Institutional Health Research Ethics Review Committee of the Ghana Health Service for their exceptional comments on important protocol and ethical issues, which sought the successful development of this proposal.

My deepest and heartfelt gratitude also goes to my medical superintendent Dr. Habib Ahmed, who always believed in what I am capable of and for his unrelenting support in perusing my career.

God richly bless you all.
ABSTRACT

**Background:** Hepatitis B virus (HBV) occurs globally and is of a great public health importance. According to World Health Organization (WHO), “more than two (2) billion people worldwide have been infected with Hepatitis-B virus and about 350 million people remain chronically infected”. Even though Ghana belongs to one of the areas where HBV is highly endemic not much study detailing the burden of the disease among the youth has been conducted.

**Objectives:** This work was intended to determine the burden of HBV infection and its associated risk factors among students in the Krachi Senior High school in the Krachi West district of the Volta region.

**Methods:** Using the 2017 student register as sample frame, 182 students were randomly selected for this cross-sectional sero prevalent survey. Chi-square test and Student t- test were used to compare categorical and continuous variables. Those categorical variables with p<0.200 were analyzed in a final regression model.

**Result:** The sero- prevalence of HBV among the 182 study participants was found to be 14.3%. More females than males 14/26 (53.8%) tested positive for the HBsAg. The highest prevalence was recorded in 18-20 age groups 14/87 (16.09%). Place of barbering was found to be statistically significant with HBV (aOR: 0.48 95%CI.0.28-0.84) (p=0.01). Also sharing of same spoon/cutlery among students also significantly influences HBV infection among students (aOR: 0.46, 95%CI.0.26-0.8) (P=0.01)

**Conclusion:** Hepatitis B virus infection is significantly high among students attending Krachi West Senior High School. Place of barbering and sharing of cutlery among students are factors significantly associated with the virus infection
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<tbody>
<tr>
<td>CI</td>
<td>Confidence Interval</td>
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<tr>
<td>CLD</td>
<td>Chronic liver disease</td>
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<tr>
<td>DHMT</td>
<td>District Health Management Team</td>
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<td>ELISA</td>
<td>Enzyme Linked ImmunoSorbant Assay</td>
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<tr>
<td></td>
<td>HIV/AIDS Prevention and Control</td>
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<tr>
<td>HAPCO</td>
<td>Organization</td>
</tr>
<tr>
<td>HBsAb</td>
<td>Antibodies to Hepatitis B surface antigen</td>
</tr>
<tr>
<td>HBsAg</td>
<td>Hepatitis B Surface Antigen</td>
</tr>
<tr>
<td>HBV</td>
<td>Hepatitis B virus</td>
</tr>
<tr>
<td>HCC</td>
<td>Hepatocellular Carcinoma</td>
</tr>
<tr>
<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
</tr>
<tr>
<td>OR</td>
<td>Odds Ratio</td>
</tr>
<tr>
<td>PTA</td>
<td>Parents Teacher Association</td>
</tr>
<tr>
<td>ssDNA</td>
<td>single stranded Deoxyribonucleic acid</td>
</tr>
<tr>
<td>VCT</td>
<td>Voluntary Counseling and Testing</td>
</tr>
<tr>
<td>VBDs</td>
<td>Blood Donors</td>
</tr>
<tr>
<td>RBDs</td>
<td>Replacement Blood Donors</td>
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<tr>
<td>RDT</td>
<td>Rapid Diagnostic Test</td>
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<td>WHO</td>
<td>World Health Organization</td>
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CHAPTER ONE

1.0 INTRODUCTION

The hepatitis-B virus is a global health threat that poses a major public health challenge that cannot be grossed over by any world leader. The HBV virus gradually attacks the liver cells initially and eventually degenerates into chronic liver disease, cancer and finally death (Shaw-Stiffel, 2000). With the use of current therapies the HBV can only be managed and there is no known cure as yet (Kourtis et al., 2012). All over the world more than two billion people are believed to be infected with the hepatitis-B virus, with a quarter chronically infected (Ferriara, 2000). As pointed out by Yosef, (2016) “30% of all liver cirrhosis and 53% of all liver cancer cases are caused by HBV”. Ninety four percent of all liver related deaths are due to complications from chronic liver infections like liver cirrhosis and hepatocellular carcinoma (HCC), and with 6% directly attributed to acute hepatitis B (Goldstein et al., 2005). “Hepatocellular carcinoma is the third most common cause of cancer death in the world” (Fernley et al., 2010). According to Yosef, (2016) „fifty percent of HCC is caused by chronic HBV infection and up to eighty percent of the cases occur in high HBV endemic regions”.

Epidemiological studies demonstrated varying levels of hepatitis-B virus endemicity worldwide, with East Asia and Sub-Saharan Africa been the most endemic areas having about 5% to 10% of the adult population chronically infected. Western Europe and North America have less than 1% of the adult population chronically infected. In Asia, Africa, Middle East and Amazon Basin the life time risk of HBV infection is over 60%. In highly endemic countries the mode of transmission usually is through vertical transmission at birth that is from a chronically infected
mother to her new born and horizontal transmission resulting from unsanitary conditions in childhood (DeFranchis et al., 2003).

The possibility of getting Hepatocellular carcinoma is strongly linked to the development of liver cirrhosis. Therefore the surest way of reducing deaths caused by hepatitis B is to primarily thwart the spread of the virus through vaccination strategies in order to thwart the development of liver cirrhosis in the first place so as to hinder its subsequent progression to HCC in those previously infected. Even though antiviral treatments can repress HBV and hinder disease progression in advance countries, most of the people with the chronic HBV unfortunately lives in under developed countries where health facilities are severely under resourced. Therefore the incidence of lifelong hepatocellular carcinoma is predicted to rise over the next twenty years due to the high HBV burden throughout the world (Lavanchy, 2005).

Hepatitis-B virus is spread by coming in touch with infected vaginal and seminal fluids as well as other blood products. Mother to child transmission is also possible at birth. Similarly other medical procedures like blood transfusion, use of contaminated needles during injection and use of infected surgical blades during invasive procedures without regard to universal precautionary measures can as well transmit the virus. The HBV can also be transferred by unprotected sexual intercourse (Smelzer et al, 2003).

The key Strategies of prevention include primary, secondary and tertiary preventions. Primary prevention of new infections includes health education and communication, vaccination of all new born as well as adults and the use of post exposure prophylaxis. Secondary prevention involves hygienic and sanitary practices and responsible sexual life. Tertiary prevention is the use of anti viral therapies (Center for Disease Control and Prevention, 2010).
1.1 STATEMENT OF THE PROBLEM

Viral hepatitis has become a global health concern (Cheesbrough, 2000). According to the Global Burden of Disease Study, (2012) “close to two billion people worldwide are infected with hepatitis-B virus (HBV) and nearly 350 million persons are living with lifelong hepatitis. Besides, it kills more than 1.4 million people every single year”.

Epidemiological studies have demonstrated that HBV is more endemic in developing countries particularly sub-Sahara Africa (Kotzee et al., 2006). In Ghana there is no national survey on the prevalence of HBV. This has given rise to fluctuating national prevalence among experts. While some experts believe that the national prevalence is 12.92% (Sweitzer et al, 2013) other experts put the figure around 10–15%. A recent systematic and metal-analysis of prevalence studies in Ghana shows that HBV prevalence were 10.8%, 12.7% and 13.1% among voluntary blood, replacement blood donors and pregnant women respectively(Ofori A. et al, 2016). According to the systematic review the regional HBV prevalence is as follows: Ashanti 13.1%, Greater Accra 10.6%, Eastern 13.6% , Northern 13.1% ,Central 11.5%, and Brong Ahanfo 13.7% regions with no prevalence for Volta, Western, Upper East and Upper West regions for lack of aggregate data”. This presupposes that HBV is of a dire public health importance and give credence to the fact that the prevalence might be much higher in the general population. Basing the national prevalence on these few fragmented evidence will be biased and may not be a true reflection of the HBV situation in Ghana since these studies were done mainly among blood donors without any regard to regional balance and age distributions. Although some studies have been done in the area of HBV, there is however a limited national data on the condition. Besides, Ofori and his colleagues pointed out that the highest HBV prevalence was found among those within the 16 to 39 year age group. This work in Krachi Senior High School is therefore intended to estimate the
HBV burden among the youth since most of them fall within this age category and are more sexually active.

Krachi west district has been chosen for this study because of its location in the far north of the Volta region and the fact that it is a peninsular which is cut off from the rest of the region by river Volta and river Oti and poor road networks which make it possible to be missed out by the few NGOs in the region in terms of awareness creation. Again, 88.8% of the district is mostly rural with a high youth population. As indicated by Ofori A. et al,( 2016) the HBV prevalence is higher among the rural community with HBV prevalence of 13.3% as compared to 12.2% in the urban areas, choosing a less endowed senior high school like Krachi senior high school is not out of place.In addition, research indicates that institutionalisation increases the risk of HBV infection seven times (Dicks et al,1987).

1.2 RESEARCH QUESTIONS

- What are the factors associated with HBV infection among students in Krachi Senior School.

- What proportion of students in Krachi Senior High School are HBV positive.

1.3 GENERAL OBJECTIVE

To determine factors associated with hepatitis-B virus infection among Krachi senior high students.

1.4 SPECIFIC OBJECTIVES

- To determine proportion of students who are hepatitis-B positive.

- To determine factors associated with the HBV infection among students.
1.5 Conceptual Framework

Risk factors: circumcision, tribal marks, sharing sharps, sexual exposures e.t.c
Environmental: high prevalence areas (Asia & Sub Sahara Africa)
Demographic: age, sex, ethnicity, economic, cultural factors

**Prevention**

- Hepatitis-B vaccine
- Hepatitis-B infection
- Hepatitis-B morbidity
- Hepatitis-B mortality

**Treatment**

- Early diagnosis

**Program factors**

- Health policy
- Hepatitis-B drug policy
- Support /partnership

**Health care system**

- Accessibility
- Affordability
- Quality of care

**Hepatitis-B knowledge**

- Causes
- Prevention methods
- Early treatment
- Awareness

Fig 1: Conceptual framework
This conceptual framework is built on the multivariable model of epidemiological analysis. It lays more emphasis on the interaction between variables such as environmental factors, demographic factors, risk factors, health care system, program factors, education and knowledge level of HBV among students.

The framework placed the outcome (HBsAg status) at the far right with the interplay of independent variables at the left with arrows showing the direction of interactions between the independent variables and how they influence HBV acquisition.

Geography is one of the main influential factors in the acquisition of HBV. HBV is more endemic in Sub Sahara Africa and Asia than the rest of the regions of the world. Hence geography is a direct predictor variable of HBV acquisition. Similarly, factors such as demography, economic, socio-cultural practices and other risk factors directly affect HBV prevalence.

Besides, Health system factors directly affect early prevention and treatment which indirectly affect HBV infection. Health care system structure refers to how health care is delivered to the patient and includes clinic and provider characteristics as well as the HBV surveillance system. Surveillance is defined as the “ongoing systematic collection, collation, analysis, interpretation of data; and the dissemination of information to those who need to know in order that action be taken. (Sbarigia U. et al, 2015)

Other variables such as Program factors which include comprehensive policy on HBV directly influence the health system structures which are indirect predictors of HBV prevalence and liver cancer. Failure on the part of world leaders to formulate comprehensive policies on HBV
vaccination and develop treatment guidelines, indirectly accounted for the over two billion people currently living with the disease.

Lack of knowledge on the mode of spread, signs and symptoms, treatment options and complications of the disease directly relates with one’s ability to seek early treatment and preventive measures which otherwise could have lessen the burden of the HBV progression. Other variables such as religious, cultural and health beliefs factors either influence or are influenced by level of education. Besides, these factors affect one’s willingness to accept one form of health delivery or the other which will eventually influence HBV status.

1.6 JUSTIFICATION FOR THE STUDY
This work in Krachi Senior High School will help close partly this knowledge gap and also give us a better picture of the hepatitis-B situation among the youth especially those in rural communities where awareness on HBV is still a huge challenge. As indicated by the systematic review, there has not been any study done in the Volta region on hepatitis. This work has given us some insight of the situation among the youth in the region and serves as a baseline data for further research. As reported by Avege,(2005) the prevalence of HBV among primary and junior high students in Navrongo was 12.0%, implying that the prevalence may be higher among adolescents who are sexually active and engage in all manner of risky behaviors. As pointed out by the national surveys (GDHS 1998, 2003 and HIV sentinel survey report, 2003) as well as other studies conducted by Nabila, Fayorsey and pappoe (2000); Ahiadeke (2001) and Fayorsey (2002), adolescents and young people in Ghana are still confronted with problems of high risk sexual behaviors.
CHAPTER TWO
LITERATURE REVIEW

2.0 HEPATITIS-B VIRUS

HBV is a double strand DNA virus from the hepadnaviridae family with many Antigenic constituents such as hepatitis-B surface antigen (HBsAg), hepatitis-B core antigen (HBcAg), hepatitis-B envelop antigen (HBeAg). (CDC& Ncird, n.d). The HBV virus causes acute inflammation of the liver that last for six months which may later fail to shed off and degenerates into chronic liver disease with severe liver impairment. Both the HBsAg and HBeAg can be detected in the serum while the HBcAg can only be detected in the liver tissue of persons with an acute or chronic HBV. The HBsAg is used to monitor progress of HBV infection while the HBeAg is an indication of high HBV infectivity (“GUIDELINE FOR THE PREVENTION,CARE AND TREATMENT OF PERSONS WITH CHRONIC HEPATITIS-B INFECTION,”2015). HBV is commonly transmitted by mucosal exposure to HBV contaminated blood and other body fluids such as saliva, vagina and seminal fluids through unprotected sex, vertical transmission, medical and surgical procedures, tattooing, scarification, percutaneous drug use and sharing of sharps (Shimakawa, 2014)
Transmission

HBV has been found in virtually all body secretions and excretions. However, only blood, body fluids containing visible blood, semen and vaginal secretions represent a risk of transmission. HBV is transmitted by percutaneous and mucosal exposure to infective blood or body fluids. Major modes of HBV transmission include sexual or close household contact with an infected person, perinatal mother to infant transmission, injecting drug use and nosocomial exposure. Percutaneous exposures that have resulted in HBV transmission include transfusion of unscreened blood or blood products, sharing unsterilized injection needles for IV drug use, haemodialysis, acupuncture, tattooing and injuries from contaminated sharp instruments sustained by hospital personnel. HBV is stable on environmental surfaces for at least 7 days and is 100 times more infectious than HIV.

(EMI Guidelines - Appendix 21 Hepatitis B virus: epidemiology and transmission risks (updated May 2016))
Transmission risks

The hepatitis B virus can survive outside the body for at least 7 days.

Several factors influence the risk of transmission of HBV infection, including the viral load of the source. In a healthcare occupational context, the level that is regarded as “high” for a viral load differs in various regions. In America and Ireland, HCWs who are infected with HBV but have a circulating viral burden <10 genome equivalents/ml are allowed to continue working unrestricted. Transmission of HBV via a percutaneous route is considered unlikely at HBV DNA levels below 10 genome equivalents/ml.

Needle stick injuries

Those who are e antigen positive generally have higher viral loads, and the transmission rate of HBV following a needle stick injury from a source who is e antigen positive is estimated to be between 30% and 62%. The same injury with exposure to blood from a source who is e antigen negative is associated with 6-37% risk of serological evidence of HBV infection in the recipient. Some patients are infected with pre-core mutant viruses. This is associated with a high viral load in the absence of the e antigen, and thus is also associated with a high risk of HBV transmission. The risk from needle stick injuries in the community is more difficult to estimate and the exact incidence of needle stick injuries and the transmission rate is unknown. The limited published case reports would indicate that there is a very low risk of HBV transmission associated with community acquired needle stick injuries.

Other healthcare setting exposures

Spring loaded lancets have been implicated in the transmission of HBV to patients, as have reusable sub-dermal EEG electrodes. There is a report of transmission of HBV to a patient during an endoscopic procedure, although no biopsies were taken, but bleeding gastric
ulceration was identified. The presumed source was HBeAg positive. Cleveland et al report that HBV infection prevalence in dentists increases with longer duration in practice. Although rates in a reference control population were not included in this report, increasing prevalence with longer duration of practice indicates that there is potential for transmission to dentists during their work.

**Other percutaneous exposures**

There are case reports documenting the transmission of HBV among butchers. These are attributed to small hand cuts, and sharing knives, which can carry the virus on the handle. It is also thought that HBV can be transmitted via small cuts acquired in barber shops.

**Body fluid exposures**

HBV DNA has been detected in body fluids apart from blood, including saliva, urine, nasopharyngeal fluid, semen, cervicovaginal fluids and tears. HBV transmission can occur following exposure to non-intact skin and mucous membranes. A case report describes transmission of HBV via broken skin, following contact with saliva and nasopharyngeal fluids from the source.

**Human bites**

Case reports have documented HBV virus transmission via a human bite, when associated with the skin being broken.

**Sexual exposures**

HBsAg has been found in seminal fluid and vaginal secretions; although concentrations in these fluids are lower than in blood. The risk of transmission of HBV following sexual exposure depends on the type of exposure, the viral load of the source, and the presence of sexually transmitted infections. The prevalence of HBV in heterosexuals is increased in those
with multiple sexual partners and those who have markers for HIV or syphilis. An infection rate of 18-44.2% is seen in regular heterosexual partners of HBV infected patients in addition, female commercial sex workers with a history of having anal intercourse had an increased risk of HBV infection. The risk of developing HBV infection is particularly high among men who have sex with men. For men who have sex with men, the prevalence of HBV infection is increased in those who have a history of an ulcerative sexually transmitted infection, Chlamydia, gonorrhea, commercial sex work, or multiple partners. There is also a significant risk associated with unprotected insertive anal intercourse. (EMI Guidelines - Appendix 21 Hepatitis B virus: epidemiology and transmission risks (updated May 2016)
### Hepatitis B transmission risk by exposure type

<table>
<thead>
<tr>
<th>Exposure Type</th>
<th>Healthcare Setting</th>
<th>HBeAg (+)</th>
<th>HBeAg (-)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Needlestick</strong></td>
<td>Healthcare setting, patient known</td>
<td>37-62% risk of serologic evidence of infection in recipient HBeAg (+) = 37-62% risk of serologic evidence of infection, 1-6% clinical infection</td>
<td>23-37% risk of serologic evidence of infection, 1-6% clinical infection</td>
</tr>
<tr>
<td><strong>Healthcare setting, patient unknown, or patient known but serology unknown</strong></td>
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<td></td>
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<tr>
<td><strong>Community setting</strong></td>
<td></td>
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</tr>
<tr>
<td><strong>Other percutaneous injuries with blood exposure</strong></td>
<td>Healthcare sharp (e.g. lancet)</td>
<td>Risk per exposure unknown. 36.8% -42% developed HBV after repeat exposures.</td>
<td>52-69% transmission if transfused with HBsAg (+) blood</td>
</tr>
<tr>
<td><strong>Exposure prone procedure by infected healthcare worker</strong></td>
<td>Exposure prone procedure by infected healthcare worker</td>
<td>Transmission rates vary between 6 and 15%- most were before standard precautions introduced</td>
<td>Requires risk assessment</td>
</tr>
<tr>
<td><strong>Transfusion</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Human bites</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Percutaneous exposure to other body fluids (e.g. saliva)</strong></td>
<td>Very low risk. Case reports - HBeAg (+) source. Requires risk assessment.</td>
<td>Risk negligible in the absence of visible blood. Case reports only. Requires risk assessment.</td>
<td>Requires risk assessment</td>
</tr>
<tr>
<td><strong>Sexual exposures</strong></td>
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<tr>
<td><strong>Heterosexual exposures in general</strong></td>
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<tr>
<td><strong>Men who have sex with men</strong></td>
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<tr>
<td><strong>Receptive oral sex (fellatio)</strong></td>
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</tbody>
</table>

### Risk assessment

- Type/details of injury – as above
- Source status – increased risk with HBeAg, high viral load
- Recipient status – increased risk if immune compromised
- For unknown source, consider where injury occurred – community setting versus hospital setting
  - if in hospital – consider high-risk ward/patients
  - if in community – consider prevalence of HBV and of PWID locally

(EMI Guidelines - Appendix 21 Hepatitis B virus: epidemiology and transmission risks (updated May 2016))
2.1 PREVALENCE OF HBV INFECTION

2.1.1 GLOBAL BURDEN

It was reported by the World Health Organization (WHO) in 2012 that “more than 2 billion people globally have been infected with HBV”. Sub-Saharan Africa and Southeast Asia have been identified as the hardest hit areas resulting in unprecedented impact in all spheres of human life. Kew and Arbuthnot estimated in 2001 that “387 million people (5% of the global population) were chronic carriers of HBV” with approximately 50 million of this number in sub-Saharan Africa (Kotzee et al., 2006). North America and Western Europe are identified as regions of low endemicity with only 2% of population been HBV positive (de Franchis R. et al., 2003). Japan and Mediterranean countries are considered areas of moderate endemicity which constitute about 45% of the world’s population.

Figure 3. HBV PREVALENCE BY REGIONS ACROSS THE GLOBE

Global Distribution of Chronic Hepatitis B Infection

(Ott et al 2012)
REGIONAL DISTRIBUTION ACROSS THE GLOBE

Sub Saharan Africa: 8%-12%

Asia: 5%-8.2%

Japan and Mediterranean Countries: 4.3%-5.4%

North America & Western Europe: 1.6%-5%

Some studies from Asia reported high prevalence. A cross-sectional sero prevalence survey from Delhi, Jilin, China in 2007 indicated a prevalence of 4.38 % (Hong Z. et al. 2011). Another study from India conducted among blood donors between the ages of 19-55 years showed a prevalence of 2.45% (n=20,000 [95% CI: 2.01-2.46]) (Behal R. et al., 2008). Another study conducted among middle school students in China showed overall seroprevalence of 1.11%

2.1.2 HBV BURDEN IN AFRICA

The highest prevalence is recorded in Africa countries. According to (Cruz, et. al., 2010) the HBV prevalence across Africa is as follows: Angola 13%, Benin 19%, Ethiopia 23%, Namibia 18%, Zimbabwe 25%, Zambia 6.5% Central African Republic 4.5%, Congo 5.4%, Nigeria 2.3%, and Ghana 13.1%.

A study conducted in blood transfusion centers in Abidjan among blood donors from 28 January to 31 December 2010 showed that “the prevalence of HBV including population of adults without risk factors was not at all negligible (4.68% [95% CI 4% - 5%])” (Ndri N. et al., 2013). A study conducted in 2009 reported “10.79% and 11.59% among voluntary and replacement blood donors respectively in Tamale Teaching hospital in Ghana” (Dongdem JT. et al., 2012). A similar study conducted in Kintampo Municipal Hospital in Ghana among blood donors from
January 2010 to December 2012 showed an overall seroprevalence of 9.6% (Walana W. et al, 2014). A seroprevalence study conducted in Navrongo among primary and junior high students in Ghana recorded HBV prevalence of 12.1% (Avege, 2005). A similar study documented a higher prevalence of HBV in suburban schools (73.9%) compared to the central town schools (53.6%) in Cameroon (Chiaranmonte et al, 1991). Furthermore, Ugwuja et al, (2009) also reported “HBV prevalence of 4.1% in their study carried out among adolescent age group in south eastern Nigeria”, while 4.7% was documented in Gondar, Ethiopia (Belay et al,. 2010)

2.1.3 HBV PREVALENCE IN GHANA
In Ghana there has been a controversy surrounding the national prevalence among experts owing to the fact that no national survey has been done to measure the burden of the disease. While Sweitzer et al. estimated in 2013 that the prevalence of HBV in Ghana is 12.92 %, others had a contrary view and put the figure around 10–15 %. A recent systematic and meta-analysis of prevalence studies in Ghana also reported that HBV prevalence was 10.8%, 12.7% and 13.1% among voluntary blood, replacement blood donors and pregnant women respectively (Ofori A. et al, 2016). According to the systematic review the regional HBV prevalence is as follows: Ashanti 13.1%, Greater Accra 10.6%, Eastern 13.6% , Northern 13.1% ,Central 11.5%, and Brong Ahanfo 13.7% region. As pointed out by Ofori A. et. al.,(2016) “the prevalence for Volta, Western, Upper East and Upper West regions could not be determined for lack of aggregate data”. The highest prevalence was found among those within the 16 to 39 year group. Despite the disparate among experts the evidences clearly show that HBV is hyper endemic in this country.
Fig. 4 HBV Prevalence by Regions in Ghana

Source: Ofori-Asenso & Agyeman BMC Infectious Disease (2016)
2.0 Distribution and Associated Factors of HBV Infection

Behal R. et al. (2008) reported that “the burden of hepatitis –B virus was high among young adults, private small businessmen, peasants and males. The hepatitis-B prevalence in males was 2.28% (C.I. 2.0683-2.4917) whist that of females was 1.30% (C.I. 0.4974-2.1026). The difference was significant with p=0.021. The hepatitis-B age specific sero-prevalence in 19-25 year age group increased with 1.78% (C.I. 1.4472-2.1128) compared to 3.03% (C.I. 2.4324-3.6276) among the 35-45 year age group. This difference was statistically significant (p=0.038). The study also demonstrated highest prevalence of HBV at 3.10% (C.I. 2.4824-3.7176) among male blood donors age between 35-45 years and at 1.76% (C.I. 0.3602-3.1598) in female donors belonging to 25-35 year age group. The smallest prevalence was recorded among donors aged 19-25 years in both genders”). A similar study in Ghana conducted at the “Tamale Teaching Hospital Blood Bank also indicated that the prevalence of HBV infection among blood donors was age and sex dependent. Among replacement donors, youth aged 20-29 years were 4 times as likely as older adults(50-70years) to be HBsAg positive(OR; 4.04;95%C.I.;1.2118-13.4702) (P=0.023). Young voluntary donors aged (20-29 years) were twice as likely as older adults (40-60 years) to be HBV positive (OR: 2.13; 95% C.I; 1.21-3.75) (P=0.009). Males aged (20-29years) recorded the highest prevalence. The risk of infection is therefore age, sex and donor type dependent”. (Dongdem JT. et al., 2012).

A cross sectional sero survey in Dehui, Jilin, China in 2007 shows an association between chronic HBV infection and the following occupation as private small businessmen 3.17 (1.56-6.43), laborers 2.26 (1.14-4.48), peasants 2.25 (1.12-4.50); male gender 1.79 (1.21-2.68); and older age 0.15 (0.02-0.85). Independent predictors for exposure to HBV included occupation as a
private small businessman 1.39 (1.03-1.88); male gender 1.61 (1.36-1.90) and older age 3.33 (2.14-5.17) (Hong Z. et al., 2011).

“In a similar study to determine the prevalence of HBV infection among blood donors at the Tamale Teaching Hospital in Ghana in 2009, young replacement blood donors, aged 20-29 years were 4 times likely than older fellows (50-70 years) to be HbsAg positive (OR: 4.04; p = 0.023, 95% C.I.:1.21-1.35)” (Dongdem JT. et al., 2012). In another study to assess hepatitis B and C viral infections among blood donors at Bahir Dar, Ethiopia in 2013, sex had statistically significant association with HBV infections ($\chi^2=4.074$, $p = 0.04$) where females (1.4%) were less likely to be infected than males (4.4%). HBV prevalence is observed to be increasing with age (5.9% in age group 36-45 years followed by 8.3% in age group of 45 and above years). However, “age distribution and seroprevalence of HBV was not significantly associated ($\chi^2=7.3$, $p=0.06$)” (Abate et al., 2013).
CHAPTER THREE

METHODS

2.1 STUDY DESIGN

The study was a cross-sectional descriptive sero-prevalence survey.

2.2 STUDY AREA

The study was conducted in the Krachi Senior High school in the Krachi-West district located far north of the Volta region. Krachi West district was chosen based on its special location in the far north of the region and its closeness to the Northern region which has a long history of high HBV. It is mainly rural with high youth population and cut off from the rest of the region by river Volta and river Oti making it difficult for awareness creation. The Krachi West district is located in the North-Western corner of the Volta Region of Ghana and lies between Latitudes 70 4” N and 80 25” S and Longitudes 00 25” E and 80 75” E. The District shares boundaries with Krachi Nchumuru District to the North, Krachi East District to the east, to the south and West with the Volta Lake. Beyond the Volta Lake, it shares boundary with Sene West District to the West. The land area of the District is 928.36 square kilometers.
figure 5: map of Krachi West District, Source: Ghana Statistical Service, GI
2.3 **STUDY POPULATION**

The study population comprised all students from Krachi Senior High school at the time of study. The school currently has a population of 850 students. Most of these students come from surrounding communities within the Krachi West district and few others from the nearby sister districts like Krachi East and Krachi Njummuru districts.

2.4 **VARIABLES**

2.4.1 **Dependent variables**

Presence or absence of HBsAg

2.4.2 **Independent variable**

- Socio-demographic characteristics of student’s age, sex, religion and ethnicity and occupation of parents/guardians
- Risk factors: Tribal marks, male and female circumcision, number of sexual partners, hospital admission, history of blood transfusion, place of barbering, sharing of sharps like blades, barbering machines, shaving sticks, syringes and needles among others.

2.5 **INCLUSION CRITERIA**

Those students above 18 years who have consented to be part of the study were recruited into the study.

Those students below 18 years who have assented and whose parents/guardians have consented were also admitted into the study.
3.6. EXCLUSION CRITERIA
All students who were sick, absent or present but whose parents have not consented were excluded.

2.6 SAMPLING TECHNIQUE
All students in the school during the study have equal chances of been selected for the study. Using the 2017 student register as sample frame, a simple random sampling technique was used in selecting students for this study. The names of the students were numbered from one to 850 and entered into an excel sheet. The numbers of all the 850 students were later entered into a random digit generator and 182 random numbers were automatically generated. These 182 random numbers were later matched with the excel sheet created to identify the names of the selected students. With the help of class teachers these selected study participants were identified and were used for the study.

2.7 SAMPLE SIZE CALCULATION
Using the Cochrane sample size formula of \( n = \frac{Z^2 pq}{E^2} \),

Where \( n \) = sample size,

\( Z \) = 95\%CI,

\( p \) = prevalence of Hepatitis B (HBsAg),

\( q = 1-p \) and \( E \) = margin of error

Avege (2005) documented in the School of Public Health, University of Ghana in his thesis on prevalence and risk factor study of HBV among primary and junior high students in Navrongo,
that the prevalence of HBV among students in the Wa district of the Upper West Region of Ghana was 12.0%. E=5%, Z=1.96, p=0.12, q= 0.88

Implies n = \((1.96)^2 \times 12(1-0.12) / 0.05^2 = 3.8416 \times 0.1056 / .0025\)

Therefore, minimum sample size = 162.27 = 162 students

Considering 12% to cater for non-responsiveness other unforeseen challenges, a total sample size of 182 students was taken.

2.8 DATA COLLECTION TECHNIQUES AND TOOL INSTRUMENT

Questionnaires were developed and administered to obtain data on socio-demographic characteristics of students such as age, sex, ethnicity, religion, economic status of parents/guardians and other risk factors such as sharing of toilet articles, blades, barbering machines, syringes and needles, history of circumcision/genital mutilation, scarification/tribal marks, blood transfusion, sexual exposures among several others. 30ul volume of blood was taken from the interviewed participants and tested for HBsAg.

2.8.1 LABORATORY PROCEDURE

Test for the HBsAg was done in the school”s science laboratory using Rapid Test™ HBsAg ELISA kits (Los Angeles-based Diagnostic Automation/Cortez Diagnostics, In). Blood samples were obtained from all the 182 eligible students for serological test for HBsAg. Blood was obtained from each participant under aseptic procedure using lancet by simply pricking the left thumb of participants. The blood sample was drawn using a pipette onto a properly labeled ELISA cassette test kits. One or two drops of buffer was added to the blood sample and it was allowed to stand for 30 minutes. In accordance with the manufacturer's instructions, the result was interpreted using the negative, positive and control bands indicated on the cassette. These
ELISA test kits have specificity of 99.75% and sensitivity of 99.9%. Both parents/guardians and students were reassured, educated, counseled and referred to both the Krachi West District Hospital and District Health Management Team for vaccination and further management.

2.8.2 TRAINING OF RESEARCH ASSISTANTS

A team of 2 laboratory technologists and 2 Nurses were trained on sampling techniques and administration of questionnaires as well as generating unique identification numbers for each student.

2.8.3 PRE-TESTING AND REVIEW OF INSTRUMENT

The questionnaires was tested by the principal investigator and the research assistants in Krachi Senior High Technical school in the study area to ensure the students understood and interpreted the questions precisely and answer them within a reasonable time limit. The consistency of the questionnaires was also tested to ensure they yielded the desired results. Those that are not consistent was revised or dropped.

2.9 DATA MANAGEMENT AND ANALYSIS

The data obtained was cleaned and analyzed using STATA 14 (Stata Corp. LP, College Station, USA). Chi square and student t-tests were used to analyze categorical and continuous variables respectively. To estimate the multiple logistic model all variables that were significant (P-value< 0.2) were selected for analysis. The multiple logistic model has been fitted, using Hosmer-Lemeshow test (P value > 0.050 indicated appropriate adjustment). Unadjusted and Adjusted odds ratio, their 95% CI and their P values determined. P values less than 0.05 were considered significant.
2.10 ETHICAL CLEARANCE

The following ethical considerations were instituted prior to the study:

I. Study participants as well parents of participants was educated on the hepatitis B disease, thus its etiology, mode of transmission, signs & symptoms, complications and its prevention, before commencement of the study.

II. Laboratory procedure and its associated risks like pain during the finger prick was fully explained to the prospective subjects before enrolment for blood sample collection.

III. Confidentiality of test results and all other information of subjects was assured and maintained.

IV. Written consent was sought from each of the participants especially parents of minors before enrolling them into the study.

V. Permission was sought from the headmaster and the PTA chairman of the school before the study was done.

VI. Ethical clearance was sought from Ghana health service ethical review board before study began(GHS-ERC:60/02/17)
CHAPTER FOUR

RESULTS

4.1 ENROLLMENT AND SOCIO-DEMOGRAPHIC CHARACTERISTICS OF STUDENTS
A total of 182 students were recruited for this study. The mean age of students was 17.4±1.8 years. Of the 182 study participants 88 (48.35%) of them were males and 94 (51.65%) were females. The students were categorized into four age groups. 81 (44.51%) of the students aged between 15 and 17 years, 87 (47.80%) between 18-20 years, and 14 (7.69%) between 21-23. Majority of the students were Christians 151 (82.97%), 26 (14.92%) were Muslim, 5 (2.75%) practiced traditional religion. A large percentage of the participants were Ewe 41 (22.53%), followed by the Akan tribe 27 (14.84%), Gonjas 17 (9.34%) and the rest belonging to other tribes 97 (53.30%).

4.2 SEROLOGICAL RESULTS
The HBV prevalence in this study was found to be 14.3% (C.I. 9.20-19.37). The highest prevalence was recorded in students 18-20 age group 14/87 (16.09%) and the lowest, in students 15-17 years of age 8/81 (9.88%). The prevalence was observed to increase with age.
4.3 PREVALENCE AND FACTORS ASSOCIATED WITH HEPATITIS B INFECTION

Table 1. Demographic Characteristics of the 182 Students and their Association with Hepatitis B Virus Infection

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>HBV+ NO. (%)</th>
<th>HBV-NO. (%)</th>
<th>P-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td>0.809</td>
</tr>
<tr>
<td>Male</td>
<td>12(46.15)</td>
<td>76(48.72)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>14(53.85)</td>
<td>80(51.28)</td>
<td></td>
</tr>
<tr>
<td>Age in years</td>
<td></td>
<td></td>
<td>0.146</td>
</tr>
<tr>
<td>15-17</td>
<td>8(30.77)</td>
<td>73(46.79)</td>
<td></td>
</tr>
<tr>
<td>18-20</td>
<td>14(53.85)</td>
<td>73(46.79)</td>
<td></td>
</tr>
<tr>
<td>21-23</td>
<td>4(15.38)</td>
<td>10(6.41)</td>
<td></td>
</tr>
<tr>
<td>Ethnic Groups</td>
<td></td>
<td></td>
<td>0.384</td>
</tr>
<tr>
<td>Ewe</td>
<td>8(30.77)</td>
<td>33(21.15)</td>
<td></td>
</tr>
<tr>
<td>Gonja</td>
<td>1(3.85)</td>
<td>16(10.26)</td>
<td></td>
</tr>
<tr>
<td>Akan</td>
<td>2(7.69)</td>
<td>25(16.03)</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>15(57.69)</td>
<td>82(52.56)</td>
<td></td>
</tr>
<tr>
<td>Religion</td>
<td></td>
<td></td>
<td>0.030</td>
</tr>
<tr>
<td>Christianity</td>
<td>17(65.38)</td>
<td>134(85.90)</td>
<td></td>
</tr>
<tr>
<td>Moslem</td>
<td>8(30.77)</td>
<td>18(11.54)</td>
<td></td>
</tr>
<tr>
<td>Traditional</td>
<td>1(3.85%)</td>
<td>4(2.56)</td>
<td></td>
</tr>
<tr>
<td>Occupation father</td>
<td></td>
<td></td>
<td>0.445</td>
</tr>
<tr>
<td>Farming</td>
<td>13(50.00)</td>
<td>99(63.46)</td>
<td></td>
</tr>
<tr>
<td>Fishing</td>
<td>3(11.54)</td>
<td>10(6.41)</td>
<td></td>
</tr>
<tr>
<td>Formal employment</td>
<td>5(19.23)</td>
<td>25(16.03)</td>
<td></td>
</tr>
<tr>
<td>Unemployment</td>
<td>3(11.54)</td>
<td>7(4.49)</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>2(7.69)</td>
<td>15(9.62)</td>
<td></td>
</tr>
<tr>
<td>Occupation mother</td>
<td></td>
<td></td>
<td>0.281</td>
</tr>
<tr>
<td>Farming</td>
<td>9(34.62)</td>
<td>65(41.67)</td>
<td></td>
</tr>
<tr>
<td>Petty trading</td>
<td>14(53.85)</td>
<td>54(34.62)</td>
<td></td>
</tr>
<tr>
<td>Formal employment</td>
<td>0(.00)</td>
<td>14(8.97)</td>
<td></td>
</tr>
<tr>
<td>Unemployment</td>
<td>2(7.69)</td>
<td>13(8.33)</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>1(3.85)</td>
<td>10(6.41)</td>
<td></td>
</tr>
</tbody>
</table>

The prevalence differed significantly among the religious affiliations of student. 68.97% among Christians and 27.89% among Muslims \(p=0.030\). The HBV prevalence was not significant
among the various ethnic groups, with the highest rate among the other ethnic groups and the
Ewe ethnic groups \[p=0.384\] with the least prevalent among the Gonja ethnic group. There was
no association seen between the occupations of guardian and the hepatitis-B positivity status of
students.

Table 2. **Risk Factors of the 182 Students and their Association with HBV**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>HBV+ NO.(%)</th>
<th>HBV- NO.(%)</th>
<th>P-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is used in cleaning teeth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tooth brush</td>
<td>25(96.15)</td>
<td>147(94.23)</td>
<td>0.834</td>
</tr>
<tr>
<td>Chewing stick</td>
<td>1(3.85)</td>
<td>7(4.49)</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>0(0.00)</td>
<td>2(1.28)</td>
<td></td>
</tr>
<tr>
<td>Do you share same tooth brush</td>
<td></td>
<td></td>
<td>0.476</td>
</tr>
<tr>
<td>Yes</td>
<td>0(0.00)</td>
<td>3(1.92)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>26(100.00)</td>
<td>153(98.08)</td>
<td></td>
</tr>
<tr>
<td>Do you share same chewing stick</td>
<td></td>
<td></td>
<td>1.000</td>
</tr>
<tr>
<td>Yes</td>
<td>1(3.85)</td>
<td>6(3.85)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>25(96.15)</td>
<td>150(96.15)</td>
<td></td>
</tr>
<tr>
<td>Do you share same towel and sponge</td>
<td></td>
<td></td>
<td>1.000</td>
</tr>
<tr>
<td>Yes</td>
<td>2(7.68)</td>
<td>12(7.69)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>24(92.31)</td>
<td>144(92.31)</td>
<td></td>
</tr>
<tr>
<td>Do share same spoon</td>
<td></td>
<td></td>
<td>0.135</td>
</tr>
<tr>
<td>Yes</td>
<td>5(19.23)</td>
<td>53(33.97)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>2180.77</td>
<td>103(66.03)</td>
<td></td>
</tr>
<tr>
<td>Trimming of finger nails</td>
<td></td>
<td></td>
<td>1.000</td>
</tr>
<tr>
<td>Biting them with teeth</td>
<td>4(15.38)</td>
<td>24(15.38)</td>
<td></td>
</tr>
</tbody>
</table>
b. Sexual Risk Factors their association with HBV

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>HBV+ NO. (%)</th>
<th>HBV- NO. (%)</th>
<th>P VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you in sexual relationship</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>7(26.92)</td>
<td>32(20.51)</td>
<td>0.461</td>
</tr>
<tr>
<td>No</td>
<td>19(73.08)</td>
<td>124(79.49)</td>
<td></td>
</tr>
<tr>
<td>How many sexual partners have you</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>19(73.09)</td>
<td>124(79.49)</td>
<td>0.359</td>
</tr>
<tr>
<td>One</td>
<td>3(11.54)</td>
<td>23(14.74)</td>
<td></td>
</tr>
<tr>
<td>Two</td>
<td>2(7.69)</td>
<td>5(3.21)</td>
<td></td>
</tr>
<tr>
<td>More than two</td>
<td>2(7.69)</td>
<td>4(2.56)</td>
<td></td>
</tr>
<tr>
<td>Have seen condom before</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>17(65.38)</td>
<td>107(68.59)</td>
<td>0.774</td>
</tr>
<tr>
<td>No</td>
<td>9(34.62)</td>
<td>49(31.41)</td>
<td></td>
</tr>
<tr>
<td>Have you use condom before</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>6(23.08)</td>
<td>28(17.95)</td>
<td>0.535</td>
</tr>
<tr>
<td>No</td>
<td>20(76.92)</td>
<td>128(82.05)</td>
<td></td>
</tr>
</tbody>
</table>

c. Sharing of Barbering machines and blades and their Association with HBV

<table>
<thead>
<tr>
<th>Use of blade</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you share same blade</td>
<td>22(84.62)</td>
<td>132(84.62)</td>
<td>0.792</td>
</tr>
<tr>
<td>Yes</td>
<td>4(15.38)</td>
<td>21(13.46)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>22(84.62)</td>
<td>135(86.54)</td>
<td></td>
</tr>
<tr>
<td>Do you share same shaving sticks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>2(7.69)</td>
<td>15(6.92)</td>
<td>0.755</td>
</tr>
<tr>
<td>No</td>
<td>24(92.31)</td>
<td>141(90.38)</td>
<td></td>
</tr>
<tr>
<td>Who shaves you</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colleagues</td>
<td>12(46.15)</td>
<td>77(49.36)</td>
<td>0.586</td>
</tr>
<tr>
<td>Barber</td>
<td>14(53.85)</td>
<td>74(47.44)</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>0(0.00)</td>
<td>5(3.21)</td>
<td></td>
</tr>
<tr>
<td>Where do you shave your hair</td>
<td></td>
<td></td>
<td>0.058</td>
</tr>
<tr>
<td>At school</td>
<td>5(19.23)</td>
<td>60(38.46)</td>
<td></td>
</tr>
<tr>
<td>At home</td>
<td>21(80.77)</td>
<td>96(61.54)</td>
<td></td>
</tr>
<tr>
<td>Do you share same shaving machine</td>
<td></td>
<td></td>
<td>0.425</td>
</tr>
<tr>
<td>Yes</td>
<td>9(34.62)</td>
<td>67(42.95)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>17(65.38)</td>
<td>89(57.05)</td>
<td></td>
</tr>
</tbody>
</table>
d. Hospital admission

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>HBV+ NO. (%)</th>
<th>HBV- NO. (%)</th>
<th>P-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital admission</td>
<td></td>
<td></td>
<td>0.261</td>
</tr>
<tr>
<td>Yes</td>
<td>15(57.69)</td>
<td>79(50.64)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>8(30.77)</td>
<td>69(44.23)</td>
<td></td>
</tr>
<tr>
<td>Don’t know</td>
<td>3(11.54)</td>
<td>3(11.54)</td>
<td></td>
</tr>
<tr>
<td>Blood transfusion</td>
<td></td>
<td></td>
<td>0.927</td>
</tr>
<tr>
<td>Yes</td>
<td>4(15.38)</td>
<td>20(12.82)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>13(50.00)</td>
<td>78(50.00)</td>
<td></td>
</tr>
<tr>
<td>Don’t know</td>
<td>9(34.62)</td>
<td>58(37.18)</td>
<td></td>
</tr>
<tr>
<td>Injection</td>
<td></td>
<td></td>
<td>0.942</td>
</tr>
<tr>
<td>Yes</td>
<td>20(76.92)</td>
<td>121(77.56)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>6(23.08)</td>
<td>35(22.44)</td>
<td></td>
</tr>
</tbody>
</table>

e. Socio -Cultural Practices

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>HBV+ NO. (%)</th>
<th>HBV- NO. (%)</th>
<th>P-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circumcision</td>
<td></td>
<td></td>
<td>0.902</td>
</tr>
<tr>
<td>Yes</td>
<td>11(42.31)</td>
<td>64(41.03)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>15(57.69)</td>
<td>92(58.97)</td>
<td></td>
</tr>
<tr>
<td>Female genital mutilation</td>
<td></td>
<td></td>
<td>1.000</td>
</tr>
<tr>
<td>Yes</td>
<td>1(3.85)</td>
<td>6(3.85)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>25(96.15)</td>
<td>150(96.16)</td>
<td></td>
</tr>
<tr>
<td>Do you have tribal mark</td>
<td></td>
<td></td>
<td>0.646</td>
</tr>
<tr>
<td>Yes</td>
<td>7(26.92)</td>
<td>49(31.41)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>19(73.08)</td>
<td>107(68.59)</td>
<td></td>
</tr>
</tbody>
</table>

f. HBV Knowledge and Perception and its Association with HBV

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>HBV+ NO. (%)</th>
<th>HBV- NO. (%)</th>
<th>P-VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have heard of hepatitis before</td>
<td></td>
<td></td>
<td>0.095</td>
</tr>
<tr>
<td>Yes</td>
<td>24(92.31)</td>
<td>122(78.21)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>2(7.69)</td>
<td>34(21.79)</td>
<td></td>
</tr>
<tr>
<td>Means of transmission</td>
<td></td>
<td></td>
<td>0.445</td>
</tr>
<tr>
<td>Sex without condom</td>
<td>9(34.62)</td>
<td>66(42.58)</td>
<td></td>
</tr>
<tr>
<td>Don’t know</td>
<td>17(65.38)</td>
<td>89(57.42)</td>
<td></td>
</tr>
</tbody>
</table>
There was no significant association between HBsAg positive students and those negative for markers, for risky behaviors and practices – such as dental cleaning materials, blood transfusion, circumcision by traditional healers e.t.c that were grouped matched.
Table 3. Multiple logistic Regression Analysis of the Factors Associated with HBV Infection among students (p=0.200).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hepatitis B Infection</th>
<th>Unadjusted Odd ratio (95%CI)</th>
<th>P-value</th>
<th>Adjusted Odd ratio (95%CI)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age Group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-17</td>
<td>8(30.77)</td>
<td>73(46.79)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>18-20</td>
<td>14(53.85)</td>
<td>73(46.79)</td>
<td>1.75(0.69-4.42)</td>
<td>0.237</td>
<td>0.56(0.28-1.11)</td>
</tr>
<tr>
<td>21-23</td>
<td>4(15.38)</td>
<td>10(6.41)</td>
<td>3.65(0.93-14.37)</td>
<td>0.064</td>
<td>1.10(0.27-4.47)</td>
</tr>
<tr>
<td><strong>Religion</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christianity</td>
<td>17(63.38)</td>
<td>134(85.90)</td>
<td>1</td>
<td>1</td>
<td>1.40(0.49-4.01)</td>
</tr>
<tr>
<td>Moslem</td>
<td>8(30.77)</td>
<td>18(11.34)</td>
<td>3.50(1.32-9.28)</td>
<td>0.012</td>
<td>0.62(0.06-6.20)</td>
</tr>
<tr>
<td>Traditional</td>
<td>1(3.85)</td>
<td>4(2.56)</td>
<td>1.97(0.21-18.67)</td>
<td>0.554</td>
<td>0.62(0.06-6.20)</td>
</tr>
<tr>
<td><strong>Do you share same spoon with colleagues?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>5(19.23)</td>
<td>53(33.97)</td>
<td>1</td>
<td>1</td>
<td>0.46(0.26-0.80)</td>
</tr>
<tr>
<td>No</td>
<td>21(80.73)</td>
<td>103(66.03)</td>
<td>2.16(0.77-6.05)</td>
<td>0.143</td>
<td>0.48(0.28-0.84)</td>
</tr>
<tr>
<td><strong>Where do you have your hair shaved?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At School</td>
<td>5(19.23)</td>
<td>60(38.46)</td>
<td>1</td>
<td>1</td>
<td>0.48(0.28-0.84)</td>
</tr>
<tr>
<td>At Home</td>
<td>21(80.73)</td>
<td>96(61.54)</td>
<td>2.63(0.94-7.33)</td>
<td>0.066</td>
<td>0.48(0.28-0.84)</td>
</tr>
<tr>
<td><strong>Have you heard of hepatitis-B?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>24(92.31)</td>
<td>122(78.21)</td>
<td>1</td>
<td>1</td>
<td>0.43(0.13-1.41)</td>
</tr>
<tr>
<td>No</td>
<td>2(7.69)</td>
<td>34(21.79)</td>
<td>0.80(0.25-2.49)</td>
<td>0.695</td>
<td>1.41(0.43-4.68)</td>
</tr>
</tbody>
</table>

Infection among students (p=0.200).
From multiple regression table (tab.3), when other variables such as age, religion, place of barbering and whether or not one had heard of hepatitis before were controlled for, sharing of same spoon/cutlery among students was significantly associated with HBV infection (aOR: 0.46, 95%CI 0.26-0.8)(p=0.01). Students who do not share spoon are 0.46 times less likely to be infected with the disease (aOR: 0.46, 95%CI 0.26-0.8) compared to those who do. This was found to be statistically significant. Additionally, place of barbering was also found to be a significant predictor of HBV (aOR: 0.48, 95%CI 0.28-0.84)(p=0.01). Hence students who had their hair shaved at home are 0.48 times less likely to be infected with HBV (aOR: 0.48, 95%CI 0.28-0.84) compared to those who shaved in the school by their colleagues. However, the chances of developing HBV among students with respect to religion were found not to be statistically significant.
CHAPTER FIVE

5.1 DISCUSSION
The prevalence of hepatitis B virus infection in the Krachi Senior High School was 14.3% (C.I. 9.20-19.37). This is consistent with most prevalent studies carried out in Ghana where the HBV prevalent rate “ranged between 10-15 percent among voluntary blood donors (VBDs), replacement blood donors (RBDs) and pregnant women” (Ofori-A., & Agyeman, 2016). This finding is higher as compared to the prevalence rate of 12.0 documented by Avege in Nanvrono among primary and junior high students in 2005 and in other countries such as 4.1% reported by Ugwuja et al., (2009) in their study carried out among adolescents in south eastern Nigeria, and 4.7% in Gondar, Ethiopia (Belay et al., 2010) as well as 4.38% in China (Hong Z. et al. 2011).

Female students had a higher prevalence than their male counterpart in this survey though the difference was not significant. Avege, (2005) also reported higher prevalence in female students in primary and the junior high schools in Navrongo in Ghana but the prevalence did not reach the level of significance. Similarly another study conducted by Donbraye et al., (2014) “in Osun state, south west, Nigeria also recorded higher prevalence in female children than males”. Bukbuk et., al. (2007)” in northern Nigeria also showed no significant difference between males and females.”

In the logistic regression analysis, sharing of same spoon/cutlery and place of barbering were statistically associated with hepatitis-B virus. Despite the fact that religion was independently associated in the univariate analysis it did not however remain in the final model of logistic regression. Students who do not share same spoon/cutlery are 0.46 times less likely to be
infected with the disease (aOR: 0.46, 95%CI:0.26-0.8) compared to those who share same spoon or cutlery. Similarly students who had their hair shaved at home are 0.48 times less likely to be infected with HBV (aOR: 0.48, 95%CI:0.28-0.84) compared to those who shaved in the school by their colleagues. The association between these variables and HBV observed in this study reflects risky behavior among students such as sharing of toilet articles, sharps and other personal articles which have higher propensity for HBV infection among the students.

The findings of this study reinforce the need for control over the senior high schools and the need for the adoption of precautionary measures in the school system in order to prevent further explosion of HBV contamination by student barbers and other transmission agents. Furthermore, strategies to ensure adequate vaccine coverage against hepatitis B among students must be implemented to reverse this unfortunate incidence.

Other risk factors including unsafe sexual exposure, traditional practice (scarification marks) low socio-economic status of the family, and male & female circumcision were not significant.

This also agrees with the findings of Al- Faleh et al, (1992) “from Saudi Arabia who demonstrated that family size and socio-economic status were not significantly associated with HBV positivity in children”. Chukwuka et al, (2003) from Ebony State, Nigeria also recorded no significant association between the cultural practice of scarification marks and ear piercing to HBs-antigaenaemia though this also was a risk factor in their study population.
5.2. Limitations of Study

Some limitations of this study are as follows:

- The possibility of occult HBV infection was not investigated in the present study due to budgetary constraints and this could affect the prevalence of “true” current HBV infection.

- The risk factors for hepatitis-B infection were self-reported by respondent with the help of the questionnaires and this could be subjective.

- Besides, the cross-sectional design adopted in this study does not allow establishment of direct causal relationships and the temporal sequence between the factors under investigation and HBV infection. Nevertheless, it provides useful information for public health planning, understanding of associated factors with HBV and hypothesis formulation for future studies.
CHAPTER SIX

6.0 CONCLUSION
This study has given us some insight about the prevalence of hepatitis-B among students in Krachi senior high school. The prevalence of hepatitis-B in this school is 14.3% which is significantly high. This is an indication that the disease is a major public health threat among the youth. Sharing of spoons/cutlery and place of barbering among students were independently associated with the presence of HBV infection.

6.1 RECOMMENDATION
On the basis of this finding and existing literature I recommend the following to the ministry of health:

- The Health Promotion Unit to implement continuous education and sensitization campaigns on hepatitis-B in all senior high schools across the country.
- Similar studies should be replicated in other senior high schools nationwide by the Ghana Health Service to accurately determine the burden of hepatitis-B prevalence among the youth.
- There should be a national survey on the disease.
REFERENCES


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Smelzer S. C. & Bare B. (2003). *Brunner and Suddarth’s Textbook of Medical Surgical Nursing,* Lippincott Williams & Wilkins, Philadelphia, Pa, USA.


APPENDICIES

APPENDIX I. CONSENT FORM

CONSENT FORM (STUDENTS ABOVE 18 YEARS)

PROJECT TITLE

FACTORS ASSOCIATED WITH HEPATITIS-B INFECTION AMONG KRACHI SENIOR HIGH SCHOOL STUDENTS IN THE KRACHI WEST DISTRICT OF THE VOLTA REGION.

Institutional Affiliation

School of Public Health

College of Health Sciences

University of Ghana, Legon

Background and Personal Introduction:

Alex Atakli is the principal investigator, currently a Master’s Student of the School of Public Health, University of Ghana, Legon and cutting a research on the factors associated with hepatitis B infection. This study is for academic purposes and a requirement for the award of Master of Science Degree in Epidemiology and Disease Control.
Procedure:

A structured questionnaire will be administered and blood sample taken for Hepatitis B (HBsAg and HBeAg) test. The data collected will be kept until after the Degree has been awarded; then it will be destroyed.

Risks and Benefits:

The study involves the draw of blood sample so you are likely to incur pain at the prick site which will resolve within a day whilst the benefits that may arise include contribution to the development of interventional policies in hepatitis B control.

Additionally, it will afford you the opportunity to know your status and been educated on the hepatitis B infection.

Right to Refuse:

Although there are no known substantial risks associated with the research protocols, if you feel uncomfortable you have the liberty to opt out.

Anonymity and Confidentiality:

You are assured that the information you will provide will be handled with the strictest confidentiality and will not be shared with third parties not directly involved in the research and thus will be used purely for academic purposes.

Before Consenting:

Do you have any questions that you wish to ask? (If yes, questions will be noted.) If you have questions you wish to ask later, or anything you wish to seek clarification regarding the research, please do not hesitate to contact the principal investigator (Atakli Alex) on:
Telephone number: 0202853761 OR Hannah Frimpong

Email: ataklialex@gmail.com GHS-ERC Administrator

+2339(0)243235225 / 05070412233

Hannah.frimpong@ghsmail.org

I, the undersigned, have volunteered to be part of this study and have agreed to offer my blood sample. The risk and benefit have been explained to me and I am aware efforts have been made to protect my identity.

…………………………………………
…………………………………………

Name & signature of participating student’s parent

Date:

…………………………………………

Name & signature of principal investigator

Dates:

…………………………………………
Study Title: FACTORS ASSOCIATED WITH HEPATITIS-B INFECTION AMONG KRACHI SENIOR HIGH SCHOOL STUDENTS IN THE KRACHI WEST DISTRICT OF THE VOLTA REGION.

Hello, my name is Atakli Alex, a student from the University of Ghana-Legon. I am conducting a study on “factors associated with hepatitis-B virus infection among students”. I am conducting this study in your district to determine the social and economic factors associated with hepatitis-B virus infection among students in Krachi West district in the Volta region. The information provided will be used for academic purpose only.

You have been selected for the study because you fall between the age group of 15–26 years and leave in this senior high school which was purposely selected for this study.

If you agree to take part in this study, I will ask you some questions and I will write down your responses. The questions will seek your opinion and ideas on hepatitis-B virus in your school. The interview will take about 20 minutes after which you will have small prick on your left thumb with a lancet for a small blood sample for the hepatitis-B test. Your participation is voluntary and you have the right to refuse from participating or withdraw from the study at any time. No penalties or negative consequences will result from withdrawal.

I assure you that everything you tell me including your hepatitis-B status will be held in high confidence and will not be shared with anyone other than my supervisor, and he would only inspect to make sure that I conducted the interview properly.
Your participation in this study is very important because it affords you the opportunity to freely know your hepatitis-B status and will enable you to seek immediate protection or treatment. It will also inform Public Health professionals and government to make good youth base policies on hepatitis-B.

When I am done with this study I will write a report about what was learned. This report will not include your name or that you were in the study.

You can ask questions about this study at any time during the interview. If you have additional questions about this study, you can contact Dr. Bismark Y. Sarfo on telephone: 0269343169 or Hannah Frimpong (ERC Secretariat): 0507041223

Opportunities to be informed of Results:

In all likelihood, the results will be fully available around July 2017. Preliminary results will be available earlier. If you wish to be told the results of this research, please contact Principal Investigator: Atakli Alex on 0202853761

He will direct you to where you can read a copy of the results. In addition, there is a chance that the results from this study will be published in a scientific public health journal which would be available in many libraries. In such an article, participants would be identified by in general terms as student aged 15-26 years in the study sites.

Do you have any questions now?

May I proceed with the interview?
INFORMED ASSENT

I have read the information on the study; it has been read and explained to me in a language that I understand. I was given the opportunity to ask questions about the study. My questions about this study were answered by _____________________________________

I am satisfied with the responses given. I have agreed to answer all the questions for the purposes of this study.

I have agreed to participate in this study with the understanding that my responses to these questions will not affect my access to service and that I will not be quoted directly in any report and that my responses to these questions will not be traceable to me. I can decline to continue to complete the questionnaire if at any point in the interview I have an objection to the questions being asked.

I agree to take part in this study.

_________________________________________________ __________________
Printed Name of Participant                                                                 Date
Signature or thumb print of Participant                  Date

_________________________________________________ __________________

Signature of Person Obtaining Assent                  Date

_________________________________________________ __________________

Printed Name of Person Obtaining Assent                Date

_________________________________________________ __________________
CONSENT FORM (GUARDIANS/PARENTS)

Study Title: FACTORS ASSOCIATED WITH HEPATITIS-B INFECTION AMONG KRACHI SENIOR HIGH SCHOOL STUDENTS IN THE KRACHI WEST DISTRICT OF THE VOLTA REGION.

Hello, my name is Atakli Alex, a student from the University of Ghana-Legon. I am conducting a study on “factors associated with hepatitis-B virus infection among students”. I am conducting this study in your district to determine the social and economic factors associated with hepatitis-B virus infection in Krachi senior high in the Krachi west district of the Volta region. The information collected will be used for academic purpose only.

Your ward has been randomly selected for the study. We are talking to students aged 15-26 years, therefore we will like to request for your approval to talk to your child/ward and also take a small blood sample by a small prick with a lancet on the left thumb of your child/ward for the hepatitis-B surface antigen test. If you agree for child/ward to participate in the study, I will ask her some questions and I will write down the answers after which the test will be done. The questions will be about their views and thoughts on hepatitis-B virus infection in your community. The process will take about 20 minutes.

I assure you that everything your child tells me including his/her hepatitis-B status will be held in high confidence and will not be shared with anyone other than my supervisor, and he would only inspect to make sure that I conducted the interview properly. When we are finished with this study I will write a report about what was learned. This report will NOT include your name or child’s name or any information that can identify you or her. The information your child provides cannot be linked to him/her in any reports or publications emanating from this study.
Your decision to let your child participate in the study is voluntary. In addition to your approval, I will also explain what participation in this study means to your child/ward and also seek her consent to talk to me. Furthermore I will explain to your child/ward that she can decline to answer any question she is not comfortable with during the interview or decline from the hepatitis-B test.

Your ward’s participation in this study is very important because it affords your ward or child the opportunity to freely know his/her hepatitis-B status in order to seek immediate protection or treatment. It will also indirectly inform Public Health professionals and government to make good youth base policies on hepatitis-B.

You can ask questions about this study at any time during the interview. If you have additional questions about this study, you can contact Dr. Bismark Y. Sarfo on telephone: 0269343169 or Hannah Frimpong (ERC Secretariat): 0507041223

Opportunities to be informed

In all likelihood, the results will be fully available around July 2017. Preliminary results will be available earlier. If you wish to be told the results of this research, please contact Principal Investigator: Atakli Alex on telephone: 0202853761

He will direct you to where you can read a copy of the results. In addition, there is a chance that the results from this study will be published in a scientific public health journal which would be available in many libraries. In such an article, participants would be identified by in general terms as student aged 15-26 years in the study sites.

Do you have any questions now?
May I proceed with the interview?

Yes   1

No    2

INFORMED CONSENT

I have read the information on the study; it has been read and explained to me in a language that I understand.

I was given the opportunity to ask questions about the study. My questions about this study were answered by ______________________________________

I am satisfied with the responses given. I have agreed to allow my child to take part in the interview for the purposes of this study.

I have agreed to have my child/ward participate in this study with the understanding that her responses to the questions will not affect her access to service and that she will not be quoted directly in any report and that her responses to the questions will not be traceable to her. She can decline to continue to complete the questionnaire if at any point in the interview she has an objection to any question being asked.

I agree to have my child who is aged 10-19 take part in this study.

_________________________________________________ __________________

Printed Name of parent/guardian      Date
Signature or thumb print of parent/guardian       Date

Signature of Person Obtaining Consent       Date
APPENDIX II QUESTIONNAIRES

Topic: Prevalence of hepatitis-B virus infection and associated risk factors among students in Krachi senior high school.

Name Sig. of research assistant……………………………………………………………………

Date of interview……………………………………………………………………………………

Name of pupil’s school……………………………………………………………………………

Name of student………………………………………………………………………………

Student’s code……………………………………………………………………………………

Name of community……………………………………………………………………………….

Name and signature of headmaster………………………………………………………………

Socio-demographic factors

1. Age: (a) 15-17 (b) 18-20 (c) 21-23 (d) 24-26 (e) >26

2. Sex (a) male (b) female

3. Guardian’s occupation-(male) (a) Farming (b) Fishing (C) Formal employment (d) unemployment (f) Others (specify)
4. Guardian’s occupation-Female (a) Farming (b) Petty Trading (c) Formal employment (d)
   Unemployment (e) Others (specify)
5. Form of pupil (a) Form One (b) Form Two (c) Form Three
6. What is your ethnic group (a) Ewe (b) Gonja (C) Akan (d) Others (specify)
7. What is your religious affiliation (a) Christian (b) Moslem (c) Traditional religion (d)
   Others (specify)

**RISK FACTORS**

8. What do you use in cleaning your teeth in the school (a) tooth brush (b) chewing stick (c)
   others (specify)
9. Do you share the same tooth brush with your colleagues (a) yes (b) no
10. Do you share same chewing stick with your colleagues (a) yes (b) no
11. Do you use the same towel and sponge with your colleagues (a) yes (b) no
12. Do you share the same spoon with your colleague (a) yes (b) no
13. How do you trim your fingernails (a) biting them with teeth (b) use blade
14. Do you share blades with your colleagues (a) yes (b) no
15. Do you share shaving sticks with colleagues (a) yes (b) no
16. Do you share syringes and needles with your colleagues (a)yes (b) no
17. Who shaves your head for you (a) a colleague (b) barber (c) others (specify)
18. Where do you regularly have your hair shaved (a) at school (b) at home
19. What is normally use to shave your hair (a) blade (b) scissors (c) machine
20. Do you share the same machine with your colleagues (a) yes (b) no
21. Have you ever been or are you in a sexual relationship? (a) yes (b) no
22. If yes how many sexual partners do you have? (a) one (b) two (c) more than two
23. Have you seen a condom before (a) yes (b) no

24. Have you use it before (a) yes (b) no

25. Do you have a tribal mark (a) yes (b) no. **Please observe for tribal marks/tattoos and body piercing and tick (a) presence (b) absence**

26. If tribal mark is present please ask who made the tribal mark/tattoo (a) guardian (b) local medicine man (c) Don’t know (d) others (specify)

27. Have you been admitted in the hospital before (a) yes (b) no (c) don’t know, **if no or don’t know go to question 30**

28. If yes were you given blood transfusion while on admission (a) yes (b) no (c) don’t know

29. Have you been injected before (a) yes (b) no

30. If yes who gave the injection (a) nurse (b) local medicine man (c) Drug peddler (d) colleague (e) others (specify)

31. Have you undergone circumcision (a) yes (b) no (c) N/A

32. Where were you circumcised (a) home (b) hospital (c) don’t know (d) others specify.

**Females only**

33. Have you undergone female genital mutilation (a) yes (b) no

34. Who did it for you (a) local medicine man (b) guardian (c) others (specify)

**Knowledge on hepatitis - B**

35. Have you heard of hepatitis before? (a) yes (b) no

36. If yes what is it? (a) a disease (b) an animal (c) a worm (d) N/A

37. Have heard of a disease called hepatitis-B before (a) yes (b) no
38. What are some of the signs and symptoms (a) fever (b) yellow eyes (c) dark urine (d) N/A

39. What are some of the ways by which one can get hepatitis-B virus (a) sex without condom (b) taking bad blood (c) through circumcision (d) through tribal marks and tattoos (e) don’t know (f) N/A

Please advise student on the modes of transmission and the need to maintain maximum Personal hygiene

Please never forget to say thank you.