

UNIVERSITY FOR DEVELOPMENT STUDIES

ASSESSING THE KNOWLEDGE, ATTITUDE AND PERCEPTION OF  
HEPATITIS B VIRAL INFECTION AMONG YOUNG ADULTS IN  
SAGNARIGU DISTRICT OF THE NORTHERN REGION

**BY**

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## DECLARATION

I, the undersigned, declare that this thesis is the result of my own research work and that all sources that I used have duly been acknowledged by means of references and that this work has not been submitted to any institution for the award of any other degree.

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I hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University for Development Studies.

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Dr. Gideon Kofi Helegbe

Date

(Supervisor)

## ABSTRACT

**Background:** The threat posed by the global hepatitis B virus (HBV) epidemic continues to assume alarming proportions in areas of public health and national development. Globally, two billion people have been infected with HBV at some point in time in their life time and 360 to 400 million people which represents more than 5% of the world's population are chronic carriers with an estimated 600,000 deaths each year due to consequences of HBV.

**Objectives:** The general objective of the study is to assess the knowledge, attitude and perception (KAP) concerning hepatitis B (HBV) among young adults of Sagnarigu district of Northern region.

**Methodology:** The study was cross-sectional, carried among young adults of Sagnarigu district of Northern region. The tool for the study was structured questionnaire specially designed for this study. A total of 400 young adults (15-40 years) responded to the survey. Data were computerized using Excel and analyzed using SPSS (version 21).

**Results:** The study showed that, sampled respondent had good knowledge about hepatitis B as majority (67.5%) of the respondent scored between the ranges of 8-12 indicating high knowledge. Additionally, respondents who were employed in the formal sector were one time more likely to show good knowledge on the mode of transmission of the hepatitis B virus infection as compared to those working in the informal sector (OR = 1.23; 95% CI: 1.7– 17.6;  $p \leq 0.001$ ).

Regarding the respondent's attitude and perception towards patients infected with HBV and the infection, the findings showed average attitude and perception as most (49.5%) of the respondents scored an average mark of 3 indicating average attitude and perception. The study also revealed significant association between respondents occupation and willingness to test for the HBV infection (OR=1.23; 95% CI: 1.7-17.6;  $p \leq 0.000$ ). It was also observed that, those aged 25 years and above were 4 times more likely to go for the hepatitis B virus screening

compared to those aged below 25 years (OR = 4.12; 95% CI: 0.1– 1.6; p = 0.834). Also, females were one time more likely to go for HBV infection screening as compared to the male counterparts (OR =1.36; 95% CI: 0.1– 1.6; p = 0.236).

**Conclusions:** The study revealed relatively high level of knowledge on hepatitis B viral infection among young adults of Sagnarigu district, but poor attitude towards the infection. The study therefore recommends amongst others that, more education should be given to public to improve people attitude towards the infection.

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To you all, I say ‘thank you’ and I wish you all the best in your endeavors; may others show you as much care and help as you showed me.

## DEDICATION

This work is dedicated to my family: my late father of blessed memory, mother, brothers, sisters, wife and children for their prayers and support throughout this course

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## ACRONYMS AND ABBREVIATIONS

ADS - Auto-disposable Syringes

ALT- Alanine amino Transferase

ART - Anti-Retroviral Treatment

AST-Aspartate amino Transferase

CDC - Centers for Disease Control

DNA – Deoxyribonucleic Acid

GHBF - Ghana Hepatitis B Foundation

GHS - Ghana Health Service

GSS - Ghana Statistical Service

HBeAg – Hepatitis B Envelope Antigen

HBcAg – Hepatitis B Core Antigen

HBe- Hepatitis B Envelope antibody

HBSAg – Hepatitis B Surface Antigen

HBV - Hepatitis B Virus

HCC - Hepatocellular Carcinoma

HCV - Hepatitis C Virus

HIV - Human Immunodeficiency Virus

IFNA - Interferon-Alpha

JHS - Junior High School

KAP - Knowledge attitude and practice

MOH - Ministry of Health

NGO - Non-Governmental Organizations

NHIS - National Health Insurance Scheme

OHBVI - Occult Hepatitis B Virus Infection

PHC - Primary Health Care

STD - Sexually Transmitted Diseases

STI - Sexually Transmitted Infections

UNICEF - United Nations International Children Education Fund

WHO – World Health Organization

## OPERATIONAL DEFINITIONS

**Attitude:** This is one's behaviour towards something

**Knowledge:** An idea about something

**Perception:** One's own view about something

**Hepatitis B:** This an infection and inflammation of the liver cells caused by hepatitis B virus

**Young adults:** People within the age of 15-40years.

# CHAPTER ONE

## 1.0 Background to the study

Viral hepatitis is one of the most common diseases worldwide. Hepatitis B, also called inflammation of the liver, which was the first to be discovered, is one of the five types of hepatitis and can cause both acute and chronic diseases. The types include: hepatitis A, B, C, D and E. The global burden of hepatitis B is severe with an estimated 350 million people or more being chronic carriers (WHO, 2012).

The major routes of hepatitis B transmission include blood transfusion, from mother to infant during child birth and sexually. The Hepatitis C virus (HCV) can also cause chronic liver diseases and is transmitted in the same ways as hepatitis B, although mother to infant and sexual transmissions are less common. An estimated 170 million people are said to be chronic carriers of HCV [Center for disease control (CDC), 2006]. Hepatitis D, also called delta hepatitis, is caused by an incomplete virus that requires hepatitis B virus to replicate. Hence, this type of hepatitis is only seen in association with hepatitis B infection. Hepatitis A and E are both transmitted by faecal-oral route, However, signs and symptoms are not seen after being infected with hepatitis A and E and can therefore result in a lifelong development of immunity. Some of the viral hepatitis can be prevented by vaccination, and vaccines for hepatitis A and B have existed for 20 years now. Hepatitis D can be prevented by using hepatitis B vaccines. As at now, the only types of hepatitis that cannot be prevented by the use of vaccine are C and E hepatitis.

According to the World Health Organization (WHO, 2012), hepatitis B is the world's most common liver infection, which is caused by a DNA-virus, the hepatitis B virus (HBV). The virus



is highly contagious, 50-100 times more infectious than human immunodeficiency virus (HIV), and is transmitted between people through blood, semen, vaginal fluids and mucous membranes. There are more than 2 billion people World-wide, having evidence of recent or past HBV infection. In south East Asian Region, there are estimated 80 million HBV carriers representing about 6% of the total population (Malik & Lee, 2000). The most common ways of transmission are by unprotected sex, unsafe blood transfusions, and unsafe use of needles, from mother to child at birth, close household contact and between children in early childhood. HBV is contagious and can also be transmitted from one infected individual to another by blood to blood contact, sharing of eating utensils and other barber shop and beauty salon equipment, (Yayehyirad et al., 2009), skin and mucous membrane infections caused by contaminated blood or body. In addition, tattooing, ear piercing, acupuncture, dialysis, and even using unsterilized syringes can be source of infection. In volunteer blood donors, the prevalence of HBV infection ranges from 5–10%. But the prevalence is higher in lower socio-economic status, older age group and those persons exposed to blood products (Muhammed et al., 2007).

Prevalence of infection, modes of transmission and human behavior occur in geographically different epidemiologic patterns of HBV infection. The practice of modern medicine have contributed a lot in the increase of the case and spreading of blood borne diseases like Human immune deficiency virus and HBV due to lapse in the sterilization technique of instruments and improper hospital waste management as 10 to 20% health care waste is regarded hazardous (Taneja & Biswal, 2009). In health care delivery, HBV transmission poses a major challenge to both patients and health workers especially those who frequently come into contact with blood. These groups of people stand a higher chance of contracting the disease if care is not taken. Apart from

health workers, some people in the general public are more prone to contracting hepatitis B than others e.g. drug users or injectors, people who pierce or tattoo their bodies and unprotected sex engaged in by adolescents due to their lack of knowledge about sexual negotiation and safe sex practices.

In most countries where HBV prevalence is low, transmission usually occur during adolescence or young adulthood as a result of the unsafe injections and unprotected sexual activities. Research has revealed that, an estimated 21 million new HBV infections occur each year due to unsafe injections in health care settings (Hauri et al., 2003).

Prevention against any disease is proportional to knowledge, attitude and practice (KAP) of the population and reflection of the importance that is paid to health related issue by the society. Health care workers should familiarize themselves with “universal precautions”, which is defined by Center for Disease Control (CDC) as a set of precautions designed to prevent transmission of Human immunodeficiency virus (HIV), HBV, and other blood-borne pathogens when providing first aid or health care. Under universal precautions, blood and certain body fluids of all patients are considered potentially infectious for HIV, HBV and other blood borne pathogens. In 1964, it became possible to identify people with HBV using serological testing by searching for hepatitis B surface antigen (HBsAg) (Weinbaum, Mast & Ward, 2009).

HBV is unique compared to other sexually transmitted diseases, because it can be prevented with a vaccine (WHO, 2012). Vaccination gives long term protection from HBV infection, possibly life-long.

All HBV infections do not give symptoms, meaning that there is a risk that people are contagious without knowing it (Weinbaum et al., 2009; WHO, 2012). However, some people may experience acute symptoms like jaundice, fatigue, loss of appetite, nausea and/or abdominal pain. For almost all adults (90%), the infection heals and they become healthy, but for infants and young children, there is a 90% and 30-50% risk respectively that the infection leads to chronic hepatitis B (WHO, 2012). This provides an increased risk, approximately 25%, that they later in life will suffer from liver cirrhosis and/or liver cancer, if the infection is not medically managed (Chao et al., 2010; WHO, 2012).

Early identification of infected persons with the help of blood tests can break the on-going transmission and lead to necessary treatment with antiviral medication (Nguyen et al., 2010; Weinbaum et al., 2009). It is also important to enable the identification and vaccination of those who share household with the infected person and sexual partners that might have become infected. To avoid transmission there are a few measures that HBV positive individuals can take. For example, they should notify sexual partners and the people they share their household with to get tested for HBV and inform them of the need for vaccination. An individual infected with the HBV can delay and/or prevent liver disease by limiting their alcohol consumption and by regularly seeking disease monitoring (Weinbaum et al., 2009). Using alcohol in combination with HBV-infection has shown to increase the risk of hepatotoxicity (Tan, Cheah & Teo, 2005).

Hepatitis B virus is efficiently transmitted by percutaneous or mucous membrane exposure to infectious blood or body fluids and not by casual contacts. Modes of transmission of Hepatitis B virus (HBV) is similar to human immunodeficiency virus (HIV), however, HBV is 50 to 100 times

more infectious (WHO, 2012). HBV infection has been recognized as an important occupational hazard for health care workers (WHO, 2008). Health care workers are at risk of infection through exposure to blood and other body fluids coupled with the high contagiousness of HBV. Fortunately, infective hepatitis B virus is largely preventable by hepatitis B vaccine which is 95% effective in preventing such disease and its chronic consequences (WHO, 2012). Knowledge, attitude, and practice (KAP) surveys are representative of a specific population to collect information on what is known, believed and done in relation to a particular topic, and are the most frequently used study tool in health-seeking behaviour research (WHO, 2008). Knowledge is usually assessed to see how far community knowledge corresponds to biomedical concepts (Good, 1994). Practices in KAP surveys usually inquire about preventive measures or different health care options. Normally, hypothetical questions are asked, so it permits statements about actual practices and therefore, yields information on people's behaviors or on what they know should be done. This study is to assess the knowledge, attitude and perception of people towards HBV infection in Sagnarigu district of the Northern region

### **1.1 Problem statement**

Hepatitis B virus (HBV) infection is a serious and common infectious disease of the liver. It is a confronting ailment and results in 0.6 million deaths annually (WHO,2009).Although HBV infection is classified as 'disease of priority,' there is an incessant increase in detection of new cases worldwide. Furthermore, HBV is widespread in the Asia Pacific region and 10 to 15 million of the population suffer from this disease (Keeffe et al., 2008; Lok & McMahon, 2009; Lesmana et al., 2006). The prevalence of HBV chronic infection is particularly high in sub-Saharan Africa, ranging from 7 to 26% (Andre, 2000).

The secret killer hepatitis B virus, though a major threat to health globally, is yet to catch the attention of health institutions, policy makers, the general public and decision makers in Ghana.

The disease has a long history in the country immediately after the Second World War. A study by Morrow et al., (1971) revealed that hepatitis has been on the increase in Accra arising from the development of shanty towns with poor sanitation. Despite the long history of the disease in Ghana, there have not been any bold and pragmatic measures put in place to curb it except the formation of the Ghana Hepatitis B Foundation (GHBF) which started its operation just in September, 2007.

In the light of the lukewarm attitude shown towards the disease and due to acts of selective prevention of infectious diseases by health professionals including HBV, the disease is said to be fast spreading with an estimated number of four million people as carriers (GHS, 2009). The 2009 Ghana Health Service report released scary figures suggesting an increase in the prevalence ratio from 8:1 in 2005 to 6:1 in 2009 (GHS, 2009). This means one out of every sixth person is infected with the disease.

It is also important to state that Ghana forms part of the 134 developing countries and economies in transition that have successfully introduced hepatitis B vaccine into their National Immunization Schedules by 2003. However, there is no program for mass screening and vaccination of children born before the vaccine introduction. Also, there is no screening for mothers, adolescents and the general public. It is an undeniable fact that although hepatitis B screening and vaccination is carried out in some few health facilities in Ghana, it is not a national policy and is not incorporated into national health policies like the free counseling and testing for HIV or the mass immunization of children against measles. This brings to the fore problems of accessibility and affordability which

the general public has to battle with. Apart from being expensive and preserve of the rich, the few people who are willing to access it find it difficult to access these screening facilities because of the inadequate and ill-equipped screening centers to cater for their needs. Media publicity on the disease is not substantial as compared to other infectious diseases.

The above mentioned factors and their threat to the health of the future leaders of the country (young adults) have necessitated this study.

In the light of these, the current study is aimed at assessing the knowledge attitude and perception of HBV infection among people of Sagnarigu District. There have been some reported increasing cases of hepatitis B virus infection in the annual reports of the Sagnarigu district health directorate (Hospital data, Annual report, 2015). Figures for 2012, 2013 and 2014 were 49, 62 and 75 respectively. It is not clear if this increment is due to poor KAP of HBV infection, which this study seeks to address.

## **1.2 Purpose/justification of the study**

HB disease is a major problem in Ghana and people suffer and die from complications of the disease daily. A good knowledge of HBV modes of transmission as well as adequate vaccination may reduce infection rate. The knowledge of HBV is generally low among the populace in a study carried out among Turkish community in Netherland (Van et al., 2010). On the other hand, studies carried out among health care workers in Sudan and Morocco revealed that most of them had a good knowledge of blood as a medium of infection but lacked adequate vaccine coverage (Bakari et al., 2012; Djeriri et al., 2008). Review of other studies (Vu et al., 2012) has shown that the

knowledge about HBV only is average and there is limited literature concerning adults' knowledge and perception of HBV infection in Ghana and Sagnarigu in particular. HBV could be transmitted through many other routes, and inadequate knowledge of HBV infection among people may reflect their behavioral pattern to vaccination and safety measures. To decrease the transmission of HBV in Ghana, it is important to increase the populations' knowledge about the disease, the vaccine and the benefits that comes with it. Therefore, it is very imperative to carry out this study to investigate the knowledge, attitude and perception of hepatitis B viral infection among young adults in Sagnarigu district of the Northern region.

### **1.3.0 General objective.**

The general objective of the study is to assess the knowledge, attitude and perception on hepatitis B virus infection among young adults in Sagnarigu district of Northern region.

### **1.3.1 Specific objectives.**

In order to achieve this goal (general objective), the study addresses the following specific objectives;

- To determine the knowledge level of Hepatitis B virus infection among young adults in Sagnarigu district of the Northern region.
- To explore the attitude and practices of young adults in Sagnarigu district in the Northern region towards Hepatitis B virus infection.
- To examine the perception about Hepatitis B virus infection among young adults in Sagnarigu district of the Northern region of Ghana.

- To determine the association between participants' demographic characteristics and their knowledge and attitude towards the condition.

## 1.4 Research questions

The study sought to answer the following questions to achieve the aim and objectives of the research;

1. What is the knowledge level about Hepatitis B virus infection among young adults in Sagnarigu district of the Northern region?
2. What is the attitude and practices of young adults in Sagnarigu district of the Northern region towards Hepatitis B virus infection?
3. What is the perception on Hepatitis B virus infection among young adults in Sagnarigu district of the Northern region?

## 1.5 Hypothesis

The study objectives are guided by the following hypothesis.

1. H<sub>0</sub>: There is low level of knowledge on hepatitis B viral infection among the people of Sagnarigu district.  
H<sub>1</sub>: There is relatively high level of knowledge on hepatitis B viral infection among the people of Sagnarigu district.
2. H<sub>0</sub>: Attitude of people towards hepatitis B viral infection is not encouraging.  
H<sub>1</sub>: Attitude of people towards hepatitis B viral infection is good.
3. H<sub>0</sub>: Perception of people towards hepatitis B viral infection is positive.  
H<sub>1</sub>: Perception of people towards hepatitis B viral infection is negative.



## **1.6 Significance of the study**

Findings from this study would be very useful in diverse ways: Continual transmission of this disease could be attributed to a number of reasons including: missing of opportunities for prevention, lack of awareness about the prevalence and prevention (vaccination), misdiagnosis, absence of medical care and poor health outcomes in infected people. The result from this study will increase the understanding and knowledge of young adults in Sagnarigu district and will also be used to plan an intervention programme for primary prevention of this disease.

Secondly, this research will be used as a mouthpiece to lobby for HBV immunization and treatment to be included under the current list of diseases being taken care of by the National Health Insurance Scheme (NHIS) or incorporate HBV screening and vaccination into the voluntary counseling and testing of HIV to be done concurrently.

### **1.7.0 Theoretical/conceptual frame work (The health belief model (HBM))**

The problem of compliance to treatment and preventive measures towards hepatitis B infection is discussed in relation to the lack of theoretical and conceptual clarity in research. Current researches have contributed little to explaining the phenomenon of compliance and to directing further research. The health belief model which has demonstrated to be good in the application in the area of preventive health behavior and compliance with medical regimen is offered as a potentially useful conceptual frame work for hepatitis B research. This model is seen as appropriate frame work for addressing health behavior related conditions like hepatitis B infection.

#### **1.7.1 Historical perspective**

The Health Belief Model (HBM) was one of the first theories of health behaviour, and remains one of the most widely recognized in the field. It was developed in the 1950s by a group of U.S. Public Health Service social psychologists who wanted to explain why so few people were

participating in programs to prevent and detect disease (Andrew et al., 1997). It was reported that, the Public Health Service sent mobile X-ray units out to neighborhoods to offer free chest X-rays screening for tuberculosis (Gochman, 1997). Despite the fact that this service was offered without charge in a variety of convenient locations, the program was of limited success. The question was, “Why?” To find an answer, social psychologists examined what was encouraging or discouraging people from participating in the programs. They theorized that people’s beliefs about whether or not they were susceptible to disease, and their perceptions of the benefits of trying to avoid it, influenced their readiness to act.

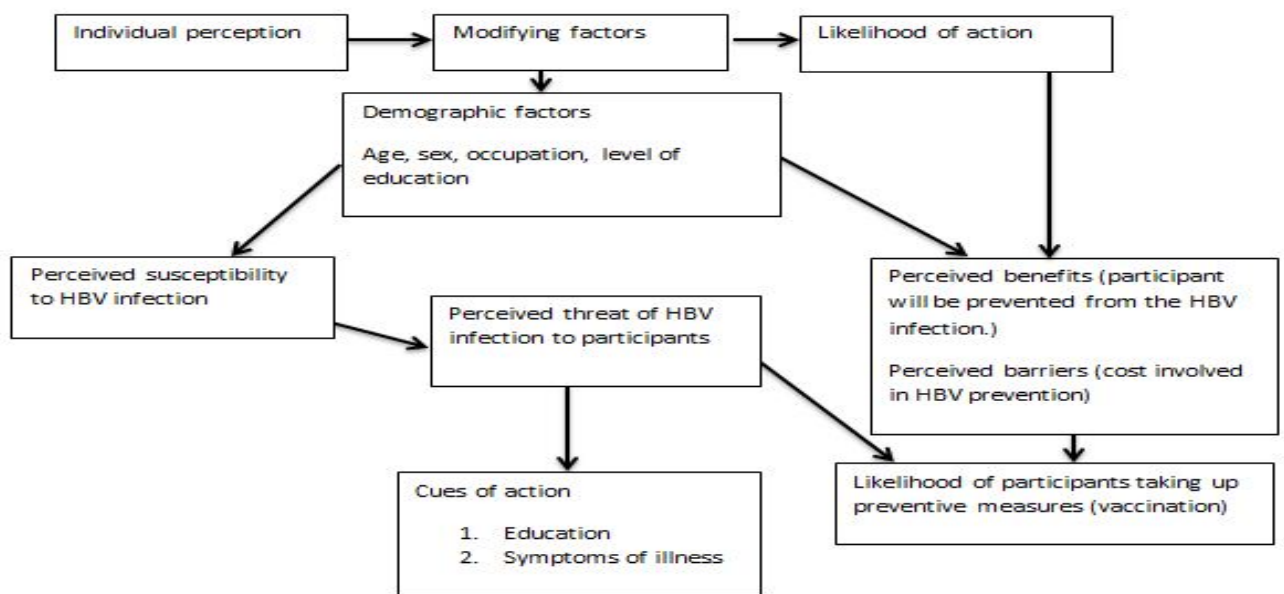
In general, it is believed that individuals will take action to ward off, to screen for or to control ill health conditions if they regard themselves susceptible to the condition; if they believe it to have potentially serious consequences; if they believe that a course of action available to them would be beneficial in reducing either their susceptibility to, or severity of the condition and if they believe that the anticipated barriers (or cost of ) taking the action are outweighed by its benefits.

The HBM proposes that feeling susceptible to a disease is a motivating factor to take preventive action. For the purpose of this study, participants were asked whether they have suffered from hepatitis B viral infection before, in order to determine participants’ perceived susceptibility to hepatitis B viral infection. In the case of a medically established disease, the component has been reformulated to include acceptance of diagnosis, personal estimates of susceptibility to illness as a whole, that is, whether the patient accepts the medical condition he/she had been diagnosed with; in this case the hepatitis B viral infection.

Perceived severity, feelings concerning the seriousness of contracting an illness or of leaving the disease untreated include evaluation of both medical and clinical consequences. For example death, pain and disability, and possible social consequences such as effects of condition on work, family life and social relations. This implies that a patient's perception about the severity of hepatitis B may act as a motivating factor for him or her to initiate action to prevent or fight the disease. Assessing the benefits involves determining whether engaging in the behavior will be beneficial and/or effective in preventing or curing the disease. In other words, will engaging in the behavior bring about positive outcome? In this study, the benefits were determined by asking participants what motivated them to go for vaccine or comply with the HBV infection treatment if they had been infected. At the same time, some barriers to engaging in the behavior are great enough to outweigh the benefits. They may consist of internal barriers such as belief that, taking action would cause embarrassment in the form of stigma from community members or external barriers such as lack of financial resources, transportation problems or unpleasant side effects of antiviral medication for the infection. This was also determined by asking participants the reason for not taking part in the hepatitis B vaccine.

The theory further proposes that, behavior is triggered by 'cues of action' which make the individual aware of the health threat. Such stimuli might be the individual's internal symptoms or prompts from external sources such as health care providers, family members or the media. Similarly, diverse demographic (age, sex and race), socio-psychological (social class, personality, peer and reference group) and structural factors (knowledge about the disease and prior experience) are likely to play a part in shaping health behavior. But these influence behavior only indirectly by modifying the other components of the model (figure 1).

From the figure below, (figure 1) the individual perception of HBV infection can be influenced by modifying and demographic factor like age, sex, educational level, occupation which can lead to the likelihood of he/she taking action or not. One is more likely to take preventive measures like vaccination if he perceives himself to be susceptible to HBV infection and also the threat of the infection. Moreover, the likelihood of taking preventive measures can be influenced by the benefit for been vaccinated (perceived benefit) and the cost of the vaccine (perceived barrier).



**Figure 1.1: Health Belief Model (Adapted from Janz and Backer 2008)**

### 1.8 Organisation of the study

The study is organized into six chapters. Chapter one contains the background of the study, the problem statement, the purpose of the study, the objectives, significance of the study, hypothesis, conceptual frame work and organization of the study.

Chapter two contains related literature review of hepatitis B from other studies, textbooks, manuals, internet and publications on annual reports.

Chapter three consists of research methods; including research design, population under study setting, sample size, sampling technique, instrumentation, validity and reliability, delimitation, analytical procedure, ethical consideration, and pretesting/pilot study.

Chapter four contains the collected data which was analyzed and presented in raw tabular form and narrative summaries.

Chapter five also entails the discussion of findings of the study with literature review, while the last chapter (six) talks about summary, recommendations and conclusion.

## CHAPTER TWO

### 2.0 Literature review

#### 2.1 Introduction

This chapter describes key information regarding issues of the occurrence of hepatitis B under study based on individuals' studies, textbooks, manuals, internet and publications of annual reports. It also gives a brief overview of the epidemiology of Hepatitis B Virus infection, and finally discusses the literature on knowledge, perception and attitudes of people regarding Hepatitis B virus infection. The chapter therefore begins with the definition of hepatitis B, historical perspectives, epidemiology, signs and symptoms, mode of transmission, diagnostic investigations, management/treatment and complications which are all review of theoretical empirical considerations of some individual researches in the prevention and treatment of hepatitis B virus infection.

#### 2.2 Historical perspective of hepatitis B virus infection

In order to understand the management and prevention of Hepatitis B which is an inflammatory disease of the liver caused by the hepatitis B virus (HBV), it is imperative to see the disease in its historical context. The etiological agent for the HBV infection was discovered in 1965 (Zanetti et al., 2005). It was discovered when Blumberg and co-workers found the hepatitis B surface antigen, which was originally called the Australia antigen because it was found in serum from an Australian patient (Blumberg et al, 1965, 1977).

Dr Baruch Samuel Blumberg was awarded the 1976 Noble Prize in Physiology or Medicine for this discovery. The virus was fully described in the 1970s (Morrow et al., 1971). In recent times,

the rapid and continuous discoveries of the viral disease around the whole world have improved our understanding of the complexity of this unusual virus. Although there has not been any substantial decrease in the overall prevalence of HBV infection, there is the hope that the next generation will see a decline in both the worldwide carrier rate and the incidence of new HBV infections if current HBV vaccinations are intensified.

Hepatitis B virus infection is a major health problem with a characteristic geographic distribution (Lavanchy, 2005). The major risk factors associated with HBV infection include poor sterilization technique and contact with infected blood and body fluids (Goldstein, 2002). All health care workers in contact with blood and body fluids should know their antibody status and be vaccinated for HBV if they have not previously had HBV infection and should adhere to universal protective measures (Fry, 2007).

### **2.3 Global epidemiology of hepatitis B.**

The threat posed by the global HBV epidemic continues to assume alarming proportions in areas of public health and national development. Globally, two billion people have been infected with HBV at some point in time in their life time and 360 to 400 million people which represents more than 5% of the world's population are chronic carriers with an estimated 600,000 deaths each year due to consequences of HBV (WHO, 2012). It is estimated to be the tenth cause of deaths worldwide (WHO, 2008). Hepatitis B virus mostly affects the liver and can cause liver cancer. The disease is 50 to 100 times more infectious than the deadly human immunodeficiency virus (HIV) and can remain on part of the body for close to seven days (Hepatitis Foundation International, 2006).

The incidence of acute hepatitis B varies greatly from country to country as a result of insufficient reliable data and also, comparisons between countries is often difficult due to different reporting systems with limited quality (Grob,1995). The WHO has therefore demarcated the world according to chronic hepatitis B prevalence into three major blocks which include high, intermediate and low prevalence. High prevalence areas have a prevalence of chronic hepatitis B infection that is equal to or greater than eight (8%) made up of countries from North America, South America, Sub-Saharan Africa and most Asian countries. Intermediate prevalence areas have a prevalence rate which ranges between 2% and 7% and include countries from South America, North Africa, Western Europe, Eastern Europe and the Indian subcontinent. Low prevalence areas are estimated to have a prevalence of chronic infection less than (2%) which includes most of the North American countries, Australia and most of Western Europe including the United Kingdom (UK).

Hepatitis B transmission route varies according to the prevalence rate of the virus. Countries with very high prevalence rate usually have vertical transmission as the main route of transmission which is mostly found during childhood. Countries with intermediate prevalence rates normally have horizontal transmission as its major route where the disease is transmitted through sexual contact or through injecting of drugs. In countries with low prevalence rates such as the United Kingdom, the epidemic is mostly acquired during adulthood through sexual intercourse or injecting of drugs.



According to the National Institute for Health and clinical Excellence (2006), chronic hepatitis infection can be treated in high income countries with the combination of drugs and that people with severe liver cases are given liver transplants in the form of surgery and chemotherapy for liver cancer patients to prolong their lives. These options are unfortunately unavailable to those in low income countries due to the expensive nature of these treatments.

Hence the only option for them is to stick to the saying that, “prevention is better than cure” through the use of vaccine. The WHO (2006) reported that hepatitis B vaccine has an excellent record of safety and effectiveness with over one billion doses used worldwide since 1982 and that, it has a 95% capacity to prevent children and adults from contracting chronic infection if they are not already infected with the disease. Completion of the hepatitis B vaccination series is the safest and the most effective way of protecting against hepatitis B virus infection.

The World Health Organization has targeted hepatitis B as one of eight infectious diseases that should be controlled through vaccination efforts. For the purpose of propagating this agenda the WHO in 1991 instructed all countries to incorporate hepatitis B vaccination into their national vaccination programs. But as at 2006, only 164 countries have acted according to the directive with most countries coming from East and South East Asia, the Pacific, Islands, Australia, Western Europe and the Middle East (WHO, 2006).

Despite the fact that since 1982 there is a vaccine against HBV that gives 90-100% protection against the infection, there are in the world today more than 350 million people living with chronic hepatitis B. The consequence of this is approximately 600 000 HBV related deaths every year around the world, where the cause is primary liver cirrhosis or liver cancer (Diederik et al., 2006;

WHO, 2012). The virus is transmitted differently between geographic regions and countries depending on how endemic the HBV is there. In regions where the endemicity is low, it is more common that the virus is transmitted through horizontal routes such as injecting drug use, high-risk sexual behaviour and receiving blood products. While in regions with high endemicity, for example in Vietnam, HBV is primarily spread by vertical transmission early in childhood or perinatally from mother to child at birth (Lozano et al., 2012). In the U.S., approximately 1.4 million residents are chronically infected with HBV (Weinbaum et al., 2009; Nguyen et al., 2010) due to the fact that during the years 1974-2008, 17.6 million people born in countries of intermediate or high prevalence of chronic hepatitis B have immigrated to the U.S. (Weinbaum et al., 2009).

Knowledge of region- and age-specific prevalence of hepatitis B infection is important for evaluating vaccination programs and national disease prevention and control efforts. Furthermore, any modeling and assessment of the disease burden associated with the hepatitis B virus (HBV) requires prevalence estimates. So far, global studies on HBV seroprevalence are limited and comprehensive data are not available for many countries. In addition, demographic changes and expanded vaccination can create new epidemiological patterns of the virus which impact on region-specific endemicity levels. HBV is spread predominantly by percutaneous or mucosal exposure to infected blood and other body fluids with numerous forms of human transmission.

The consequences of HBV infection include acute and chronic infection, cirrhosis of the liver and primary liver cancer. The likelihood of progression to chronic infection is inversely related to age at the time of infection. Around 90% of infants infected perinatally become chronic carriers, unless vaccinated at birth. The risk for chronic HBV infection decreases to 30% of children infected

between ages 1 and 4 years and to less than 5% of persons infected as adults (Hyams, 1995; McMahon, et al., 1985).

Chronic HBV infection progresses nonlinearly through 3–4 phases, from the immune-tolerant phase to immune clearance or immunoactive phase, to non-replicative inactive phase and possible reactivation (Weinbaum, et al 2008) and (Wong & Lok, 2006). After infection with HBV, most patients either develop immunity (87–90%) and clear the infection or become chronic carriers. A lower percentage will develop liver disease or chronic active hepatitis with an increased risk of developing cirrhosis, liver cancer or both (Goldstein et al., 2002). The fatality of these diseases as well as their attribution to hepatitis infection is well known: 600,000 HBV-related deaths were estimated to occur annually (Goldstein et al., 2005) and 73% of all liver cancer deaths worldwide are due to hepatitis viruses, with much higher proportions in low and middle income countries (Ott et al., 2011). The complex serology and natural history associated with HBV infection creates challenges for the assessment of HBV prevalence and the provision of comparable global estimates. This is due to the availability of multiple laboratory markers for hepatitis B infection. Antibodies and antigens associated with this infection include hepatitis B surface antigen (HBsAg), antibody to hepatitis surface antigen (anti-HBs), antibody to hepatitis B core antigen (anti-HBc), and IgM antibody subclass of anti-HBc (IgM anti-HBc). Some studies also report markers of high HBV replication such as hepatitis B “e” antigen (HBeAg), antibody to HBeAg (anti-HBe), and quantitative HBV-DNA. HBsAg is the main clinical marker indicating acute or chronic infection and prevalence as well as endemicity of HBV infection which is defined by the presence of HBsAg (Shepard et al., 2006). HBsAg testing is the primary way to identify persons with chronic HBV infection and several characteristics of this serological marker increase the precision of HBsAg estimates, including high specificity, long serum persistence, low possibility

of chronic cases losing HBsAg ( Brechart et al., 2001; Shepard et al., 2006) . However, routine population surveillance of chronic viral hepatitis is currently rare.

Standardized monitoring would help not only in quantifying the disease burden on a population level but also in determining the characteristics of infected individuals, avoiding further transmission and allocating appropriate treatment. This is particularly important for populous countries that have been previously categorized as highly endemic for chronic hepatitis B infection such as China, Indonesia, Nigeria as part of Africa and Asia, where an immense absolute number of people live with the virus (Goldstein et al., 2005) and HBsAg (Shepard et al., 2006). However, up to date region-specific and globally comparable chronic HBV prevalence data are lacking and no relevant meta-analysis has been published on this topic (WHO, 2012). In addition, the absolute number of individuals being chronically infected with HBV is not known.

## **2.4 Hepatitis B epidemiology in Africa**

Africa, the second largest continent in the world covers 3,030,000 km<sup>2</sup> of land i.e. one fifth of the global land area. Despite the fact that it is sparsely populated with an estimated 800 million inhabitants, it accounts for 12% of the world's population. Although, the high prevalence of infectious HBV has been well documented worldwide in well-equipped correctional facilities, such information on the exact prevalence of the deadly disease has been so sparse in Africa. This could be attributed to under reporting and ineffective data collection strategies in the continent. However, from the few data available, it is estimated that out of the 360 million chronic global carriers of HBV, about 65 million of these chronic carriers live in Africa (WHO, 2004)

After Asia, Africa has the second largest number of individuals with chronic HBV infection, approaching 58 million (Kiire, 1990). Although overall Africa is considered a high endemic area with 7–26% prevalence of HBsAg, Tunisia, Morocco, and Zambia have intermediate endemicity (Andre, 2000). In some countries in western Africa, e.g., Senegal and Gambia, over 90% of the population are exposed to and become infected with HBV during their lives (Edmunds et al., 1996). Because of high HBV endemicity, Gambia was the first country in Africa to implement a mass infant immunization program in 1990, and demonstrated a reduced HBV burden in children, with HBsAg prevalence decreasing from 10.0 to 0.6% (Montesana et al., 2002). In contrast to Asia, where mother-to-infant transmission is an important route, horizontal transmission in early life is considered to be the predominant mode of transmission in most parts of sub-Saharan Africa (Edmunds, Medley & Nokes, 1998).

In rural areas of West Africa, HBV infection rates increase rapidly from the age of 6 months, and by the age of 2 years, 40% of children are infected and 15% develop chronic infection. By the age of 10 years, 90% of children become infected and 20% are chronic carriers (Kiire, 1996).

## **2.5 Hepatitis B virus infection epidemiology in Ghana.**

The exact hepatitis B prevalence in Ghana is not known as different studies targeted different segments of the population and does not give a clear picture of the situation on the ground. Although there is a relatively low prevalence of HIV with an estimated number of 260,000 carriers as compared to an estimated number of four million carriers of HBV, much of the attention of Ghana Health Service and other health related organizations is focused on HIV prevention and treatment through health education programs and provision of anti-retroviral drugs to the neglect

of equally deadly diseases like hepatitis B infection. Meanwhile, few studies conducted in the country about HBV revealed its continuous increase. In a hospital-based study conducted among blood donors it was revealed that HBV is endemic in the country with prevalence rates ranging from 6.4% to 10% among blood donors, 6.4% among pregnant women and 16% for children among the general population (Malik et al., 2000).

Another hospital-based study conducted in two different hospitals in Jirapa and Tumu in the Upper West Region of Ghana by a Cuban Medical Brigade has shown that in 2009, 128 admitted patients were tested HBV positive and that majority of the cases were between the ages of 30-44 years (GHS, 2009). In a cross-sectional study of children aged 15 years and younger in the rural Ashanti-Akim North district of Ghana, Martinson et al., (1998) estimated the HBV prevalence at 5.4%. A hospital-based study of pregnant women in Accra the capital of Ghana, estimated the prevalence at 2.5% (Lasseby et al., 2004). Malik et al., (2000) performed a cross-sectional study of prison inmates in two regional central prisons in Ghana and found that the HBV prevalence was 19%. Prisoners have been found to be part of the high-risk groups of hepatitis prevalence in Ghana. The congested nature of most prisons in the country coupled with the fact that prison inmates are not usually screened before serving their prison sentence exposes them to HBV infection.

Unpublished data on causes of deaths in Ghana's premier hospital, Korle Bu Teaching Hospital, over a 20-year period (1980-2000) from the Department of Pathology revealed that the commonest cause of liver diseases leading to death at autopsy in Ghana was cirrhosis of the liver. Although statistics from the Ghana Health Service mentioned liver cirrhosis as the major cause of all liver related deaths in Ghana, there have been very few studies of the possible role of hepatitis B and

other possible risk factors that account for the deadly epidemic in the country. This is a clear manifestation that hepatitis B related causes of liver cirrhosis are relegated to the background and not much documentation on it.

The HBV prevalence rates for studies published within the period of 2003–2009 ranged from 10.5 to 22.1 %. The pooled prevalence rate across the studies published within the period was 14.7 %. For 18 studies published within the last 5 years (2010–2015), the HBV prevalence ranged from 3.6 to 16.8 % (Ali -Abdulai et al., 2016). The pooled prevalence rate across the studies published within the period was 10.2%. Such comparative information further highlights the enormity of the HBV burden in Ghana. Studies also raise serious concerns regarding the safety of blood supply in Ghana as nearly 1 in 9 blood donors may be infected with HBV with even higher proportions in replacement blood donors. Ghana has a national blood policy which requires the screening of all donated blood for HIV 1 and 2, HBV, Hepatitis C and Syphilis (WHO, 2006). Findings from studies highlight the need for stricter adherence to such policies as the risk of receiving contaminated blood, which in this is HBV remains high. Additionally, HBV infection among pregnant women also remains high ( $\approx 1$  in 8) and which justifies the establishment of a national HBV screening program for all pregnant women in antenatal clinics throughout Ghana. Additionally, a national policy to vaccinate all pregnant women who test negative for HBV should be adopted so as to reduce the risk of mother to child transmission within the population (Ephraim et al., 2015).

A number of factors may account for the observed high HBV prevalence in Ghana. This includes lack of adequate information and understanding among Ghanaians of the transmission dynamics of the virus. For instance, in an assessment of 200 barber shops within the Kumasi metropolis,

only 7 % knew the route of transmission of HBV (Mutocheluh & kwateng k., 2015). Akumiah and Sarfo, (2015) further pointed out that, the barber community in Ghana paid more attention to the decoration (e.g.availability of television, air conditioning, sound system etc.) other than the risk factors associated with their profession in the transmission of diseases such as HBV. Although, the 3 main transmission routes of HBV in Ghana are transfusion of infected blood, unprotected sex and mother to child transmission, and most Ghanaians with chronic hepatitis B were infected at birth or in childhood, HBV has often been framed as a sexually transmitted infection in many communities and even among health workers (Owusu- Ansah, 2014). Stigmatization arising from such misconceptions has many times prevented patients from finding their way to proper care and subsequently reducing their infectivity rate

There are three (3) key components to controlling hepatitis B. These include treating infected persons, interrupting the spread of the infection transmission and reducing the mortality associated with advanced hepatic disease and HCC (Lesi, 2015). A vaccine against hepatitis B has been available since 1982. The vaccine is safe and 95 % effective in preventing infection and the development of chronic disease and HCC due hepatitis B (WHO, 2015). For instance, in Senegal, vaccinations have reduced infection rates among children from 18.7 to 2.2 %, whereas in Gambia, it has led to a reduction in infection rate from 10 % to less than 1 % (Vildosola, 2000). Ghana introduced Hepatitis B vaccination of babies as part of the Expanded Programme of Immunization (EPI) in 2002 (Owusu-Ansah, 2014). Babies from 6 weeks onwards receive the pentavalent vaccine (diphtheria, polio, tetanus, hepatitis B, influenza type B). The coverage of EPI is good in all regions of the country and among the highest in Sub-Saharan Africa (Menaca, 2014). The introduction of the HBV vaccine in 2002 might have contributed to the lowering of prevalence



rates as studies published in the post vaccine introduction periods 2003–2015 recorded lower HBV prevalence rates than the pre-vaccine introduction period (1995–2002).

On the other hand, although, Ghana's National Health Insurance Scheme (NHIS) introduced in 2003, aims to improve access to health services by eliminating financial barriers (particularly out-of-pocket payments), hepatitis B screening and vaccination in Ghana outside EPI are still not covered under the scheme. Screenings are only covered and prescribed at hospitals for patients suspected to be reactive to hepatitis B and/or C. Hepatitis B immunoglobulin G and hepatitis B monovalent vaccine for babies born to hepatitis B reactive mothers are also not covered by the NHIS [World hepatitis alliance (WHA, 2013)]. These may have all hampered effective control of the disease over the last couple of years. Epidemiological studies have demonstrated that rapid urbanization, overpopulated cities and poor socioeconomic conditions such as lack of access to clean water and sanitation are implicated in the burden of HBV (WHO, 2015). The World Bank notes that over the last 2 decades, there has been a steady increase in the proportion of Ghanaians with access to portable water with current rates exceeding 88 % [World Bank Group (WBG, 2015)]. Nevertheless, less than 15 % of Ghanaians have access to proper sanitation (UNICEF, 2013).

Martinson et al., (1996), has demonstrated that the improvement of socioeconomic conditions may lead to a decreasing exposure to viral hepatitis such as HBV in Ghana. Hence, the apparent reported lower prevalence rate within the period 2003–2015, may have been due to the combined effect of vaccine introduction and improvement in some socioeconomic conditions. Better socioeconomic improvement and vaccination coverage in urban areas compared to rural areas may underline the

difference in HBV prevalence rates difference between these two settings. However, it is unclear the extent to which factors such as vaccination and socioeconomic conditions have played in the slight regional variations in HBV prevalence across the country.

Although, there exist significant gaps in the evidence documenting the burden of HBV on individuals, the healthcare system and the country as a whole, the cost associated with HBV in Ghana can be enormous because of the high morbidity and mortality associated with endstage liver disease, cirrhosis and HCC. Blankson et al., ( 2005), identified that over 2 in 5 cirrhotic patients in Ghana had chronic HBV. The cost of oral treatment for HBV in Ghana is about GHC 300-400 (USD100-150) a month or the same amount weekly to take an injection for 48 weeks as a way of managing the condition (Myjoyonline, 2011). This cost is enormous and one that majority of Ghanaians cannot afford. Even if this was to be publicly funded, the impact on health expenditure would be significant. Moreover, as it affects people between ages 16–39 years covering some of the most productive age groups, thus the economic impact of HBV in Ghana through loss of life and absenteeism from work cannot be underestimated.

Addressing Ghana's high HBV prevalence should remain a key national priority and one that needs strategic public health interventions. In 2014, the World Health Assembly (WHA) adopted the second WHO resolution on viral hepatitis thus, providing guidance to governments on how to prioritize actions to tackle all forms of viral hepatitis in a coordinated manner (WHO, 2014). Subsequently, the recently released WHO guidelines on the management of chronic hepatitis B, highlights the importance of adopting a simplified public health approach to controlling the virus (WHO, 2015). The key highlights of this guideline include developing publicly-funded screening

and treatment programmes and providing universal access to hepatitis B prevention, care and treatment. Scaling up this programme in Ghana will have two main benefits. Firstly, it will expand access to the general population. And secondly, it will strengthen the diagnostic services and laboratory infrastructure to support care. In line with this, Hepatitis B vaccination should be covered by the NHIS, preferably for every citizen. If this is not achievable owing to resource limitations, it should be made available at least to all family members/close contacts of persons with hepatitis B in efforts to reduce horizontal transmission of the disease.

Effectively tackling HBV burden calls for a stronger political will and a wider social involvement. The aim will be to solidify the inclusion of HBV prevention in the overall national health agenda and salvage the needed resources to execute the necessary interventions. Lemoine et al., (2015) makes interesting reference to lessons learnt from the HIV/AIDS epidemic and advocates that, the same energy and mobilization must be applied to fighting viral hepatitis such as HBV (Lemoine et al., 2015). Within the HIV/AIDS domain, pressure from patient advocacy groups and civil societies for instance “pushed” policy makers and drug manufacturers to lower the cost of antiretroviral therapy (ARTs) to the current level of around USD100 per person per year from about \$10,000 per patient per year in the early 2000s ( Lemoine et al.,2015). This has subsequently had tremendous impact on the number of individuals receiving ART. Also integrating viral hepatitis programmes into the existing national health programs like Tuberculosis (TB) or HIV may allow shared synergies in terms of the programme’s success and limit its cost (Lesi, 2015). In view of the above-mentioned factors and forces facilitating the spread of the disease worldwide, being knowledgeable about the facts and figures on the ground and having positive attitudes and behaviours are paramount in the fight against the spread of the global epidemic.

## 2.6 Clinical manifestation/signs and symptoms

A person with hepatitis B virus infection will manifest the following signs and symptoms; At the insidious stage, patient will experience: fatigue, anorexia, abdominal discomfort, nausea and vomiting, joint pains, urticaria etc. The icteric phase occurs one week to two months after onset of the insidious signs and symptoms. Icteric phase is the period when bile is not being excreted as it should and is collected in the blood stream. Therefore patient exhibits symptoms and signs like: Jaundice, pruritus, dark urine, ancolic (clay coloured stool), elevated liver enzymes, hepatomegaly, and tenderness in the right upper quadrant of the abdomen.

## 2.7 Stages of hepatitis B virus infection

There are three stages of hepatitis B virus infection which include; Acute, fulminant and chronic stages of hepatitis B virus infection.

### *Acute HBV infection*

Acute HBV infection can be either symptomatic or asymptomatic; the latter is more common, especially in infants and young children. Acute infection runs a self-limited course and recovery is marked by hepatitis B surface antibody (anti-HBs) seroconversion. In symptomatic patients, the prodromal symptoms, including general malaise, anorexia, nausea, vomiting, and fever, may persist for several days to weeks. Some cases may have jaundice with or without light yellow stool. Hepatomegaly with tenderness on right upper quadrant of abdomen is typical; however, splenomegaly is uncommon. Alanine aminotransferase (ALT) levels do not increase until after viral infection is well established because time is required for virus-specific cytotoxic T lymphocytes to develop against HBV-infected hepatocytes.

In acute hepatitis B, HBsAg is the first marker detectable in the blood after an incubation period of 4 – 10 weeks, followed shortly by anti-hepatitis B core antibodies (HBc), which are predominantly of the immunoglobulin (IgM) type in the early phase. Viremia is established by the time HBsAg is detected, and the level of HBV DNA in acute infection is very high, frequently in the range of  $10^9$ – $10^{12}$  copies/mL ( $10^8$ – $10^{11}$  IU/mL). Circulating HBeAg can be detected early but is cleared rapidly in patients with acute hepatitis B, and anti-hepatitis B surface antibodies (HBs) appear within 6 months of disease onset in most patients. Patients with acute hepatitis B usually recover completely from the liver damage with the development of lasting immunity to reinfection.

However, with the development of sensitive assays for HBV DNA, it has been determined that low levels of HBV DNA may persist in the blood for up to 10 years in some patients, despite the presence of anti-HBs and specific cytotoxic T lymphocytes (Yotsuyanagi et al., 1998). These observations suggest that HBV may not be completely eradicated after recovery from acute hepatitis, which supports reports of reactivation of HBV replication in patients with anti-HBs who receive chemotherapy or immunosuppression after organ transplantation (Blampain et al., 1998).

### *Fulminant hepatitis B*

Fulminant hepatitis B is considered in people who develop signs of liver failure, including coagulopathy, increasing bilirubin levels with declining aminotransferase levels, and a decreasing liver size, with or without hepatic encephalopathy, within 8 weeks after the initial symptoms of HBV (Bhaduri et al., 1996). Bernau and colleagues defined fulminant hepatitis as hepatic encephalopathy developing 2 weeks after the onset of jaundice and subfulminant hepatitis as

hepatic encephalopathy developing between 2 and 12 weeks after the onset of jaundice (Bernuau, Rueff & Benhamou, 2005). The incidence of fulminant hepatitis B is higher in infancy than in other age periods (Chen et al., 2004). As the diagnosis of hepatic encephalopathy is difficult to establish in infants aged less than 1 year, the presence of hepatic encephalopathy is not an absolute requisite for fulminant hepatic failure in this age group (Lee et al., 2005).

Fulminant hepatitis B can occur as early as 2 months of age in infants of HBsAg-positive mothers (Chen et al., 2004). Maternal transmission is the most important route in infants with fulminant hepatitis B, especially in those of HBeAg seronegative mothers (Chang et al., 1987). The mortality rate for infants with fulminant hepatitis B is high; 67% of affected infants die without liver transplantation (Hsu et al., 1992). Regarding older children or other age groups with fulminant hepatitis B, HBV infection occurs via a horizontal route (i.e., blood transfusion), which could potentially be prevented by vaccination or blood products screening (Chen et al., 2004).

### *Chronic HBV infection*

The natural course of chronic HBV infection, which is defined as persistence of HBsAg for more than 6 months, consists of three to four phases, according to the serum hepatitis B envelope antigen (HBeAg) and HBV DNA status.

#### *Phase 1: Immune tolerance phase*

Patients with chronic HBV infection have an initial immune tolerance state, which is characterized by the presence of HBeAg and high levels of HBV DNA due to rapid viral replication. The host is highly infectious, and an important source of horizontal infection in the family. During this phase, the host is usually asymptomatic and aminotransferase levels are usually normal, or mildly elevated. This phase is mostly seen in patients infected at birth or during early childhood.

Infected persons do not mount effective immune responses and exhibit immune tolerance, which leads to a high risk of chronicity in adulthood. Despite high levels of HBV DNA, liver damage in this phase is absent or minimal as a consequence of T cell immune tolerance to HBeAg and hepatitis B core antigen (HBcAg) (Hsu et al., 1992). Mechanisms underlying this immune tolerance are not well understood. During this phase, positivity of HBeAg and high HBV DNA levels in blood can persist for years after primary infection.

#### *Phase 2: Inflammatory (immune active) phase*

When the host immune system becomes mature and begins to recognize HBV related epitopes on hepatocytes, immune-mediated viral clearance and hepatocyte damage begin (Chu et al., 1987). This phase, which lasts from several months to many years, is characterized by HBeAg positivity, high levels of HBV DNA, but no elevated serum aminotransferase levels, and active inflammation of the liver. In patients with perinatal or early childhood infection, transition from immune tolerance to immune clearance occurs mainly during the second or third decade of life (Liaw et al, 1987).

Patients in the HBe seroconversion stage mostly remain asymptomatic, or have mild nonspecific symptoms such as general malaise, poor appetite, etc., making it difficult to detect the beginning

of immune clearance. Serum ALT levels become elevated and fluctuate depending on the severity of liver damage during the virus–host interaction process. The peak levels of ALT often vary and are mostly <600 international unit per mil (IU/mL.)

Active inflammation and hepatocyte damage are common histologic findings, but liver cirrhosis occurs uncommonly during childhood. Only 3.4% of 292 Italian HBsAg carrier children with elevated ALT were found to have liver cirrhosis at presentation (Bortoloti et al, 1990).The HBe seroconversion process, implying that the host loses the immune tolerance, varies in different individuals and is affected by age and maternal HBsAg status (Chang et al., 1989). Some patients present with a flare of hepatitis followed by the disappearance of HBeAg and the presence of antibodies against HBeAg (anti-HBe); some have transient decreased HBV DNA levels without the clearance of HBeAg. In general, it takes around 2–7 years for the process of HBe seroconversion to occur. The annual HBe seroconversion rate is less than 2% before the age of 3 years in a Taiwanese cohort; after 3 years of age, the annual HBe seroconversion rate gradually increased to about 5% (Lee et al., 1990).

### *Phase 3: Low replication phase (inactive carrier state)*

After HBeAg seroconversion, most patients remain positive for anti-HBe antibodies and have gradual normalization of serum ALT levels. Patients in this phase are commonly referred to as “inactive HBsAg carriers.” HBV DNA can only be detected in 1% of anti-HBe-positive patient using the less sensitive hybridization method but can be persistently detected in sera, usually at less than 10<sup>4</sup> copies/mL, in the long term by assays that use the polymerase chain reaction (PCR).



In an Italian study, 87% of 37 children after HBeAg seroconversion had detectable HBV DNA by PCR at 5-year follow-up and 58% had HBV DNA at 10-year follow-up ((Bortoloti et al., 1996).

Histologically minimal or mild hepatitis may be observed in children after HBeAg seroconversion. Reactivation of HBV replication and a rise in ALT levels are not common in this phase in children; however, permanent liver damage and integration of the HBV genome may develop insidiously and gradually despite clearance of HBeAg. The subsequent development of liver cirrhosis or hepatocellular carcinoma (HCC) is rarely observed but may happen during childhood (Bortoloti et al., 1990). In general, however, around 80% of childhood HCC occurs in children with anti-HBe antibodies (Chang et al., 2007). In an Italian long-term follow-up study for 29 years, the overall prognosis in horizontally infected children after HBeAg seroconversion showed that 2% of them progressed to HCC and 6% had HBeAg-negative hepatitis (Bortoloti et al., 2006).

#### *Phase 4: Reactivation phase (HBeAg negative chronic hepatitis B)*

HBeAg seroconversion is generally considered as a good event indicating the cessation of liver inflammation and the beginning of an immune inactive status with low viral replication and minimal liver inflammation. However, HBeAg negative hepatitis is an important cause of liver injury after HBeAg seroconversion in adults. Subsequent reactivation of chronic hepatitis B occurs in up to one-third of inactive adult HBV carriers without reversion of HBeAg (Sung et al., 2002).

This phase is characterized by the absence of HBeAg, the presence of anti-HBe antibodies, detectable HBV DNA levels (<104 copies/mL), serum ALT elevations, and histologically continuous necro inflammation of the liver. Most patients progress to this phase after a variable

duration in the inactive carrier state, but some directly progress into this phase from immune clearance phase (Hsu, et al., 2002). Selected HBV variants that cannot express HBeAg because of mutations in the precore or core regions of the HBV genome are thought to be the cause of HBeAg-negative chronic hepatitis (Hadziyannis & Vassilopoulos, 2001).

The significance of HBeAg seroconversion occurring in childhood and young adulthood is clarified after a long-term follow-up study of 7–23.7 years (Nii et al, 2007). In contrast to HBeAg seroconversion in adults, most children who underwent HBeAg seroconversion early had decreased viral loads, normal ALT levels, and uneventful courses after the HBeAg seroconversion. A prospective follow-up study of children with chronic hepatitis B showed that only 4.3% of 140 HBeAg seroconverters had re-elevated ALT after seroconversion (Chang et al., 1995).

## **2.8 Transmission route of hepatitis B virus**

Yoder, (1997) stated that HBV may be transmitted horizontally and vertically. Horizontal transmission occurs during adolescence or childhood, throughout sexual exposure, needle stick (both accidental or through intravenous drug use), and blood transfusion. Therefore, any person with a bad history of sexually transmitted diseases (STDs), multiple sexual partners or an injecting drug user stands a higher chance of being infected with HBV (CDC, 2002). Exposure to blood is also by means of open wounds in households, other close contacts, and multiple transfusions in hemophiliacs. This view of exposure to risk was also shared by (Goldstein et al., 2000) who argued that most of the infections occur among adolescents and young adults due to exposure to high risk activities they engage in at this stage of life.

A vertical transmission occurs when an infected mother transmits the virus directly to the neonate during childbirth. Such transmissions are usually possible when the expectant mother suffers an acute infection of hepatitis B during pregnancy or if she is a chronic carrier during that period. The mode of this vertical transmission is not clear-cut, but indications are that, infection might occur through a placenta cutting during childbirth. Majority of countries in South east Asia, the Western Pacific and Africa have high endemicity of HBV. In these settings the major mode of HBV transmission has been identified as vertical, where by mothers directly transmit virus to their infants during prenatal periods or where infected siblings, playmates, other members of different households transmit the virus to their younger ones (Armstrong et al., 2003). A cross-sectional study by Margolis et al., (1991) clarified that without prophylaxis, an estimated number of 6000 infants born to carrier mothers each year in the USA would develop chronic HBV infection as a consequence of prenatal transmission.

In addition to the above mentioned major modes of transmission, tattooing and body piercing tools have been recently discovered to contribute significantly to the spread of the disease. The incidence of reported hepatitis B in different age groups in the USA is indicative of a life style disease linked with at-risk behavior in late adolescence (15-19 years) and young adulthood (20-29 years).The disturbing risk factors are mostly sexual misconduct, tattooing, body-piercing, drug use or injection. In less developed countries, the use of crude methods during injections such as reused unsterilized or improperly sterilized needles and syringes are estimated to cause millions of cases of hepatitis B and C as well as HIV and other blood borne diseases globally (Hauri et al., 2003).

## 2.9 Diagnostic investigation for hepatitis B virus infection

The following are investigation carried out to diagnose or confirm hepatitis B virus infection.

- Radioimmuno assay to detect hepatitis B surface antigen (HBsAg).
- Radioimmuno assay to detect antibody to hepatitis B core antigen (anti-HBc).
- Radioimmuno assay to detect antibody to hepatitis B surface antigen (anti-HBs).
- Liver function test. (Test for serum transferase levels (Aspartate aminotransferase (AST), Alanine aminotransferase (ALT))
- Blood Clotting test.
- Viral load
- Ultrasonography

## 2.10 Treatment/management of hepatitis B virus infection

Acute hepatitis B has no specific treatment. Care is aimed at maintaining comfort and adequate nutritional balance, including replacements of fluid that has been lost through vomiting and diarrhoea. Chronic hepatitis B can be managed rather than treated. Some of the general management strategies for HBV recommended by medical experts include;

Avoidance of:

- heavy alcohol consumption.
- unprotected sexual intercourse with partners who are not vaccinated.
- sharing of needles or other items that potentially contain blood such as shavers or toothbrushes
- donation of blood or organs

Screening of family members and sexual partners for HBV infection and vaccination of those who are sero-negative,

Patient education and long-term follow-up with regular testing of liver biochemistry and surveillance of hepatocellular carcinoma in high risk groups.

However, drugs including interferon and other anti-viral agents are recommended for the treatment of hepatitis B viral infection. These include;

#### *Adefovir*

Adefovir (ADF) is a nucleotide analogue that on average reduces HBV DNA levels to 3.5 log<sub>10</sub> copies/ml after 48 weeks of therapy in HBV monoinfected patients (Hadziyannis et al., 2003), but is less potent than Tenofovir (TDF). Only one of these studies has reported use beyond 48 weeks (Benhamou et al., 2001); in that study 25% achieved undetectable HBV DNA (400 copies/ml) by week 144 and no breakthrough or ADF resistant mutations were observed. ADF dosage ranges from 10mg every 48hrs to 10mg every 7days depending on the kidney functioning status.

#### *Entecavir*

Entecavir is a guanosine analogue that is highly potent against HBV, the dosage ranges from 0.25mg daily to 0.5mg weekly depending on the renal functioning status. It is however, Contraindicated in pregnancy and breastfeeding.

#### *Lamivudine*

Lamivudine (3TC) is a nucleoside analogue with activity against both HIV and HBV. In patients with impaired renal function 3TC dose should be reduced ranging from 150mg, 100mg, 50mg and 25mg depending on the kidney functioning status.

### *Telbivudine*

Telbivudine is a relatively new nucleoside analogue with greater activity against HBV than both 3TC and ADF, but its efficacy is limited by a high risk of resistance (25% at 24 months in HBV monoinfected patients).

### *Tenofovir*

Tenofovir (TDF) is a nucleotide analogue with potent activity against both HBV and HIV and is the preferred drug, as part of a full ART regimen, to treat HBV in HIV coinfecting patients. Although development of HBV resistance seems to be very rare, it is recommended that TDF is always combined with another drug with anti-HBV activity (e.g. 3TC or FTC) when used as part of ART in HBV/HIV coinfecting patients. TDF is active against 3TC/FTC resistant HBV. Although TDF is associated with an increased risk of nephrotoxicity (Macrossoft et al., 2010), dose adjustment in individuals with altered creatinine clearance can be considered. The dosage ranges from 300 mg once daily, 300mg every 48hrs then 300mg once every 72-96hrs.

## **2.11 Complications of hepatitis B virus infection**

Failure to manage the condition with the drugs above, may lead to the following complications.

- **Liver Cirrhosis:** This is where the infection of the liver with hepatitis B virus causes inflammation which leads to extensive scarring of the liver thereby impairing the ability of the liver to function.
- **Liver Cancer:** This is where the extensive scarring of the liver leads to carcinoma thereby limiting the functions of the liver.
- **Liver Failure:** In this case the liver is unable to carry out its normal physiological activities.

- **Kidney Failure:** This is where the impairment of the liver affects the physiological function of the kidney since the organs are interdependent.

## **2.12 Prevention of transmission of virus hepatitis B infection**

Even though HBV has become a major source of health concern worldwide, it is worth acknowledging the good news that it is the only sexual transmitted diseases (STD) that can be prevented by vaccination (CDC, 2002). The prevention of HBV globally has become one of the topmost priorities of major political actors and decision makers in recent years.

The disease is prevented by the use of safe and effective vaccine which became available in 1982 through funding and implementation of hepatitis B immunization programs. Measures for HBV prevention have been geared towards avoidance of unsafe blood exposure or blocking of transmission before the advent of the vaccine.

Unsafe blood transfusion has been a major factor in the transmission of HBV globally (Shang et al., 2007). The enactment of a law for the donation and management of blood in blood banks across the world has aggressively fought this channel of HBV transmission. This notwithstanding, current researches have showed that blood transfusion is regaining its position as one of the major risk factors for HBV transmission globally. This finding is attributed to the presence of occult HBV infection (OHBVI) among blood donors (Chang et al., 2007). It is also worth mentioning that the global acceptance of the auto-disposable syringes (ADS) has considerably reduced the incidence of HBV infections that occur due to unsafe injections. Also, as a result of the extensive use of invasive medical procedures, iatrogenic HBV infections are no longer frequent. There have also been speculations that dental care operations which are capable of causing oral mucous membrane

injuries is becoming a major route to HBV transmission if steps are not taken to prevent it (Chang et al., 1998). HBV per se does not have a permanent treatment; therefore the surest antidote to the global epidemic is prevention

Prevention strategies include primary prevention of new infections (i.e. vaccines and post-exposure prophylaxis), secondary prevention of HBV transmission by appropriate sexual and sanitary practices, and tertiary prevention of the pathological consequences of chronic HBV infection by anti-viral treatment. The risk of progression from acute to chronic infection is inversely proportional to the age of infection. Up to 90% of infants who acquire HBV infection from their mothers at birth become chronically infected, whereas in adults, only 5% of acute HBV cases remain chronically infected (McMahon et al., 1985). Thus; the highest risk of developing chronic HBV is in high endemic areas where perinatal and early childhood infection is most common, making universal immunization the highest yield strategy for prevention.

According to model-based predictions, universal HBV infant immunization would prevent up to 75% of global deaths from HBV-related causes. Adding a birth dose, where the first dose of HBV vaccine is administered within the first 24 hours of birth, would prevent perinatal transmission in up to 84% of infants (Goldstein et al., 2005). Safe and effective HBV vaccines have been available since the 1980s. The plasma-derived HBV vaccine was first commercially available in the United States in 1982, and continues to be used today, mostly in the less affluent countries. Recombinant DNA vaccines were then licensed in 1986 and 1989 (Zenatti et al, 2008). After the introduction of recombinant vaccines and the subsequent drop in cost of the plasma-derived vaccines, the WHO set a goal in 1992 for all countries to introduce the HBV vaccine into



their national routine infant immunization programs by 1997. By 2006, 162 of 193 countries had introduced the vaccine into their national infant immunization schedules. As at 2008, 177 countries had incorporated the vaccine as part of their national infant immunization program and an estimated 69% of all newborns had received all 3 doses of the HBV vaccine (CDC, 2006). In 2010, the WHO recommended universal administration of a birth dose regardless of the level of endemicity (WHO, 2010). As at 2006, 81 of 193 countries (42%) reported using a vaccination schedule with a birth dose; however, only 36% of all newborns in countries with high endemicity and 27% of newborns worldwide received a birth dose (CDC, 2006). Although these relatively low percentages were partly due to missing data from logistical and financial issues, they emphasize the need to improve newborn hepatitis B vaccination program.

Following a full course of vaccination (3 doses of the vaccine given at 0, 1 and 6 months after birth), almost 100% of children and 95% of healthy young adults developed protective levels of antibody against hepatitis B surface antigen (anti-HBs). People who are elderly, obese, heavy smokers, undergoing hemodialysis or immunocompromised have suboptimal antibody responses when vaccinated (Zenatti et al., 2008). For that reason, the key is to vaccinate the youngest populations as broadly as possible to allow for maximal prevention. Hepatitis B immune globulin (HBIG), combined with hepatitis B vaccine or active post-exposure prophylaxis with hepatitis B vaccine alone, is effective in preventing transmission after exposure to HBV from mother to newborn or after sexual exposure. Post-exposure prophylaxis with hepatitis B vaccine is recommended first-line; if available and feasible from a logistic and financial standpoint, HBIG is also recommended for infants born to HBsAg-positive mothers. Unvaccinated infants whose mothers or primary caregivers have acute hepatitis B, sexual contacts of people with acute hepatitis

B, and people without immunity who have been occupationally exposed to HBsAg-positive blood are all recommended to take the vaccine (Van, 2008).

### **2.13 Disease (Hepatitis B virus infection) burden in the world**

There is an increased burden of chronic hepatitis B in the world. More than half of the estimated chronic hepatitis B cases were from the Western Pacific region, from countries such as the Philippines, China and Vietnam. These were the main countries of birth for imported cases of chronic hepatitis B, Africa was the second largest region for imported cases of chronic hepatitis B (Nguyen et al., 2009).

According to systematic review (Rossi et al., 2012) migrants from East Asia, the Pacific and Sub-Saharan Africa represented a high sero prevalence of chronic hepatitis B (10.3-11.3%), and migrants from Eastern Europe, Central Africa and South Asia were intermediate sero prevalence. The sero prevalence of chronic hepatitis B was low among migrants from the Caribbean, Latin America, the Middle East and North Africa. Refugees and asylum seekers had higher sero prevalence of chronic hepatitis B compared to migrants.

Hepatitis B virus infection is estimated to be the cause of 30% of cirrhosis and 53% of liver cancer in the world (Perz et al., 2006). Approximately 15-40% of patients with chronic HBV will develop cirrhosis, end-stage liver failure or hepatocellular carcinoma (HCC) in their lifetime (Lok et al, 2002). Mathematical modeling for the year 2000 estimated the annual number of HBV-related deaths to be more than 600,000 worldwide. Most of the deaths (94%) were attributed to complications of chronic infection, such as cirrhosis and HCC, and only 6% were attributed directly to acute hepatitis B (Goldstein et al., 2005). Hepatocellular carcinoma is the sixth most

common cancer and the third most common cause of cancer death in the world (Goldstein et al., 2005). Chronic HBV infection is the most common cause of HCC, accounting for 50% of HCC cases worldwide and up to 80% of cases in high HBV endemic regions (Bosch et al., 2004).

The risk of people living in areas of low endemicity developing HCC, is greatly increased with the development of cirrhosis. Thus, the ideal way to decrease HBV-related deaths is to first prevent the infection through vaccination and strategies to reduce transmission and to prevent progression to cirrhosis and HCC in those already infected. Although anti-viral therapies can suppress HBV and delay liver disease progression, most people with chronic HBV infection reside in developing countries with limited health care resources. Thus, HBV-related HCC incidence is projected to increase for at least two decades due to the high prevalence of chronic HBV infection throughout the world (Lavanchy et al., 2005).

#### **2.14 Disease (Hepatitis B virus infection) burden in Africa.**

In sub-Saharan Africa, chronic infection with the hepatitis B virus (HBV) is a profoundly important public health issue characterized by high prevalence, frequent co-infection with HIV, and sub optimally applied ascertainment and management strategies. Prevalence of hepatitis B surface antigen (HBsAg) in the general population varies geographically, with the highest rates (8%) measured in West Africa (Ott et al., 2012).

Among people living with HIV, between 6% and 25% are co-infected with HBV, and co-infection accelerates fibrosis and increases the risk of liver-related mortality and development of hepatocellular carcinoma (HCC) compared to HIV-negative controls (Mathew et al., 2004). In

part, as a consequence of reduced HIV-related mortality, both HCC and cirrhosis are increasing in sub-Saharan Africa (Lozano et al., 2015). The proportion of deaths due to cirrhosis increased by 31% between 1990 and 2010 (Lozano et al., 2015).

Lemoine et al.,(2015) argue that if HCC and cirrhosis were grouped together, chronic viral hepatitis would rank within the top 10 causes of global mortality, above malaria and TB (Lemoine & Lacose, 2015). However, accurate epidemiological data on liver-related mortality in sub-Saharan Africa are lacking, and verbal autopsy remains the predominant method of ascertaining the cause of death, which is highly likely to underestimate the true burden of disease (Byass, 2014). World Hepatitis Day, on 28 July, is both a chance to celebrate the progress made in sub-Saharan Africa and an opportunity to focus on the action now needed to reverse the increasing tide of the disease.

There are multiple fronts on which the battle against viral hepatitis must be fought. In the first place, there is the need to gain accurate epidemiological data on chronic viral hepatitis in sub-Saharan Africa so that the scope of the problem is properly understood and appropriate resources can be engaged. Also, an increase in HBV vaccination will be of great help. In South Africa, a national sero survey showed that the introduction of infant HBV vaccination in 1995 led to a reduction in chronic HBV from 4.3% in the prevaccination period to 1.4% by 2011 (Amposah-Dacosta et al., 2014). As over 90% of HBV is transmitted in the first 5 years of life, improving vaccination coverage in neonates is essential.

Moreover, transfusion of infected blood must be checked or stopped. A mathematical model estimated that for every 1000 units transfused in sub-Saharan Africa, 4.3 transmit HBV and 2.5 transmit HCV, based on the prevalence of infection in donors and the incomplete provision of

routine virological screening (Jayaraman, et al., 2010). Resources must be targeted to ensure that quality assured screening methods are employed in all blood transfusion services in sub-Saharan Africa.

In addition, the use of contaminated needles should be checked or monitored in healthcare settings. Up-to-date data is lacking but available WHO surveys from 2000 estimated that between 13 and 23% of needles in healthcare settings in sub-Saharan Africa were reused (Huntin. & Armstrong, 2000). WHO has developed an injection safety policy, which aims to transition to the exclusive use of safety engineered injection devices with needle injury and reuse prevention (WHO, 2015).

Furthermore, HIV programmes should include universal screening for HBsAg and offer co-infected patients antiretroviral treatment regimens that are active against both HIV and HBV. These typically include tenofovir for its potency and lack of propensity to select for HBV drug-resistance. While tenofovir is recommended for first-line antiretroviral therapy in all patients with HIV in sub-Saharan Africa, availability is far from universal. Yet, HBV diagnosis and tenofovir use are the key strategy to counteract the risk of liver disease emerging as a prominent cause of non-AIDS related morbidity in this population. While data are still limited, there have been important steps forward. There has been recent report on a cohort of HIV/HBV co-infected patients on long-term antiretroviral therapy in Ghana, where HIV co-infection with HBV shows a prevalence of 14%. Reflecting routine practice across sub-Saharan Africa, patients had received lamivudine as the sole HBV inhibitor for several years (median 45 months): over half of patients had detectable HBV DNA, one-third had DNA levels above 2000 IU/ml, one-third had HBV

lamivudine resistance and one in eight had advanced liver fibrosis as determined by transient elastography (Stockdale et al., 2015)

These initial findings led to the adoption of routine HBV screening in the local HIV clinic, and to HBVco-infected patients being prioritized for tenofovir use. In this cohort, within just a few months (median 8), the introduction of tenofovir led to substantial improvements in HBV DNA suppression and promising evidence of reversal of liver fibrosis. These observations offer encouragement that improved control of HIV co-infection with HBV is an achievable goal across Africa (Stockdale et al., 2015).

Finally, testing and treatment for HBV in other settings must be expanded. Much remains to be done concerning the diagnosis and management of chronic HBV in populations without HIV. WHO issued guidelines for hepatitis B in 2015 (WHO, 2015). They recommend prioritizing antiviral treatment for those with established cirrhosis (based on non-invasive measures of fibrosis), clinical evidence of decompensated liver disease, or evidence of active disease as indicated by abnormal transaminases and a high HBV DNA load (above 20 000 IU/ml) (WHO, 2015). These steps to promote HBV diagnosis, disease staging and treatment are highly encouraging: providing a consistent standard for treatment in resource limited settings, for which resources must now be committed.

The example of HIV patient groups pressing policy-makers to engage with the scientific evidence and deliver access to lifesaving treatment demonstrates the power of informed patients engaging in the political arena. Effective treatments for HBV (and hepatitis C) exist but currently high costs

prohibit widespread access to treatment to all but a minority in sub-Saharan Africa. The incredible progress made in expanding access to HIV treatment must inspire campaigns for a similar commitment to universal access to treatment for viral hepatitis. There is hope that with concerted action, prevention of transmission and reversal of the rising tide of liver-related morbidity is an achievable goal in sub-Saharan Africa. Collaborative action among epidemiologists, patient advocacy groups, research funders, public health doctors, policy-makers, physicians and patients will be essential for achieving this goal to save millions of peoples affected with viral hepatitis.

### **2.15 Hepatitis B virus vaccine.**

The HBV vaccine was introduced in 1982 in the U.S. (Weinbaum et al., 2009) and in 1997 infant HBV vaccination was introduced in Vietnam. It was part of a trial and was implemented in two cities; Hanoi and Ho Chi Minh City (Nguyen, Law & Dore, 2008; Program for Appropriate Technology in Health [PATH], 2012). In 2003, a universal infant vaccination programme was implemented in the whole country. However, in 2006, only 64% of the new-born got the birth-dose vaccine within 24 hours. If the birth-dose of hepatitis B vaccine is given within the first 24-hours of birth, it prevents 80-90% of the virus transmission between mother and child. In 2010, the Vietnamese Ministry of Health re-emphasized their recommendation of birth-dose vaccine in an attempt to increase the prevalence of vaccinated infants (PATH, 2012).

The HBV vaccine gives healthy infants, children and adults a protective concentration of anti-HBs in 90-100% of the cases if the vaccination schedule is properly followed. The vaccine is typically given in a three-dose series. Persons who are immunosuppressed or over 40 years old are less likely to develop protective concentrations (Shepard et al., 2006). It is not known if the HBV

vaccine gives lifelong protection against HBV and if boosters are necessary. However, it is known that the protection is long lasting, at least 10-15 years, if the vaccination schedule is followed correctly (Ni et al., 2007). Fever and pain at the injection site are the most common side effects of the HBV vaccine. Allergic reactions have been reported but are not common (Shepard et al., 2006).

To investigate the hepatitis B immunization coverage among 1508 Vietnamese-American children in three different metropolitan areas in the U.S., a telephone survey was made in 1994 (Montesana R, 2002). In that study, approximately one-third of the children reported to know someone with liver disease, and half of them had heard about HBV infection. Less than 25% knew that doses of hepatitis B vaccine were available for free. The results also showed that, among 4-year olds the three doses vaccine coverage was 37%, while among 17-18 year olds the reported coverage was 0%. In the age group 12-18 year olds only 4% had three doses of the vaccine (Montesana R., 2002).

In a study made in Taiwan (Zanetti et al., 2008) the authors analysed data from acute hepatitis B surveillance during eight years. They found that the execution of the immunization programme effectively had reduced the prevalence of acute hepatitis B among young adults and adolescents. Although many infants are vaccinated, there is still a high incidence of acute hepatitis B among the infants due to mother to baby transmission at birth. The combination of hepatitis B vaccine and hepatitis B immunoglobulin within the first 24 hours was given to new-borne whose mothers were tested positive for HBsAg and HBeAg, hepatitis B e antigen gave 85-95% effective preventive effect against HBV infection (Zanetti et al., 2012).

In Ghana it is recommended that hepatitis B vaccinations be provided at birth. Since 2002, the Ghanaian government has committed to providing hepatitis B vaccinations for



children. Currently, Ghana's 'Expanded Programme on Immunization' includes hepatitis B immunization for children. This focus on early childhood immunization following the understandings that a major site of transmission is person to person contact in early childhood and that children who are infected while under 6 years of age are most likely to develop chronic infections from hepatitis B ('Ministry of Health – Ghana, Immunization Programme Comprehensive Multi-Year Plan (2010- 2014). However unfortunately, not all Ghanaian children obtain full vaccination against hepatitis B for a variety of reasons including lack of understanding of the importance of the vaccine and lack of access to healthcare facilities.

### **2.16 The effect of HBV immunization in children and adolescents.**

Universal hepatitis B vaccination programs in some hyperendemic countries have effectively reduced the prevalence rate and reduce the chronic HBV infection rate. Countries or regions that were examples of early implementation of universal HBV immunization include Taiwan (1984), Hong Kong (1988), Israel (1989), Malaysia (1990), Gambia (1990), Italy (1991), Spain (1991), and the United States (1991). Strategies of HBV immunization vary in different countries depending on the seroepidemiologic status and the resources of the countries. In some countries like Taiwan, United State, Italy, Spain etc, hepatitis B immunoglobulin (HBIG) is given within 24 h after birth to infants of HBsAg- and HBeAg-positive mothers (Ni et al., 2007,; Harpaz et al., 2000,; Da Villa et al, 1999; Salleras et al., 2007).

In countries with limited resources, maternal screening is not performed and no hepatitis immunoglobulin (HBIG) is given (Chang, 2007). Taiwan has the longest experience with HBV immunization in the world, and has been a good example of a highly endemic area with a striking reduction in the burden of hepatitis B infection resulting from universal infant vaccination. HBsAg

seroprevalence among Taiwanese children declined from 9.8% in 1984 to 0.5% in 2004 (Chang, 2007); this universal vaccination program is poised to change Taiwan from a hyperendemic country to a low endemic country in the coming years. The HBsAg seropositivity rates declined to below 1% in most countries worldwide after universal infant hepatitis B immunization, regardless of the endemicity before vaccination (Chunsuttiwat et al, 1997). Moreover, universal infant HBV immunization may reduce the incidence of HCC in childhood and early adulthood. The average annual incidence of HCC in Taiwanese children aged 6–14 years decreased from 0.52-0.54 cases per 100,000 children of the birth cohort born before the HBV vaccination program, to 0.13–0.20 cases in those born after the HBV vaccination program (Chang, 2000).

According to a 20-year follow-up study of national cancer surveillance in Taiwan, prevention of HCC by universal HBV vaccination was observed not only in children but also extended to adolescents, with an age- and sex-adjusted relative risk of 0.31 for persons vaccinated at birth (Chang, 2009). HBV vaccine is the first human vaccine demonstrated to prevent the development of cancer. In addition to the beneficial effects on prevalence of HBV infection and incidence of HCC, after the universal vaccination program was instituted, the mortality rate of fulminant hepatitis among Taiwanese infants declined by 68% (Chen et al., 2004).

### **2.17 Knowledge on hepatitis B infection.**

Knowledge is formed through interaction with the surroundings where individuals themselves construct their understanding of the world through experience. Its exchange is an integral part of learning as well as helping the individual to shape his or her abilities by converting theoretical and practical skills into new knowledge. Human knowledge is mostly acquired through communication and its processes. Knowledge is the key to prevention and education is the key to knowledge.

However, knowledge about the deadly disease in the district ( Sagnarigu ) is average.

An interaction with people in some parts of the district shows that, many people in the district ( Sagnarigu ) have average or little knowledge or understanding of the importance of their liver which plays a major role in the maintenance of good health. This low or average knowledge or awareness is not only limited to hepatitis B but also their overall well-being in terms of health. There are a lot of factors impeding efforts put up by established institutions like WHO and other world organizations to curb the menace of hepatitis B globally. Notably among these is the lack of knowledge and awareness among health care providers, social service professionals, young adults, members of the public and even policy makers (WHO, 2006).

It is an established fact that though there has been a safe and effective vaccine for hepatitis B over the past 20 years, universal vaccination is still lacking in many countries including Ghana. One of the major obstacles identified for this drawback is the lack of commitment to preventive medicine and vaccines. Due to the apparent lack of knowledge about hepatitis B, most governments which are supposed to be the major financiers of public health activities have seriously not considered hepatitis B prevention as a topmost priority in health care and have opted for selective prevention strategies. Most interventions aimed at reducing HBV prevalence among high risks groups have failed because of the inability to access these groups. There is also lack of perceived risk among these high risk groups and over 30% of those with acute hepatitis B infection do not have identifiable risk factors (Mangtani, 1995).

Lack of knowledge on hepatitis B virus infection makes the condition a serious health issue which needs greater attention. A patient knowledge about the signs and symptoms could prompt early care seeking. Similarly, a person's knowledge about the mode of transmission and methods of prevention would have helped people to take measures to protect themselves and others from contracting the disease.

Burnett et al, (2007) examined the knowledge on HBV and liver cancer among 256 Vietnamese Americans with low socioeconomic status. The results showed that the participants had general knowledge of HBV, but only 22% knew that HBV could spread through unprotected sex. Many did not know that liver cancer is preventable or that it is curable. Only a third of the participants knew about the vaccine that protects against HBV. An average knowledge was confirmed by Morrow et al., (2012) where the knowledge level about HBV infection was investigated among 433 Vietnamese men in Australia. About half of the respondents knew that HBV could spread by unprotected sex. Only 32% of them knew that sharing food and drink with an infected person is not a risk factor for being infected with HBV. Knowledge about the progression and character of the disease was higher. Approximately 60% knew that long-time infection still can transmit the disease, be asymptomatic and that treatment is available. Less than half of the respondents knew that it could turn into a lifelong disease.

A study was carried out in China (Chao et al., 2010) to investigate the knowledge about HBV among 250 health professionals by handing out a questionnaire at the "China national conference on the prevention and control of viral hepatitis". The results showed that even among highly educated health professionals the knowledge on the disease was deficient. One-third of the respondents did not know that it is common for chronic HBV infection to be asymptomatic or that

it can lead to liver cancer, liver cirrhosis and premature death. The authors believe that this increases the risk of health professionals overlooking the significance of screening even those who are asymptomatic, and vaccinating those who need it.

Mohamed et al, (2012) also found that factors associated with greater knowledge about HBV are high educational level or employment in professional jobs. The study by Taylor et al (2005) investigated knowledge and awareness of hepatitis B among randomly selected Vietnamese adults living in the United States. About 81% of the 715 adults that participated in the study had heard of hepatitis B and 67% had been tested for HBV. The knowledge of the infection was generally good, with about three-quarters knowing the different ways of transmission but only 69% knew about infection through unprotected sex.

Hwang, Huang and Yi (2010) investigated knowledge about HBV and predictors of HBV vaccination among 251 Vietnamese American college students. More than half of the participants were aware that HBV could be transmitted via unprotected sex and contaminated blood; though most of the participants' thought that HBV was transmitted through food and water. Less than one third knew that Asian Americans have higher risk of being infected with HBV than other people. About 87% had heard about HBV before and they had significantly greater knowledge compared to those who had not heard about the disease. The knowledge was also greater among those who had been screened for, or vaccinated against HBV, or had family members diagnosed with HBV or liver cancer. The study also indicated that women had greater knowledge about HBV compared to men. About 43% of the participants reported being vaccinated against HBV and they had greater

knowledge than those who had not been vaccinated. Older participants or participants who were sexually active and/or knew someone with HBV were less likely to have been vaccinated.

A study conducted by Boakye, (2014) on Assessing Knowledge Attitude and Perception of hepatitis B among senior high students in Dunkwa-on-offin Ghana, revealed high level of knowledge on the disease. A look at the knowledge about Hepatitis B Virus infection among the students revealed that majority of the students answered 7 out of 11 questions on knowledge correctly. This indicates a high level of knowledge among the students. It was also revealed that majority of the respondents (92%) had heard of HBV infection. Majority of the respondents (53.6%) answered correctly that HBV could not be inherited. However, Only 20% of respondents knew HBV could be sexually transmitted.

Less than half of the respondents (41%) knew correctly that HBV could be transmitted during childbirth. More than half (58%) of the respondents were right that HBV cannot be transmitted by sharing food with an infected person or eating food that has been prepared by an infected person. A majority of the respondents (81.1%) were also right that people could get HBV by eating food that has been pre chewed by an infected person, and 70% knew that HBV could be transmitted by sharing a toothbrush with an infected person. About 85% of respondents knew that holding hands with an infected person could not transmit HBV. Most of them (75%) knew infected person can have signs or symptoms like jaundice, bodily weakness, right sided abdominal pains, fever and loss of appetite. Majority of respondents (84%) knew that even asymptomatic HBV infected persons could transmit the disease.

A study by Mary et al., (2015) on knowledge attitude and perception of hepatitis B among health care workers in Sunteresu Government hospital revealed generally good knowledge about the condition as most of the respondents (90%) answering correctly the questions related to knowledge .

## **2.18 Attitude and practices towards hepatitis B infection**

Atkinson et al (2003) defined attitude as the favorable or unfavorable reaction to objects, people, situations or other aspects of the world. Other social psychologists considered attitudes to include factors such as cognition, affection and behavior ( Kruglanski et al., 2007). They further explained the cognition aspect of a person to mean a person's knowledge of something, the affective component represents an individual's feelings and evaluations that influence the standpoint for or against something and the behavioral aspect to be, the way people act towards a situation or a person and the motivation to make changes. Attitudes as suggested by psychologist are formed through experiences in lifetime and are usually determined by beliefs and the evaluation of such beliefs. Attitudes formed by individuals in society can be comprehensive as well as unspecific.

Fishbein et al., (1975) indicated that comprehensive attitudes are more stable and are usually strongly held by the owners therefore, very difficult if not impossible to be influenced as compared to unspecific attitudes. A person's behavior can be predicted by using the strength and consistency of his or her attitude. In this regard, any intervention that is aimed at changing the behavior of an individual must first of all have enough information about his or her attitudes and then employ methods that will help change these attitudes. Attitudes of which one is aware of or that are based

on one's own experience can predict behavior to a higher degree than attitudes that do not meet these criteria (Smith et al, 2003).

Smith et al., (2003) indicated those possible factors that could help influence the attitudes of an individual include, the nature of the sender (e.g. the nurse, doctor, health worker or professional in a counseling situation), the receiver (e.g. the patient), the message itself and the social context in which the information was communicated. Trustworthiness, expertise and interpersonal attraction are important signs that should be exhibited by the sender in order to influence a person's attitude. It is important to state that for a sender to be able to make an impact on the attitude of a receiver factors such as sex, age, self-esteem and knowledge have an important role to play.

Knowledge does not necessarily influence a person's attitude. People may be knowledgeable about a particular risk behavior but may still go ahead to do it. Knowledge about hepatitis B is necessary but the provision of knowledge alone is not sufficient since it does not necessarily lead to the behavior change. Attitudes, values and beliefs (including perceptions about personal vulnerability to infection) as well as cultural norms and the influence of family, peers and the media are all important determinants of whether or not appropriate behavior is adopted by a person (Emmons et al., 1986). Another important motivation for a behavior change among young adults or anybody at risk of a health situation is the feeling of compassion for those already affected. This is backed by the fact that stigmatization of disease is often a sign of denial of potential personal risk (Parker & Aggleton, 2003 ).



A report from the USA on Health Care Worker's attitudes towards vaccination against hepatitis B found that they were reluctant to be vaccinated, as they fear plasma-derived vaccine as it contains attenuated Hepatitis B virus (Zanetti et al., 2008). However many studies have found a positive correlation between increased knowledge and uptake of HBV vaccination. For example, studies in Nigeria, Spain, and Taiwan found that most vaccinated nurses and dental students acquired knowledge of HBV from their nursing degree and from working in high-risk areas that expose them to HBV (Hu et al., 2004).

Contrary to these findings, a study conducted in the UK on nurses' reports that, nurses did not finish their vaccination schedule despite having studied a course on vaccination, and midwives who were not immunized showed lack of awareness of the existence of the vaccine (Lee, 2009).

In a study conducted in Saudi Arabia, low immunization uptake was identified among dental staff despite their knowledge and availability of the vaccine (Goldstein et al., 2006). In Slonim et al., (2005) study, carried out in the U.S., 96 adolescents were individually interviewed and 17063 adolescents and young adults filled in a questionnaire. The participants were European-Americans, African-Americans, multiracial, Native Americans, Asian and Pacific Islanders, and other races. The study showed that the most common barrier to hepatitis B vaccine acceptance was that the adolescents did not like getting shots (94%) and time-related barriers (50%), as they had to come back two more times to the clinic to get the remaining doses of vaccine. Almost two-thirds of the adolescents that were interviewed could not provide any correct information before their clinic visit about hepatitis B.

In a study (Nguyen et al., 2010) carried out in the U.S. among Vietnamese-Americans, 1704 respondents participated in a computer-assisted telephone interviewing survey. The interviews included questions about knowledge, beliefs and communication regarding HBV testing. The study showed that 17.7% reported a family history of hepatitis B and 61.6% had been tested for hepatitis B. Only 26.5% reported that they had been vaccinated against HBV, which was disappointingly low. Studies conducted in Iran and Egypt found high uptake of free vaccine among young surgeons (Yayehyirad et al., 2009; Zanetti et al., 2008). In Sweden despite the availability of free vaccine, seventy six (76%) percent of HCWs were not vaccinated, they either forgot or never made appointment for vaccination (Dannetun et al., 2006). Study in Nigeria found that only twelve percent of the unvaccinated respondents could not afford the vaccine.

A study by Boakye (2014), on knowledge attitude and perceptions of student also revealed that, most of the students had a good attitude towards Hepatitis B virus infection. They indicated that healthy people need vaccination against HBV, and thought that people of their own age need vaccination. Students were also willing to be tested for Hepatitis B Virus infection. Despite the good attitude of the students towards HBV infection, only few of them had ever been vaccinated against the disease, which was disappointingly low. The main reasons stated for the non-patronize of HBV vaccination was that, they believe they were not at risk for getting Hepatitis B Virus, Hepatitis B vaccine cost too much, and they do not believe in the Hepatitis B vaccine.

## **2.19 Perception towards hepatitis B infection**

In a study made in Singapore (Tan et al., 2005) the authors looked into the health-seeking behaviours of those infected with HBV by interviewing 39 HBV infected individuals. Those who

had a family member that had had HBV-related liver disease or had liver abnormality themselves were more likely to seek help. They wanted to know if their own livers were functioning normally, but were at the same time reluctant to find out the results of a test, in fear of it. The authors concluded that the low compliance to follow-up among the patients was partly due to a widespread perception that there was no efficient treatment to the disease. Many patients preferred traditional medication such as herbs instead of western medication, which was perceived not to be as effective as the herbal medicine (Tan et al., 2005).

In a study by Mohamed et al, (2012) on knowledge, attitudes and practices among 483 chronically HBV infected people in Malaysia was investigated. The study showed that more than half of the participants felt worried about the diagnosis and felt anxious about spreading the HBV infection to family and friends. A third of the participants felt embarrassed to make their diagnosis public. About 11.6% reported that they would not tell their doctor or dentist about being HBV positive, while most of them would tell their family and friends. Many of the participants had changed their life-style habits after receiving the HBV diagnosis. A majority of those who had smoked and drunk alcohol reduced their intake-level and about half of the participants made healthier food choices and increased their daily exercise level. A large interest about encouraging family members to be screened for HBV was also noticed after receiving the HBV diagnosis (Mohamed et al., 2012).

In a study by Boakye, (2014) on Assessing Knowledge Attitude and Perception of hepatitis B among senior high students in Dunkwa-on-offin Ghana, revealed that, the perception of students on Hepatitis B Virus infection was good. Results from the study showed that majority of the students (68%) were of the view that there is efficient treatment of Hepatitis B Virus infection.

About 29.5% indicated that persons with HBV infection should be isolated away from the people to prevent spread. It was further showed that half of respondents (50%) were of the view that exercising regularly and eating healthy food can prevent Hepatitis B Virus infection. The results of the study showed that most of respondents (64%) believed that healthy people need vaccination against HBV infection and 70.5% of them thought that people of their own age need vaccination. More than half of the respondents (53%) indicated that they were willing to be tested for Hepatitis B Virus infection. However, only 4% had ever been vaccinated against the disease. Majority of them (88%) had never received a Hepatitis B vaccine before.

## CHAPTER THREE

### 3.0 Methodology

#### 3.1 Introduction

This chapter presents a comprehensive account of how the study was conducted. It describes methods and materials that were used in this study to assess the knowledge, attitude and perception about Hepatitis B virus infection among young adults in Sagnarigu district of the Northern region. The chapter also describes the study area, study design/type, study population, ethical consideration, sampling procedure, instrument as well as tools for data analysis.

#### 3.2 Study area

The study was carried out in the Sagnarigu district of the Northern region specifically Sheshegu, Jisonayili , Gurugu and Sagnarigu township with population of 5723, 4583, 3075 and 2425 respectively . The selection of this communities was done randomly (balloting) for better representation .

##### 3.2.1 Geographical location and size

The Sagnarigu District is located in the central part of the Northern Region of Ghana. The district has an estimated total land size of 114.29km<sup>sq</sup> – representing 26% of the total landmark of the region.

It shares boundaries to the North with Savelugu-Nanton Municipality, to the South and East with Tamale Metropolis, to the West with Tolon District, and to North-West with Kumbungu District. The district is spatially attached to the Tamale Metropolis (the administrative and commercial hub of the northern part of Ghana) to the South and East (Figure 2).

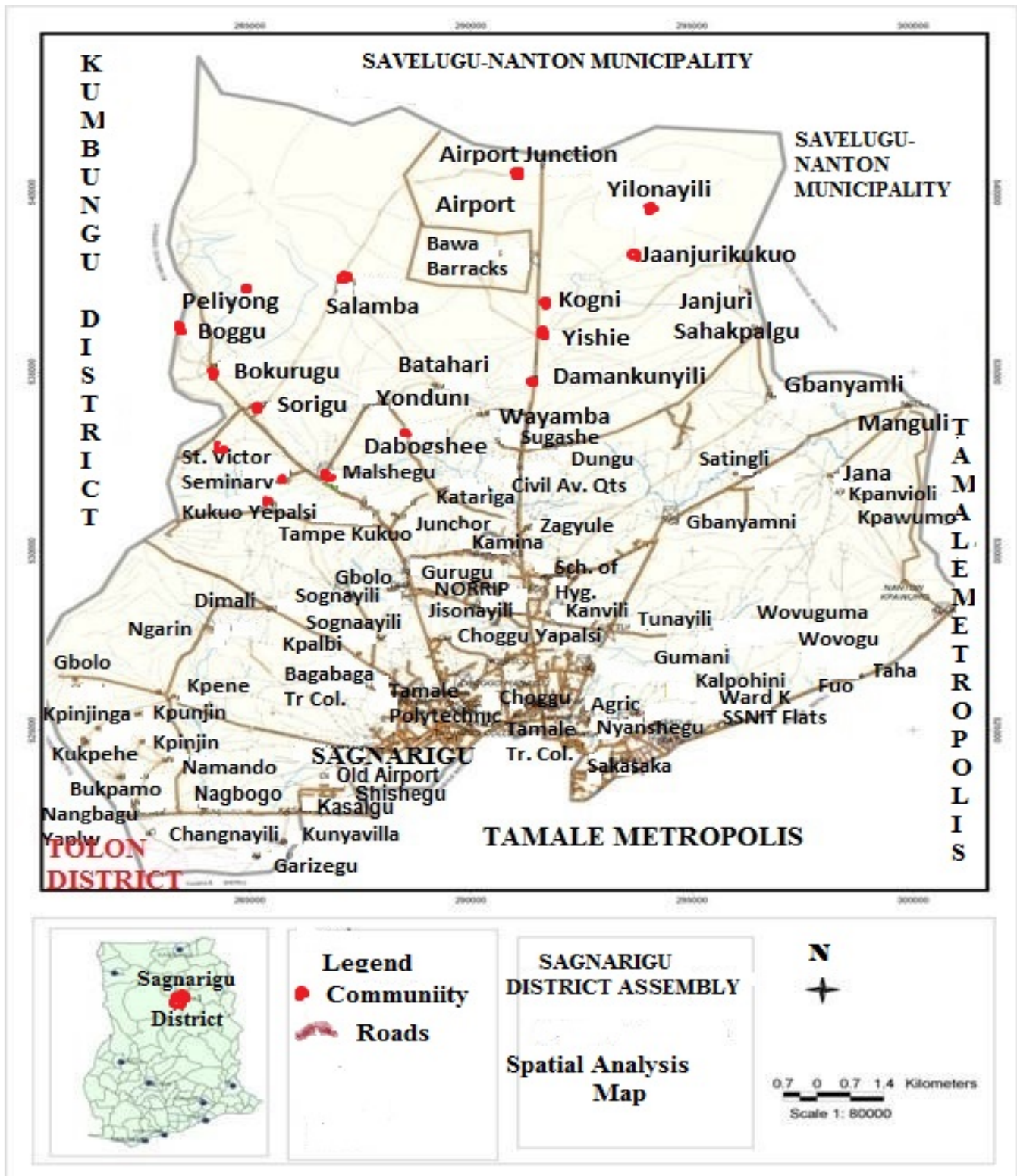


Figure 3.2: Map of Sagnarigu district (District assembly profile 2015)

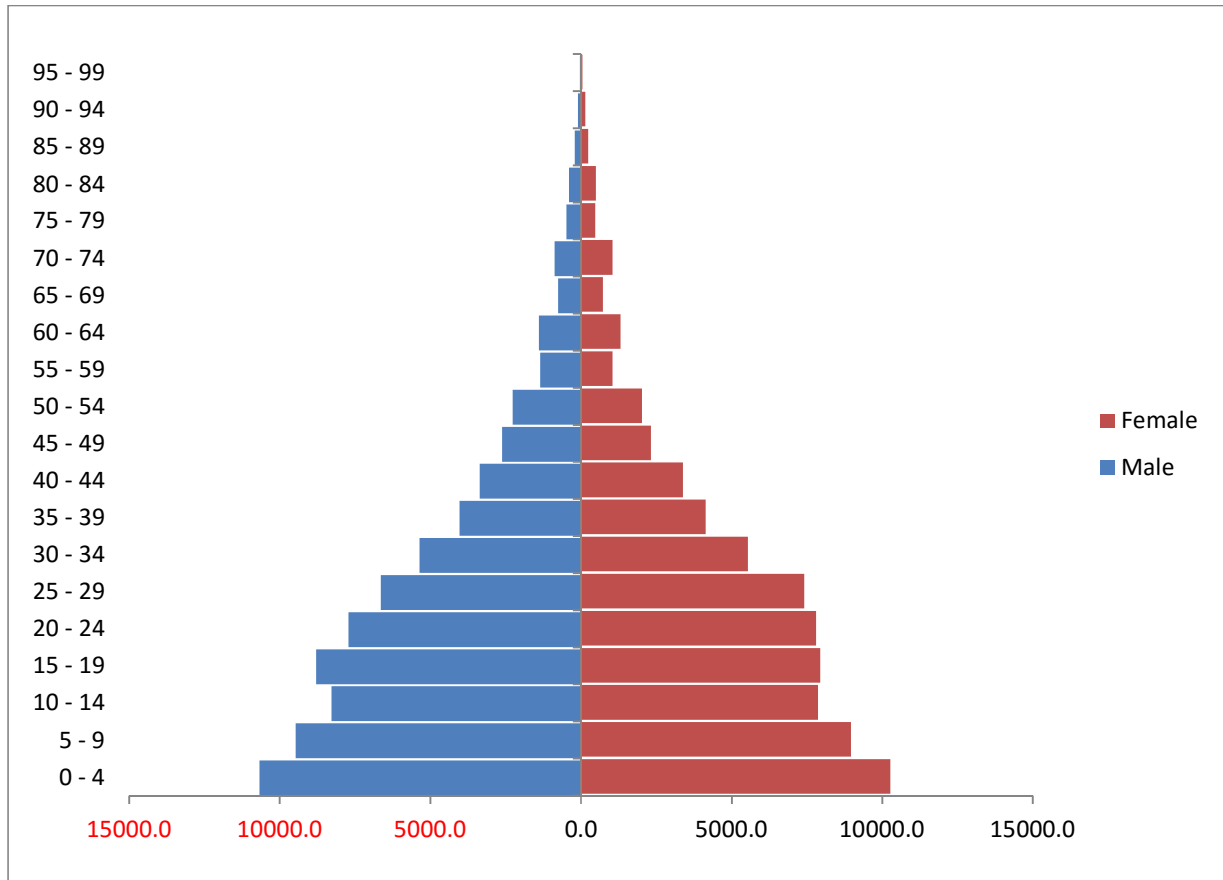
### **3.2.2 Population/Demography of the people**

The Northern Regions of the country have vast land cover with smaller population sizes.

According to the 2010 population and housing census, the Sagnarigu District has an estimated population of 148, 099 constituting 74,886 males representing 50.5% and 73,213 females representing 49.5%. The Sagnarigu district is inhabited by many ethnic groups; the dominant group however is the native Dagomba people. Other ethnic groups include Nanumbas, Gonjas, Mamprusi, Bimoba, Builsa, Dagartis, Wala, Frafra, Akans, Ewes and other northern ethnic groups. These groups practice various religions with Islam being the dominant religion of practice.

### **3.2.3 Population pyramid**

Figure 3 below shows that the District's population structure is broad at the base and narrows upwards as age group increases. The district's population is therefore more youthful in nature and has the potential of increasing the productive work force with time. However, it also implies greater provision of social amenities such as schools, water, health facilities, and recreational centers to cater for the youthful population.



**Figure 3.3: Population Pyramid of the Sagnarigu District**

Source: Ghana Statistical Service, 2010 Population and Housing Census.

### 3.2.4 Education

The total literate population of the district is 62,856 and the non-literate stands at 41,498. Out of this 38.6% can speak English only, (1.4%) Ghanaian Language only and (59.1%) English and Ghanaian language. The proportion of the population who can speak English only and are within the age group 11-14 years constituted 53.6 percent, Ghanaian Language only is 1.4 percent whiles English and Ghanaian Language account for 44.5 percent of the entire population (Sagnarigu district assembly profile 2015)



### **3.2.5 Health care**

#### **3.2.5.1 Health infrastructure.**

The formal health system in the Sagnarigu District has 20 functional facilities and 2 non-functional facilities. The facilities consist of 5 hospitals, 1 specialist facility, 3 health centres, 1 polyclinic, 4 clinics, 3 maternity homes, 3 community base planning and services (CHPS) compounds, and 1 nutrition centre. These facilities complement one another to deliver quality services to the people.

### **3.3 Study design**

A study design is procedural plan that is adopted in a study to answer questions validly, objectively, accurately and economically (Kumar, 2011). The study design was a descriptive cross-sectional survey. According to Gay & Airasian (2006), the descriptive survey is concerned with the conditions or relationships that exist, such as determining the nature of prevailing conditions, practices and attitudes; opinions that are held; processes that are going on; or trends that are developed. They also argue that it is only descriptive studies that lead to generalization beyond the given sample and situation. This type of study design was chosen because, considering the purpose of this study, the research questions and the target population, it is the most appropriate design that suits the aim/objectives of the study and to collect data from respondents.

Walker (1985) described descriptive survey as the type of study design that determines and report the way things are. This research design has a number of advantages. The design has the advantage of eliciting responses from a wide range of people. It involves asking the same set of questions to large number of individuals through mails, telephone and by hand on the basis of data gathered at a point in time. It is also appropriate when there is attempt to describe some aspects of a population by selecting unbiased samples of individuals who are asked to complete questionnaire, interview and test Silverman (2006).

The descriptive survey is not without weaknesses or disadvantages. Dey (2007) contended that errors and inadequacies of a survey research in education at many points appear the way problems are initially chosen and defined through the selection of population and sample to items construction and analysis of resulting data. Also, getting a sufficient number of the questionnaire completed and returned so that meaningful analysis can be made is another weakness of descriptive survey (Higgins, 1996). Despite these shortcomings, the descriptive design is most appropriate to providing answers to many research questions and achieving the purpose of the study.

### **3.4 Study population**

This refers to individuals, organization, groups or communities from which the required information about a research problem is obtained. In other words, it is the full set of individuals who could be included and around which the findings can be generalised. The target population for the study were people of Sagnarigu district and sample units were people between 15 and 40 years both male and females of the district. The sample was drawn specifically from Sagnarigu township with population of 2425 people, Sheshegu with the population of 5723, Gurugu with population of 3075 people and Jusonayili with the population of 4583 (Sagnarigu district profile 2015). The selection of this communities was done randomly (balloting) for better representation. The questionnaires were distributed proportionally according to the size of the communities to ensure proper representation. Thus; Sagnarigu (61), Sheshegu (145), Gurugu (78) and Jusonayili (116)

### 3.5 Sample size and sampling procedure

A sample is the selected subset of a population from which information is collected about a study. Sampling is the process of selecting subjects or individuals from the entire population of interest to be used for the study.

Using a sample size determination formula,  $N = \frac{Z^2 \times P \times Q}{d^2}$  (Coleman et al, 1996).

$$d^2$$

Where; N =sample size, Z= confidence level (95%=1.96), p = estimated prevalence of knowledge/attitude towards HBV (50% = 0.5)

d= margin of error (0.05), Q = (1-P) proportion of people without knowledge on the disease =1-0.5 =0.5

$$N = \frac{3.8416 \times 0.5 \times 0.5}{0.0025} = 384.$$

$$0.0025$$

Representative sample of 400 (16+384) was used from the population at confidence level of 95% and a margin of error 0.05 where the additional 16 represent possible non responses. These numbers of respondents were chosen based on the formula above.

A probability sampling method specifically systematic sampling was used to select the households. In each household, a maximum of 3 sample units were randomly selected. People who were willing to participate in the study were giving the questionnaire to answer at their own convenience. Those who could not read and write were interviewed using the questionnaire as a guide. People who were excluded within the study population were those who did not give their informed consent during the data collection. A proportionate sample of 61, 145, 78 and 116 participants were drawn

from Sagnarigu, Sheshegu, Gurugu and Jusonayily communities respectively for the study. The data collection period started from late April to middle May, 2016.

### **3.6 Research instrument**

The main instrument used for the data collection was a structured questionnaire with closed and open ended questions (Appendix). The instrument was chosen because of its simplicity, ability to save time and the possibility to make comparison as well as gather data from a group of people at ago. It is an appropriate tool for collecting quantitative and qualitative data about healthcare seeking behaviours. The data collection instrument was developed in line with the study objectives; thus, focusing on assessing the knowledge, attitude and perception of young adults in the Sagnarigu district about hepatitis B viral infection. The questionnaire was divided into five major sections made up of 37 items. Section A sought to know the respondents background information such as age, sex, educational level, occupation, ethnicity and religion. Section B basically talks about young adult's knowledge about hepatitis B. Section C talks about the attitude of young adults towards the spread of the disease hepatitis B as well as their attitude towards carriers of the disease. Section D talks about perception of young adults about hepatitis B virus infection, while the final section (E) has to do with ways of improving knowledge, attitude and perception of young adults about hepatitis B virus infection.

### **3.7 Variables of the study**

A variable is a property that can assume different values. The variables considered in this study included: Age group, sex of respondents, occupation, level of formal education, knowledge level, attitude and perception of participants about the hepatitis B virus infection.

**Table 3.1: Variables of the study**

VARIABLES	DEFINITION	DEPENDENT/INDEPENDENT
Age group	The age group a participant fall within with reference to his/her date of birth.	Independent
Sex	Biological in terms of male and female.	Independent
Educational level	Educational attainment of participant in terms of primary, JHS, SHS and Tertiary.	Independent
Occupation	Usual work done by participant on day to day basis.	Independent
Knowledge level	Ability of the participant to identify cardinal signs/symptoms, major route of transmission, preventive measures and consequences of the HBV infection	Dependent
Attitude	Participants practices and behavior towards the HBV	Dependent
Perception	Participant beliefs or feelings about the HBV infection	Dependent

### **3.8 Data collection procedures**

A probability sampling method specifically systematic sampling was used to select the households. In each household, a maximum of 3 sample units were randomly selected. People who were excluded within the study population were those who did not give their informed consent during the data collection. After the selection process, a vivid explanation was made to the people sampled for the study, the purpose of the research as well explained to them as well as their right to opt out of the study if they so wish and the need for them to answer the questions individually. The study participants were also assured of confidentiality and that, the data will not be released for any other purpose apart from the purpose it was meant for. After the explanation, the questionnaires were personally administered to the respondents. They were given 30 minutes to respond to the

questions after which the questionnaires were collected back from them. Those who could not read and write were interviewed using the questionnaire as a guide. Data was checked for completeness and validity of information once questionnaires were collected. This was done to check for missing data and correct mistakes in order to avoid deviations and errors in the data collected. The corrected data sheets were serially numbered. The checked questionnaires were kept for data processing and analysis.

### **3.9 Data analysis**

Data was entered, processed and analysed using SPSS for windows version 21.0 and transpose into word excels 2013. After entry, the data was cleaned by running the raw statistics, filling in the missing value to ensure completeness of the data entry. Logistic regression was run to compare variables for significant, Odds ratios (OR) at 95% confidence intervals (CIs) was carried out to test association between certain variables to establish any significance or otherwise. Also Chi-square test was computed and the association was considered as significant at a  $P$ -value  $\leq 0.05$  as the criterion for statistical significance. To measure the level of knowledge on HBV infection and attitude as well as perception of respondents towards the infection, a scale of 0-12 was used for the knowledge and 0-5 for each of attitude and perception. The scale for knowledge was wider (0-12) than that of attitude and perception (0-5) because, questions related to knowledge were more than that of attitude and perception. A score of 1 was awarded for a correctly answered question and 0 for a wrongly answered question by respondents. Respondent was considered to have high knowledge on the HBV infection if he/she scores 8 and above, average if the score is 6-7 and low if the score was below 6 out of the 12 questions on the knowledge aspect of the questionnaire. Thus the rating been 0-5 implies low knowledge, 6-7 indicates average knowledge and 8-12

signifies high knowledge. For attitude and perception, the rating is as follows; 0-2 indicates poor attitude or negative perception, 3 signifies average or mixed feelings (neither negative nor positive) and 4-5 implying good or positive attitude/perception (Likerts scale, [www.typform.com](http://www.typform.com))

### **3.10 Quality control**

1. Data collected in the field was double checked to ensure that, all the information required was captured and recorded.
2. In a situation where a questionnaire was not properly filled, it had to be re-administered on the respondent by tracing the participant via his or her phone number.
3. Data security was maintained by entering the data on a personal computer with a password.
4. To ensure the quality of data entered, another person was made to independently crosscheck each entry

### **3.11 Ethical consideration**

Ethical clearance was sought from the Joint School of Medicine and Health Sciences/School of Allied Health Sciences Review Board of University for Development Studies, Tamale. Introductory letter was obtained from the School and the Head of department of Community Health. Informed consent was sought from the respondents of the study. They were assured of confidentiality of their responses. In addition, they were assured that their participation would not affect the relations with health institutions now or in the future and that refusal to participate would not attract any penalty. Permission was sought from the District Health Directorate and Opinion

Leaders before the commencement of the study. The questionnaires were anonymous and did not require any identity and all data were kept confidential.

### **3.12 Delimitation**

There are several dimensions of HBV infection that call for investigation. However, this study focuses, among others, the knowledge or awareness of HBV infection, perception on HBV infection, attitude/ practices towards HBV infections, as well as strategies to improve the knowledge, attitude and perception of young adults about Hepatitis B infection in the Sagnarigu district of Northern region.

### **3.13 Validity and reliability**

For the purpose of validity, the content of the questionnaire reflects the objective of the study. Appropriate literature review was ensured. Reliability was ensured through the explanation of terms and concepts in clear and understanding form, collection of the right information and usage of systematic methodology.

### **3.14 Pretesting**

The study questionnaires were piloted in a similar district to identify areas that need to be corrected in order to make the necessary changes before going to the study area for the data collection. Thus; corrections were made before administering the questionnaire in the study area.



## CHAPTER FOUR

### 4.0 Results

#### 4.1 Introduction

This chapter presents the analysis of the data that was collected from the respondents. It is presented largely descriptively in the form of tables. The results is organized into five thematic areas comprising; demographic characteristics of respondents, knowledge of respondents concerning Hepatitis B Viral infection, attitude / practice of respondents towards Hepatitis B Virus infection, perception of Hepatitis B Virus infection among respondents and ways of improving knowledge, attitude and perception of respondents towards Hepatitis B Virus infection.

#### 4.2 Socio-demographic data of respondents

A total of 400 participants were recruited for the study at the study area. Majority 234 (58.5%) of the respondents were males (Table 4.2). Majority of the respondents 255 (64%) were  $\leq 25$  years whilst the rest were above 25 (Table 4.2).

From the findings it was observed that, majority 200(50%) were students with most 140 (35%) of them been tertiary students. Meanwhile 54 (14%) respondents indicated that they had no form of formal education (Table 4.2).

The analyses indicates that, majority (22%) of the participants were traders and the rest engaged in teaching and public service, whilst 52 (13%) were unemployed. The results also showed that most of the study participants 264 (66%) were of the Islamic faith with majority 225 (56%) being Dagombas (Table 4.2).

**Table 4.2: Demographic characteristics of respondents**

<b>Socio-demographic variables</b>		<b>Frequency(n) (%)</b>
Sex of respondents	Male	234 (58.5)
	Female	166 (41.5)
Age of respondents in years	≤25	255 (64)
	26-40	145 (36)
Occupation of respondents	Formal	61 (15)
	Traders	87 (22)
	Students	200 (50)
	Unemployed	52 (13)
Educational level of respondents	Primary	12 (3)
	JHS	77 (19)
	SHS	117 (29)
	Tertiary	140 (35)
	No formal education	54 (14)
Ethnicity of respondents	Dagomba	225 (56)
	Gonja	63 (16)
	Mampurisi	38 (9)
	Builsa	74 (19)
Religious affiliation	Christianity	126 (32)
	Islam	264 (66)
	African Traditional Religions	10 (2)

**Source: Field survey, 2016**

### 4.3 Knowledge of Hepatitis B Viral infection

In this study, participants were asked whether they have ever heard of HBV infection before, 356 (89%) said yes (Table 4.3). Prevention is considered as one best way to safeguard populations' health. Prevention against any disease is proportional to knowledge and practice of the population and is reflective of the importance that is paid to health related issues by the society. Study participants mentioned the sources of their knowledge with vast majority 136 (34%) of them mentioning the mass media while 128 (32%), 76 (19%) and 60 (15%) study participants identifying the School, health facilities and their friends respectively (Table 4.3). As at the time of the study, the findings showed that 153 (38%) study participants did not know whether HBV infection can be inherited from parents or not while 118 (30%) were of the view that HBV infection can be inherited (Table 4.3). Among the subjects enrolled in the study majority 156 (39%) said people cannot get HBV infection from the air while 105 (26%) participants said they do not know whether it can be gotten from air or not (Table 4.3).

Continual transmission of this disease could be attributed to the following reasons including: missing of opportunities for prevention, lack of awareness about their prevalence and prevention (vaccination) and poor knowledge on mode of transmission of HBV infection especially among those at risk. On the issue of whether people can get HBV infection through sexual relationships, findings from this study showed that, 68 (17%) could not tell whether it can be transmitted through sexual relationship or not whilst 285 (71%) said people can get HBV infection through sexual intercourse (Table 4.3).

It was also observed from the current study that, 179 (45%) of the study subjects said people can get HBV infection during birth while 122 (30%) subjects not being able to tell (Table 4.3).

Findings also showed that, most (70.5%) of the respondents knew the signs of HBV to include; fever, weakness, jaundice (yellowish coloration of the eyes) and right side abdominal pains with 104 (26%) stating they do not know the signs and symptoms of HBV (Table 4.3).

**Table 4.3: Knowledge of Hepatitis B Viral infection**

Variables		n (%)
Heard of HBV infection	Yes	356 (89)
	No	44 (11)
Sources of information on HBV	School	128 (32)
	Health centers	76 (19)
	Media	136 (34)
	Friends	60 (15)
Do people get HBV from genes	Yes	118 (30)
	No	129 (32)
	Do not know	153 (38)
HBV infection through the air	Yes	139 (35)
	No	156 (39)
	Do not know	105 (26)
HBV infection through sex	Yes	285 (71)
	No	47 (12)
	Do not know	68 (17)
HBV infection through birth	Yes	179 (45)
	No	99 (25)
	Do not know	122 (30)
Signs/symptoms of HBV like jaundice, fever, abdominal pains, dizziness etc	Yes	282 (70.5)
	No	14 (3.5)
	Don't know	104 (26)

**Source: Field survey, 2016**

The findings showed that, nearly half 187 (47%) of the subjects said people can get HBV infection by sharing spoons or bowls for food, while 68 (18%) subjects said they could not tell whether people can get HBV infection by sharing spoons or bowls for food (Table 4.4). The study revealed that majority (75%) subjects said people can get HBV by sharing a toothbrush with an infected person, while 58 (14%) said they do not know whether people can get HBV infection by sharing a toothbrush with an infected person or not (Table 4.4).

Majority 299 (75%) said “YES” to the statement that HBV causes liver cancer and 58 (14%) said they do not know whether HBV infection causes liver cancer or not (Table 4.4). It was also observed in the study that, 271 (68%) subjects said a person infected with HBV infection who looks healthy can still spread the infection to others, while 79 (20%) said they do not know whether if someone is infected with hepatitis B infection and looks or feels healthy, that person can still spread the hepatitis B Virus or not (Table 4.4). It was revealed that 231 (58%) respondents said hepatitis B virus is more deadly than HIV and 95 (24%) respondents said they do not know.

**Table 4.4: Knowledge on mode of transmission of HBV infection and related issues**

<b>Variables</b>		<b>n (%)</b>
HBV and sharing of spoons	Yes	187 (47)
	No	145 (35)
	Do not know	68 (18)
HBV and sharing of tooth brush	Yes	299 (75)
	No	43 (11)
	Do not know	58 (14)
HBV infection and liver cancer	Yes	299 (75)
	No	43(11)
	Do not know	58 (14)
Healthy person and transmission of HBV	Yes	271 (68)
	No	50 (12)
	Do not know	79 (20)
HBV infection more deadly than HIV	Yes	231 (58)
	No	74 (18)
	Do not know	95 (24)

**Source: Field survey, 2016**

#### 4.3.1 Rating respondents level of knowledge on HBV infection

Respondents were rated according to their responses to the questions pertaining to knowledge, (Table 4.5), Majority, 270 (67.5%) of the respondents scored between the range of 8-12 indicating high knowledge, followed by 66 (16.5%) falling within the range of 0-6 signifying low knowledge and 64 (16%) scoring between 6-7 implying average knowledge

*Table 4.5: Rating of respondents' level of knowledge on HBV infection*

Variable/Scale	Frequencies(n)	Percentages (%)
Knowledge		
0-6 (Low)	66	16.5
6-7 (Average)	64	16
8-12 (High)	270	67.5
Total	400	100

**Source: Field survey, 2016**



#### **4.4 Attitude or Practices of People towards Hepatitis B Virus Infection**

On assessing the attitude of subjects towards HBV infection, 317 (79%) said they have ever heard of HBV vaccine before while 18 (5%) could not tell whether they have ever heard of HBV infection vaccine (Table 4.6).

Fortunately, hepatitis B virus infection is largely preventable by hepatitis B vaccine which is 95% effective in preventing such disease and its chronic consequences. Transmission of infection is rare among persons who have been immunized. Analysis also revealed that a vast majority 310 (78%) of the subjects said healthy people need the HBV vaccine while 54 (13%) of the subjects could not tell whether healthy people need the vaccine or not (Table 4. 6).

It was also revealed from the study that, 350 (87.5%) said they were willing to take the vaccine, whilst 10 (2.5%) respondents said they do not know whether they will go for the HBV vaccine or not (Table 4. 6).

Majority of those interviewed 234 (58.5%) indicated that they have not taken the HBV vaccine before while 12 (3%) said they do not know whether they have taken the HBV infection vaccine before (Table 4. 6). With regards to whether subjects will like to eat, sleep or shake hands with a person infected with hepatitis B virus infection, 219 (55%) respondents said no while 28 (7%) respondents said they do not know whether they would eat or sleep with a person infected with HBV (Table 4. 6).

**Table 4.6: Attitude towards HBV infection**

<b>Variables</b>		<b>n (%)</b>
Heard of HBV vaccine before	Yes	317 (79)
	No	65 (16)
	Do not know	18 (5)
Healthy People and HBV vaccine	Yes	310 (78)
	No	36 (9)
	Do not know	54 (13)
Willing for HBV vaccine	Yes	350 (87.5)
	No	40 (10)
	Do not know	10 (2.5)
Vaccinated against HBV	Yes	154 (38.5)
	No	234 (58.5)
	Do not know	12 (3)
Eat and sleep with infected person	Yes	153 (38)
	No	219 (55)
	Do not know	28 (7)

**Source: Field survey, 2016**

Among respondents who had ever received the HBV vaccine, majority of the them 92 (59.7%) said they took the vaccine from the hospital, 28 (18.2%) mentioned the School, 24 (15.6%) from health workers at their homes whilst 10 (6.5%) said they took it at the pharmacy (Table 4. 7). Study subjects were further asked to indicate the number of doses received, 103 (67%) said they have received the three doses of the vaccine, 35 (23%) said they have received two doses of the vaccine, 16 (10%) said they have received one dose of the vaccine whilst 246 said they have never receive the vaccine (Table 4.7). Among subjects who said they have never taken the HBV vaccines, majority of the respondents 106 (43.1%) mentioned that the HBV infection vaccine is too costly, 84 (34.1%) said they were not aware of the HBV vaccine, 49 (20%) said they were not at risk of getting HBV infection whilst 6 (2.8%) said they do not believe in the HBV infection vaccine (Table 4. 7).

**Table 4.7: Vaccine uptake among subjects**

<b>Variables</b>		<b>n (%)</b>
Facility subjects took vaccine	Pharmacy shop	10 (6.5)
	Health worker at homes	24 (15.6)
	Hospital	92 (59.7)
	School	28 (18.2)
Number of doses of HBV	Never received	246 (61.5)
	One dose	16 (10)
	Two doses	35 (23)
	Three doses	103 (67)
Reasons for not taking vaccine	I am not at risk for getting HBV	49 (20)
	I do not believe in the HB vaccine	7 (2.8)
	I think HB vaccine cost too much	106 (43.1)
	I am not aware of the vaccine	84 (34.1)

**Source: Field survey, 2016**

In table 4. 7, it is seen that, only one hundred and fifty four 154 (38.5%) respondents took the hepatitis B virus vaccine, hence the number of total doses received adding up to 154 and not 400. Also, the reasons for not taking vaccine add up to 246 (61.5%) and not 400, since this number did not take part in the hepatitis B virus infection vaccine.

#### 4.4.1 Rating of respondents level of attitude towards HBV infection

Respondents were asked series of questions in relation to their attitude towards the hepatitis B virus infection (Table 4. 6). As shown in table 4.7, most of the respondents 198 (49.5%) score an average mark of 3, indicating average attitude and 104 (26%) of the participant fell within the range of 4-5 signifying positive or good attitude, while the least number of respondents, 98 (24.5%) being within the range of 0-2 score implying poor attitude towards the condition.

**Table 4.8: Rating of respondents' level of attitude towards HBV infection**

Variable/Scale	Frequencies (n)	Percentages (%)
Attitude		
0-2(Poor)	98	24.5
3(Average)	198	49.5
4-5(Good/positive)	104	26
Total	400	100

**Source: Field survey, 2016**

#### **4.5 Perception of Hepatitis B Virus Infection**

Worldwide, hepatitis B infection is one of the major public health problems and is the tenth leading cause of death. It has become one of the most important infectious diseases all over the world, especially in developing countries. Perception of people about HBV infection has always received mixed feelings. From the results it was observed that 198 (49.5%) said there is an efficient treatment for hepatitis B virus infection whilst 106 (26.5%) could not tell whether there is an efficient treatment for hepatitis B virus infection or not (Table 4. 9).

Findings also revealed that 219 (54.8%) said persons infected with the HBV should be isolated from other people to prevent them from infecting others, whilst 50 (12.5%) could not tell whether persons infected with HBV infection should be isolated from other people or not (Table 4. 9). It was also observed in the study that, majority of the respondents 184 (46%) said regular exercise and eating healthy food can prevent hepatitis B virus infection whilst 96 (24%) could not tell whether regular exercise and eating healthy food can prevent hepatitis B virus infection or not (Table 4. 9)

**Table 4.9: Perception of subjects on HBV infection**

<b>Variables</b>		<b>n (%)</b>
Efficient treatment of HBV	Yes	198 (49.5)
	No	96 (24)
	Do not know	106 (26.5)
Isolation of person infected with HBV	Yes	219 (54.8)
	No	131 (32.7)
	Do not know	50 (12.5)
Prevention of HBV by exercise and eating healthy food.	Yes	184 (46)
	No	120 (30)
	Do not know	96 (24)

**Source: Field Survey, 201**

#### **4.5.1 Rating respondents' level of perception about HBV infection.**

Respondents were asked questions in relation to their perception about hepatitis B virus infection (Table 4.10), and the responses were rated accordingly. Out of the 400 participants, 162 (40.5%) scored between 0-2 indicating bad or negative perception and 160 (40%) scoring 4-5, implying good or positive perception. With the rest, 78 (19.5%) scored 3, signifying average perception about the disease (Table 4.10).

***Table 4.10: Rating respondents' level of perception about HBV infection***

Variable/Scale	Frequencies (n)	Percentages (%)
Perception		
0-2 (Bad/negative)	162	40.5
3 (Average)	78	19.5
4-5 (Good or positive)	160	40
Total	400	100

**Source: Field Survey, 2016**



#### **4.6 Ways of Improving knowledge, Attitude and Perception towards Hepatitis B virus infection**

Results from the study revealed that 380 (95%) said educating the public on hepatitis B viral infection can improve their knowledge on the disease whilst 8 (2%) could not tell whether educating the public on hepatitis B viral infection can improve their knowledge on the disease or not (Table 4.11). With regards to whether provision of information by giving leaflets, flyers and posters on the condition could help improve the public knowledge on HBV infection, 350 (87.5%) respondents said “YES”, whilst 32 ( 8%) could not tell (Table 4.11).

Analysis of results also revealed that 332 (83%) said letting people know the benefits of early screening for the condition could help improve their attitude towards HBV infection whilst 47 (12%) could not tell whether letting people know the benefits of early screening for the condition would help improve their attitude towards HBV infection (Table 4.11).

Additionally, 270 (67%) said the attitude of people towards the HBV infection would improve by making them aware that HBV infection is not transmitted through handshake and mere conversation with infected person whilst 68 (17%) could not tell whether the attitude of people towards the HBV infection can be improved by making them aware that, it is not transmitted through handshake and mere conversation with infected person or not (Table 4.11).

Most of the study subjects, 328 (82%) noted that, people perception about the condition would change if they are made aware that, there is effective treatment for the disease whiles 52 (13%) could not tell whether people perception about the condition would change if they are made aware that, there is effective treatment for the disease (Table 4.11).

**Table 4.11: Improving knowledge, Attitude and Perception on HBV infection**

<b>Variables</b>		<b>n (%)</b>
Public education on HBV	Yes	380 (95)
	No	12 (3)
	Do not know	8 (2)
Provision of leaflets and flyers	Yes	350 (87.5)
	No	18 (4.5)
	Do not know	32 (8.0)
Providing screening for people	Yes	332 (83)
	No	21 (5)
	Do not know	47 (12)
Conversation, handshake and Attitude of people towards HBV	Yes	270 (67)
	No	62 (16)
	Do not know	68 (17)
Awareness of efficient treatment of HBV infection and attitude	Yes	328 (82)
	No	20 (5)
	Do not know	52 (13)

**Source: Field Survey, 2016**

#### 4.7 Other ways of improving attitude and perception about HBV infection

Subjects were asked to suggest other ways of improving people attitude and perception about the hepatitis B virus infection. Relating to that, most 266 (66%) of them mentioned public education about the HBV infection, 91 (23%) respondents had no idea, 19 (5%) said going in for the vaccination, 6 (2%) said making the drugs (vaccine) available and affordable, 5 (1%) stated avoid using contaminated instrument, another 5(1%) mention going to health facility early, 4 (1%) said through prayer, 2 (0.5%) each mentioned giving proper attention to the disease by health authorities, and motivating those who present themselves for early screening (Table 4.12).

**Table 4.12: Other ways of improving attitude and perception about HBV infection**

<b>Variables</b>	<b>n (%)</b>
Public education	266 (66)
No idea	91 (23)
Going in for vaccination	19 (5)
Making the drug available and affordable	6 (2)
Avoid using contaminated instruments	5 (1)
Going to the health facility early	5 (1)
Through prayers	4 (1)
Motivating those who present themselves for screening	2 (0.5)
Giving proper attention to the disease	2 (0.5)

**Source: Field Survey, 2016**

#### **4.8 Socio-demographic characteristics and their relationship with knowledge, attitude and perception on Hepatitis B virus infection**

Demographic factors and their association with knowledge, attitude and perception on hepatitis B virus infection were investigated. The demographic factors were age, sex and occupation. Logistic regression analysis and Chi-square test ( $X^2$ ) were used to test for significant relationships. The findings of this study showed no significant associations between respondents age and willing to test for hepatitis B virus infection ( $X^2 = 1.131$ ;  $p = 0.204$ ). However, finding from the study showed that, a significant relationship exists between age and uptake of hepatitis B virus vaccine ( $X^2 = 0.003$ ;  $p = 0.001$ ). The findings of this study also showed a significant association between respondents' occupation and willing to test for hepatitis B virus infection ( $X^2 = 0.005$ ;  $p = 0.004$ ). The study did not reveal any association between respondents' educational level and willingness to take the hepatitis B virus vaccine ( $X^2 = 1.221$ ;  $p = 1.222$ ). The study could not establish any strong link between sex and willingness to test for hepatitis B virus infection ( $X^2 = 5.332$ ;  $p = 0.443$ ). Respondents with different occupational background were found not to be significant concerning their knowledge on hepatitis B virus infection ( $X^2 = 6.034$ ;  $p = 0.448$ ).

Findings from the study also revealed that, those who aged 25 years and above were 4 times more likely to go for the hepatitis B virus screening compared to those who aged below 25 years (OR = 4.12; 95% CI: 0.1– 1.6;  $p = 0.834$ ), Table 4.13.

It was also revealed from the current study that, females were one time more likely to go for HBV infection screening as compared to the male counterparts (OR = 1.36; 95% CI: 0.1– 1.6;  $p = 0.236$ ) in Table 4.13.

Additionally, respondents who were employed in the formal sector were one time more likely to show good attitude towards hepatitis B virus infection and good knowledge on the mode of transmission of the hepatitis B virus infection as compared to those working in the informal sector (OR = 1.23; 95% CI: 1.7– 17.6; p= 0.000), Table 4.13.

Moreover, from the study, respondents who had formal education were 4 time more likely to show good attitude towards hepatitis B virus infection as they are willing to be tested as compared to those who had no educational background (OR = 4.23; 95% CI: 0.7– 7.0; p = 0.002), Table 4.13.

**Table 4.13: Socio-demographic characteristics and their relationship with knowledge, attitude and perception on Hepatitis B virus infection**

<b>Independent variables</b>	<b>Dependent variables</b>	<b>P – values</b>	<b>Odds ratio (OR)</b>	<b>95% Confidence interval</b>
Age (> 25 years: < 25 years)	Willing for HBV infection test	0.834	4.12	0.1- 1.6
Sex (female; male)	Willing for HBV infection test	0.236	1.36	0.1- 1.6
Occupation (formal sector; informal sector)	Willing for HBV infection test/mode of transmission	0.000	1.23	1.7- 17.6
Education (educated & non-educated)	Willing for HBV infection test	0.002	4.23	0.7-7.0

**Source: Field data, 2016**

## CHAPTER FIVE

### 5.0 Discussion of findings and results

#### 5.1 Introduction

This chapter consists of the discussion of the findings and results from the study. It involves comparison of the findings and results with other studies on the hepatitis B virus infection. They include: demographic characteristic of respondents, knowledge about hepatitis B virus infection, attitude and perception about hepatitis B virus infection as well as ways of improving perception and attitude of people towards hepatitis B virus infection.

#### 5.2 Demographic characteristics

Finding from the study showed that, Majority (64%) of the respondents were between the ages of 15-25 years. This findings could be attributed to the fact that the population pyramid of the district has higher population at the base between age 0-20 years and less population from the middle towards the pick thus; 40 years and above) (Ghana Statistical Service, 2010 Population and Housing Census). Majority of the respondents falling within the ages of 15-25 years is not surprising in the study since it is in line with the district population pyramid with the higher population among the target group (15-40 years) (Sagnarigu district profile, 2015). Also, in the national population pyramid, the age range of 15-25 years is more populated than those above 25 years, that is; high population at the base and less at the pick (Ghana Statistical Service, 2010 Population and Housing Census).

Majority (58.5%) of the respondents were males. The low female population in the study could be due to the fact that most females could have been engaged in household chores and other trading

activities hence could not participate in the exercise. Results from the study further revealed that majority (50%) of the respondents were students with most (35%) of them attaining tertiary status.

The results also showed that, most of the respondents (66%) were of the Islamic faith with Dagombas being the dominant ethnic group among them. The greater portion of the participants beign Dagombas could also be related to the fact that the district has most of its residents being Dagombas since it is an indigenous Dagomba land.



### 5.3 Knowledge of respondents on hepatitis B virus infection

According to the World Health Organization (WHO, 2012), hepatitis B is the world's most common liver infection, which is caused by a DNA-virus, the hepatitis B virus (HBV). The virus is highly contagious, 50-100 times more infectious than HIV, and is transmitted between people through blood, semen, vaginal fluids and mucous membranes. There are more than 2 billion people world-wide having evidence of recent or past HBV infection and 350 million are chronic carriers. The secret killer hepatitis B, though a major threat to health globally, is yet to catch the attention of health institutions, policy makers, the general public and decision makers in Ghana. It is important that people be made aware of the disease so they can take measures to prevent themselves from contracting the condition because poor knowledge concerning prevention of HBV infection is associated with increased occupational and daily risk.

Prevention is considered as one best way to safeguard populations' health. Prevention against any disease is proportional to knowledge and practice of the population and is reflective of the importance that is paid to health related issues by the society.

Findings from the study revealed that majority of the respondents (89%) were aware of HBV infection. The major source of information about Hepatitis B Virus (HBV) infection was the media (34%). This could be due to the fact that most young people are more interested in exploring the media as source of information than any other source. There was also a high level of knowledge among respondents on HBV infection as majority of the respondents (67.5%) scored within the range of 8-12 in an average of 10 out of 12 questions on knowledge correctly.

These findings correlate with other studies. Burnett et al., (2005) for instance examined the knowledge of HBV and liver cancer among 256 Vietnamese Americans. Their results (Burnett. et al., 2005) showed that the participants had general knowledge of HBV, with more than half of the

respondents answering correctly questions related to knowledge on hepatitis B virus infection. Similarly, Hwang, Huang and Yi (2010) found that about 87% of respondents had heard about HBV before and had significantly greater knowledge compared to those who had not heard about the disease. Again, Morow et al., (2012) found that about half of respondents knew that HBV could spread by unprotected sex.

The current study is also in line with study conducted by Boakye (2014) on knowledge about the hepatitis B virus infection among students of Dunkwa-on-offine in Ghana, This study by Boakye (2014) revealed high knowledge about the disease among the students. The current study however; differ from the finding of Boakye (2014) with respect to unprotected sex as a route of transmission ,since 72% of respondents from the current study indicated unprotected sex as a route of transmission against only 20% in the study by Boakye (2014). The correlation of high/good knowledge on the disease in the current study and that of the other studies could be attributed to some level of health education on the condition worldwide. The current study is however, in contrary to Ali Abdulai et al., (2016) study which sought to assess knowledge and awareness among pregnant women at the antenatal clinic in Kintampo north municipality. Their (Ali Abdulai et al., 2016) study revealed low level of knowledge and awareness among the women. This variation could be due to the fact that, young adults are more likely to be interested in seeking information than pregnant women. The study therefore supports the notion that, there is relatively high knowledge about the disease among the public in Sagnarigu district. This high level of knowledge among respondents could be attributed to the health talks that are sometimes carried out in some radio/TV stations, churches/mosques and schools. It is expected that, the high level of knowledge about hepatitis B virus infection among respondents in the various studies, will reflect

in the incidence and prevalence rate of the condition by reducing the rates of infection. However, the prevalence rate is rather high as indicated in the literature review reported by other studies, (GHS,2009: WHO,2009). Could this be attributed to other factors like poor attitude towards the HBV infection? since knowledge, though necessary, but not sufficient enough to change one's behavior towards something. People may be knowledgeable about a particular risk behavior but may still go ahead to do it.

Respondents' knowledge was also determined using different scores in different categories such as; age, sex, educational levels and occupation. It was observed that, respondents who were employed in the formal sector were 4 time more likely to show good knowledge on the mode of transmission of the HBV infection as compared to those working in the informal sector (OR = 1.23; 95% CI: 1.7– 17.6; p = 0.000) (Table 13). This could probably suggest that, those people might have been well informed on the HBV infections. This finding is at variance with a study carried out in China (Chao et al., 2010). Chao et al., 2010, investigated the knowledge about HBV among 250 health professionals by handing out a questionnaire at the “China national conference on the prevention and control of viral hepatitis”. The results showed that even among highly educated health professionals the knowledge on the disease was deficient. One-third of the respondents did not know that it is common for chronic HBV infection to be asymptomatic or that it can lead to liver cancer, liver cirrhosis and premature death

There was no significant difference in knowledge/attitude score for respondents in different sex category. This finding is at variance with a study by Hwang, Huang and Yi (2010) to investigate knowledge about HBV and predictors of HBV vaccination among 251 Vietnamese American

college students which revealed that, there was high knowledge among the females than their male counterparts.

Respondents with formal educational background were more likely to have good knowledge on the mode of transmission than their counterparts without formal education. This finding was in consistence with a study by Muhamed et al., (2012) which found that factors associated with greater knowledge about HBV are high educational level or employment in professional jobs. The consistence of this study with Muhamed et al., (2012) could be attributed to the fact that, formal education is a key factor in acquiring knowledge.

#### 5.4 Attitude of respondents on hepatitis B virus infection

Results from this study showed that, people attitude towards Hepatitis B Virus infection is average. They indicated that healthy people need vaccination against HBV (78%), and thought that people of their own age need vaccination. Most of the people (87.5%) were also willing to be tested for Hepatitis B Virus infection. These findings from the current study disagrees with results from a study conducted by Zanetti et al, (2008) in the United State of America (USA), which showed that respondents were reluctant to be vaccinated as they fear plasma-derived vaccine which contains attenuated HBV virus. This variation could be due to the level of information received about hepatitis B and the vaccine by the respective participants of the two studies.

The current study, however, agrees with that of Boakye's (2014) study which indicated that majority of the respondents (90%) were willing be tested for the hepatitis B Virus infection and also about 80% of the respondents from his study said healthy people need the vaccination against the disease.

Despite the average attitude of the people towards HBV infection, only 38% of them had ever been vaccinated against the disease, which was low and also corresponds with Boakye, (2014) which indicated low uptake of the vaccine despite high interest or willingness to be tested for and go for the vaccine. The main reasons stated for not taking part in the HBV infection vaccination was that, majority of the people (43.1%) think the Hepatitis B vaccine cost too much, and others do not believe in the Hepatitis B vaccine (2.8%) amongst others.

Similarly, a study carried out in the U.S.A. among Vietnamese-Americans by Nguyen et al. (2010) found that only 26.5% reported that they had been vaccinated against HBV. In Sweden despite the

availability of free vaccine, seventy six percent (76%) Health Care Workers were not vaccinated; they either forgot or never made appointment for vaccination (Dannetun et al., 2006). Another study that was conducted in Saudi Arabia showed a low immunization uptake among dental staff despite their knowledge and availability of the vaccine (Goldstein et al., 2006). The low uptake of the vaccine in the current and other previous studies could be associated with inadequate information on the benefits of the vaccine and the consequences of getting the disease by participants in those studies.

However, other studies have found a high practice of HBV vaccination uptake. Studies conducted in Iran and Egypt found high uptake of free vaccine among young surgeons (Yayehyirad et al., 2009; Zanetti et al., 2008). Therefore findings from this study suggest that, people attitude towards the disease is not the best since there is low uptake of the vaccine despite the high knowledge on the disease and willingness to be tested for the disease. The findings therefore supports the hypothesis that, people attitude towards hepatitis B is not encouraging. From the findings, one could deduce that, the average attitude of people towards the condition could be due to lack of information on the benefit of the HBV vaccine and the consequences of getting the disease. The low uptake of the HBV vaccine could have negative impact on the society which implies that, the society is at risk since those with infection can easily transmit it to those who are not protected with vaccine. This will subsequently affect the development of the nation for that matter, the society since a nation or society without good health cannot develop.

In addition, some demographic factors and their association with knowledge, attitude and perception on HBV infection were investigated and these factors include; age, sex, occupation and

education. The findings of this study showed no significant associations between respondents' age and willing to test for HBV infection. However, finding from the current study showed that, a significant relationship exist between age and uptake of HBV vaccine. The findings of this study also showed a significant association between respondents' occupation and willing to test for HBV infection. The relationship between age as well as occupation and uptake of the vaccine could suggest that, the people might have been well informed about the benefit of the vaccine and the consequences of getting the HBV infection, which could of influence their decision to go for the screening and the vaccine.

### **5.5 Perception of respondents about hepatitis B virus infection**

Worldwide, hepatitis B infection is one of the major public health problems and it is one of the leading causes of death. It has become one of the most important infectious diseases all over the world, especially in developing countries. Perception of people about HBV infection has always received mixed feelings. A similar study conducted by Tan et al., (2005) in Singapore, showed that there is a widespread perception that there is no efficient treatment for the disease. This current study however, showed that many of the people perceived that, there is efficient treatment for Hepatitis B Virus infection (49.5%). Some respondents also perceived that exercising regularly and eating healthy food could minimize the effect of hepatitis B virus infection (46%). Meanwhile 55% of the respondents perceived that infected persons should be isolated away from the people to prevent spread. This finding supports Mohamed et al, (2012) study which indicated that more than half of the participants felt worried about the diagnosis and felt anxious about spreading the HBV infection to family and friends if infected persons were not isolated.

However, they (Mohamed et al, 2012) reported that majority of participants had changed their life-style habits such as smoking, drinking and taking healthier food and daily exercise after receiving some education on the HBV infection. This study is also at variance with another study (Boakye, 2014) which indicated that, majority (60%) of the respondent were of the view that there is no efficient treatment for disease, but agreed with the aspect of isolating infected persons to prevent infection. In both studies, more than half of the respondents were of the view that, infected persons should be isolated with the reason of preventing infection. The findings from this current study therefore suggest that, there are mix feelings on the perception of people about hepatitis B virus infection. In the current study, almost the same number of participant scored between 0-2 (40.5%) and 4-5 (40%) which disagrees with the hypothesis that, people have negative perception about the disease.



## 5.6 Ways of improving knowledge, attitude and perception towards hepatitis B virus infection

From the study, majority of the respondents (95%) were of the view that, public education on the disease is the best way by which people's knowledge, attitude and perception towards hepatitis B can be improved. They added that, provision of information by giving leaflets, flyers and posters on the condition can help improve the public knowledge on HBV infection. Moreover, majority (332) of the respondents representing 83% said letting people know the benefits of early screening for the condition helps improve their attitude towards HBV infection. Also, 67% of the respondents said the attitude of people towards the HBV infection can be improved by making them aware that HBV infection is not transmitted through handshake and mere conversation with infected person. About 82% of the respondents said people perception about the condition will change if they are made aware that, there is effective treatment for the disease.

Respondents were asked to suggest other ways of improving people attitude and perception about the conditions and the following suggestion were made: Majority of the respondents (66%) mentioned public education about the HBV infection, 23% said they had no idea as to how to improve attitude and perception of people about the hepatitis B virus infection, 5% mentioned going for the vaccine, 2% said making the HBV vaccine available to the people and at affordable price and 1% each mentioned avoiding using contaminated instrument and going to health facility early, whilst 0.5% each mentioned motivating those who present themselves for screening and through prayers.

## CHAPTER SIX

### 6.0 Summary of findings, conclusion, and recommendations

#### 6.1 Introduction

This chapter is divided into three sections. The first section presents the summary of findings from the study in relation to the set objectives. The second section gives the conclusions and the last section suggests recommendations.

#### 6.2 Summary of findings

An examination of the demographic characteristics of the people showed that there were more male respondents (58.5%) as compared to their female counterpart. It was also found that majority of the respondents (64%) were within 15-25 years age. Majority of the respondents (35%) attained tertiary education and most of them (66%) were Muslims compared to the other religions. The study also shows that, majority of the respondents (50%) were student with Dagombas being the dominant ethnic group among the respondents (56%).

A look at the knowledge of Hepatitis B Virus infection among the respondents revealed high knowledge among them, as majority (67.5%) scored within the range of 8-12. The perception and attitude of people on Hepatitis B Virus infection was also assessed in the study. Results from the study showed that majority of the people (49.5%) had average attitude as this percentage had an average score of 3 and the perception was not bad as less than half of them scored within the range of 0-2. Also, majority (49.5%) of the participant were of the view that there is efficient treatment of Hepatitis B Virus infection. The results of the study also showed that most of respondents (78%) believed that healthy people need vaccination against HBV. Almost all of the respondents (87.5%)

indicated that they were willing to be vaccinated against Hepatitis B Virus infection. However, only 38% had ever been vaccinated against the hepatitis B virus infection.

### **6.3 Conclusion**

Theoretically, this study has provided some empirical evidence on knowledge, attitude and perception on Hepatitis B Virus (HBV) infection among young adults of the Sagnarigu district in Northern region. The findings showed that majority of the people were aware of HBV infection. There was also a high level of knowledge among the people on HBV infection. Most of the people perceived that there is efficient treatment of Hepatitis B Virus infection and exercising regularly and eating healthy food boost one's immunity against Hepatitis B Virus infection. Few perceived that infected persons should be isolated away from the people to prevent spread.

The study also showed that the respondents' attitude towards Hepatitis B Virus infection is not the best, though most of them were able to answer questions correctly in relation to attitude, but failed to patronize the vaccine which is the best way of preventing the infection. They indicated that healthy people need vaccination against HBV, and thought that people of their own age need vaccination. They were also willing to be tested for Hepatitis B Virus infection. Despite the good knowledge of the people on HBV infection and willingness to go for the test, only few of them had ever been vaccinated against the disease, which was low.

## 6.4 Recommendations

The following recommendations were made from the study. They are categorized into two blocks which include; recommendations for researchers and recommendations for policy makers, educational institutions and health care providers.

### **The Researchers**

More studies need to cover large numbers of rural and urban areas to investigate the level of knowledge attitude and perception about HBV infection among them and if possible investigate the prevalence of the disease in the Sagnarigu district of the northern region. Also, further studies are required to measure other factors that may contribute to the poor attitudes and mix-feelings of young adults towards the HBV infection in the district.

### **Policy makers, educational institutions and health care providers**

1. The integration of knowledge about hepatitis B within formal and informal school programs:

Conscious efforts should be made by Ghana education service to blend HBV education into the curriculum or extracurricular activities in schools.

2. Health education campaigns about the disease and its complications: NGOs and the mass media to increase the awareness of the young adults as well as vulnerable and high risk groups to help in modification of their different risk behaviors and also intensify the campaign on stigma on chronic carriers.

3. The health authorities should carry out a program of compulsory free vaccination of people who were born before HBV vaccine introduction in Ghana. It should be backed by a national comprehensive immunization policy and should cover the screening of pregnant women, risk groups and the general public.

4. Formulation of a Legislative Instrument to enable the Ghana Hepatitis B foundation functions as a commission. The autonomy of this foundation will enable it have a budgetary allocation which will eventually lead to an increase in funding for hepatitis B activities and research. Since the foundation cannot work in isolation, there should be effective collaboration between it and key stakeholders such as health care workers, schools, government of Ghana and its immunization development partners.

5. HBV immunization should be covered as part of preventive services in the NHIS:

The exclusion of HBV treatment in the list of diseases covered by NHIS in the country denied a lot of chronic carriers from seeking treatment because of its high cost of treatment. Its inclusion will offer the vulnerable/ poor access to treatment.

## **6.5 Limitations**

The problem of time and financial constraints could not permit the study to be extended to other parts of the region. Some respondents could also have given socially acceptable responses to some questions even though they were educated about the purpose of the study. Also, the study failed to triangulate the data collection process in the form of adopting a qualitative approach in addition to the quantitative approach since most of the questions were close-ended. This was because, it was felt that the qualitative approach might take some time to build trust with participants that will facilitate full participation and honest self-representation.

Finally, despite the fact that this study has been able to answer some important questions regarding young adults' knowledge, attitude and perception about HBV infection in the Sagnarigu district, there are still some unanswered questions to be answered such as: to what extent does young

adults' knowledge about HBV affect the prevalence of the disease in the district? These limitations notwithstanding, it is expected that, findings of this study will be generalized to other districts similar to the one studied

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## APPENDIX

UNIVERSITY FOR DEVELOPMENT STUDIES

SCHOOL OF ALLIED HEALTH SCIENCES

DEPARTMENT OF COMMUNITY HEALTH

GRADUATE SCHOOL

‘ASSESSING THE KNOWLEDGE, ATTITUDE AND PERCEPTION OF HEPATITIS B VIRUS INFECTION AMONG YOUNG ADULTS IN SAGNARIGU DISTRICT OF NORTHERN REGION’

I am ABDULAI IDDRISU, a student of the University for Development Studies. The aim of this study is to examine ‘knowledge, attitude and perception of hepatitis B virus infection’ of people in Sagnarigu. The data obtained is to assist in completing my thesis as a partial fulfillment for the master’s program. Your participation is voluntary to answer the following questionnaire. Your answer will be confidential. The result will be used to improve method of education and communication to young adults about their health. The information will be treated with utmost confidentiality

Please answer the following questions and choose one answer that best expresses your opinion by placing a tick in the relevant box

Do I have your consent to interview? YES [ ] NO [ ]

Questionnaire no: ..... Date: .....

## Section A: Demographic Details

1. Sex

Male [ ]                      Female [ ]

2. What is your age?

15- 20years [ ]            21-25 [ ]            26-30 [ ]            31-35 [ ]            36-40 [ ]

3. What is your educational level?

Primary [ ]    JHS [ ]            SHS [ ]                      Tertiary [ ]    No education [ ]

4. What is your occupation?

Teacher [ ]    Nurse [ ]            Trader [ ]            Student [ ]            Others .....

5. What is your religion?

Christianity [ ]            Islam [ ]            Traditional [ ]            Others .....

6. What is your tribe

Dagomba[ ]    Gonja[ ]            Mamprisi [ ]    Builsa [ ]            others.....

## Section B: Knowledge of Hepatitis B Viral Infection.

7. Have you heard about hepatitis B virus (HBV) infection?

Yes [ ]            No [ ]

8. If yes, indicate your source of information

.....

9. Do people get HBV infection from genes (heredity)?

Yes [ ]            No [ ]            Don't know [ ]

10. Do people get HBV infection through the air (coughing or staying in the same room)?

Yes [ ]            No [ ]            Don't know [ ]

11. Do people get HBV infection from sexual relationships?

Yes [ ]      No [ ]      Don't know [ ]

12. Do people get HBV infection during birth?

Yes [ ]      No [ ]      Don't know [ ]

13. Do people get HBV infection by sharing spoons or bowls for food?

Yes [ ]      No [ ]      Don't know [ ]

14. Do people get HBV infection by sharing a toothbrush with an infected person?

Yes [ ]      No [ ]      Don't know [ ]

15. Do people get HBV infection by shaking hands with an infected person?

Yes [ ]      No [ ]      Don't know [ ]

16. Does HBV infection present with signs like fever, weakness, jaundice (yellowish coloration of the eyes), right sided abdominal pains?

Yes [ ]      No [ ]      Don't know [ ]

17. Does HBV cause liver cancer?

Yes [ ]      No [ ]      Don't know [ ]

18. If someone is infected with hepatitis B infection but he or she look and feel healthy, do you think that person can spread hepatitis B?

Yes [ ]      No [ ]      Don't know [ ]

19. Is hepatitis B virus more infectious and deadly than human immunodeficiency virus (HIV)?

Yes [ ]      No [ ]      Don't know [ ]

## Section C: Attitude and Practices of people towards Hepatitis B Virus Infection

20. Have you heard of hepatitis B vaccine before?

Yes [ ]      No [ ]      Don't know [ ]

21. Do you know if healthy people need vaccination?

Yes [ ]      No [ ]      Don't know [ ]

22. Will you like to go for the hepatitis B vaccine?

Yes [ ]      No [ ]      Don't know [ ]

23. Have you ever received a hepatitis B vaccine before?

Yes [ ]      No [ ]      Don't know [ ]

24. If yes, please name the facility/institution where you received hepatitis vaccine

.....

25. If no, state/give reason(s). Tick all that apply.

I am not at risk for getting hepatitis B [ ]      I don't believe in the hepatitis B vaccine [ ]

I think hepatitis B vaccine cost too much [ ]      I am not aware of the vaccine [ ]

26. How many doses of hepatitis B vaccine did you receive?

One dose [ ]      Two doses [ ]      Three doses [ ]      Don't know [ ]

27. Would you be willing to be tested for hepatitis B infection?

Yes [ ]      No [ ]      Don't know [ ]

28. Will you like to eat, sleep or shake hands a person infected with hepatitis B?

Yes [ ]      No [ ]      Don't know [ ]

## Section D: Perception of Hepatitis B Virus Infection among young adults

29. Do you think there is efficient treatment of hepatitis B virus infection?

Yes [ ]      No [ ]      Don't know [ ]

30. Should hepatitis B virus infected person be isolated away from the people to prevent them from infecting others?

Yes [ ]      No [ ]      Don't know [ ]

31. Can regular exercise and eating healthy food prevent hepatitis B virus infection?

Yes [ ]      No [ ]      Don't know [ ]

## Section E: Ways of improving knowledge, attitude and practice of young adults towards hepatitis B virus infection.

32. Do you think educating the public on hepatitis B viral infection can improve their knowledge on the disease?

Yes [ ]      No [ ]      Don't know [ ]

33. Can provision of information by giving leaflets, flyers, posters etc on the condition help improve the public knowledge on the disease?

Yes [ ]      No [ ]      Don't know [ ]

34. Will letting people know the benefits of early screening for the condition help improve their attitude towards the disease?

Yes [ ]      No [ ]      Don't know [ ]

35. Can the attitude of people towards the disease improve by making them aware it is not transmitted through handshake and mere conversation with infected person?

Yes [ ]      No [ ]      Don't know [ ]

36. Do you think people perception about the condition will change if they are made aware that, there is effective treatment for the disease?

Yes [ ]      No [ ]      Don't know [ ]

37. What other ways can improve the perception of people about the condition (HBV infection)?

.....  
.....

Thank you for your participation.

