UNIVERSITY FOR DEVELOPMENT STUDIES, TAMALE

EXPECTANT MOTHERS' KNOWLEDGE ABOUT MOTHER-TO-CHILD TRANSMISSION OF VIRAL HEPATITIS B INFECTION IN TWO DISTRICTS OF GHANA'S UPPER WEST REGION

BY

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JULY, 2016

DECLARATION

Candidate

I hereby declare that this thesis is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

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ABSTRACT

Viral Hepatitis B infection is a serious public health concern globally, notably in developing countries. Expectant mothers' knowledge on mother-to-child transmission of the disease is significant in preventing the transmission from an infected mother-to-child. In endemic areas, as the case is in Ghana, majority of infections occur in children less than 5 years of age and may be attributable to mother-to-child transmission; knowledge of HBV infection varies from urban to rural areas. As such, this study selected two Districts to compare the results – the Wa Municipality as a relatively urban area and the Lawra District as a relatively rural area. The study sought to establish the expectant mothers' knowledge about mother-to-child transmission of the hepatitis B virus in the Upper West Region. A descriptive cross-sectional study with a multi-stage sampling technique was applied to enlist 450 participants; 240 in the Wa Municipality and 210 in the Lawra District. A structured questionnaire was used to collect the data: the data were coded and double entered into SPSS (version 20.0) for the analysis. The results are organized into frequency tables and bar chart. Respondents' ages ranged from 14 to 48 years with median age of 29 years. General literacy rate was 62.4% but was higher among the respondents in the Wa Municipality compared to the Lawra District. In general, 46.2% of the respondents had general knowledge about Hepatitis B Viral infection and disease; and 35.1% knew about mother-to-child transmission. Maternal knowledge level was comparatively high in Wa Municipality than Lawra District. Socio-demographic determinants of respondents' knowledge about Mother-to-Child-Transmission of Hepatitis B Virus included education ($p=0.007$), marital status ($p=0.007$), occupation ($p<0.001$) and gravidity ($p=0.008$). Generally, there was low knowledge about the Mother-to-Child Transmission of the Hepatitis B virus among expectant mothers in the Upper West Region. Thus, increased commitments and a comprehensive educational intervention program are required to help increase the knowledge level especially in the rural areas of the region.

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DEDICATION

To my humble family, especially my beloved mom, Madam Gladys Amata Tangoor-Dery.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS/ACRONYMS

ANC	Antenatal Care
ATR	African Traditional Religion
CDC	Centres for Disease Control
CHPS	Community-based Health Planning and Services
CI	Confidence Interval
DCEs	District Chief Executives
df	degree of freedom
DHMT	District Health Management Team
DNA	Deoxyribonucleic Acid
ECS	Elective Caesarean Section
GoG	Government of Ghana
GSS	Ghana Statistical Service
HBeAg	Hepatitis B "envelop" Antigen
HBsAg	Hepatitis B *surface* Antigen
HBV	Hepatitis B Virus
HCC	Hepatocellular Carcinoma
HFs or H/F	Health facilities
HIV	Human Immunodeficiency Virus
IQR	Interquartile Range
JHS	Junior High School
L.I	Legislative Instrument
LDA	Lawra District Assembly
LDHD	Lawra District Health Directorate
LQ	Lower Quartile
MDCE	Municipal Chief Executive
MTCT	Mother-To-Child Transmission

MTCTHBVD	Mother-To-child Transmission of Hepatitis B Viral Disease
NGOs	Non-Governmental Organizations
OR	Odds Ratio
PPP	Public Private Partnership
PR	Prevalence Rate
SHS	Senior High School
SPSS	Statistical Package for Social Sciences
STD	Sexually Transmitted Disease
TBAs	Traditional Birth Attendants
UCS	Urgent Caesarean Section
UQ	Upper Quartile
UWR	Upper West Region
VD	Vaginal Delivery
WHO	World Health Organization
WIFA	Women In Fertility Age
WMA	Wa Municipal Assembly
WMHD	Wa Municipal Health Directorate
WMHMT	Wa Municipal Health Management Team
WRHD	Wa Regional Health Directorate

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Hepatitis refers to the inflammation of the liver. Its infectious causes include viral hepatitis A, B, C, D, and E. Among them, the Hepatitis B virus (HBV) causes the most common infection and can lead to death from liver cirrhosis, cancer and liver failure (WHO, 2009). Universally, an average of 2 billion people are infected by the HBV and well over 240 million of this number have developed chronic (long-term) liver infections, with an estimated annual mortality of about 1 million (WHO, 2015). Sub-Saharan Africa, comparatively, has the most predominant rate of chronic hepatitis B infection among its matured population, of about 5 to 10 percent (WHO, 2015). Ghana is endemic with the hepatitis B infection with an estimated national prevalence of a little over 10% (Dongdem, *et al*., 2012; Rufai, *et al*., 2014; Walana, *et al*., 2014).

Routes of transmission include the horizontal route, that is, persons exposed to the blood and/or other bodily fluids of an infected person and mostly through unprotected sexual intercourse (WHO, 2015). HBV transmission also occurs via the shared use or reuse of needles and syringes and other hypodermic objects that are contaminated with infected blood (Chao, *et a*l., 2012). An important route of transmission in endemic areas is mother-to-her child transmission, also known as the perinatal transmission (Custer, *et al*., 2004). Mother-to-child transmission of HBV refers to a positivity of the hepatitis B surface antigen or the HBV-DNA at 6 to 12 months of a child's life born to an infected mother (Gentile & Borgia, 2014). It is one of the major routes of infection in many endemic areas all over the world with about 95% chance among children born to infected mothers

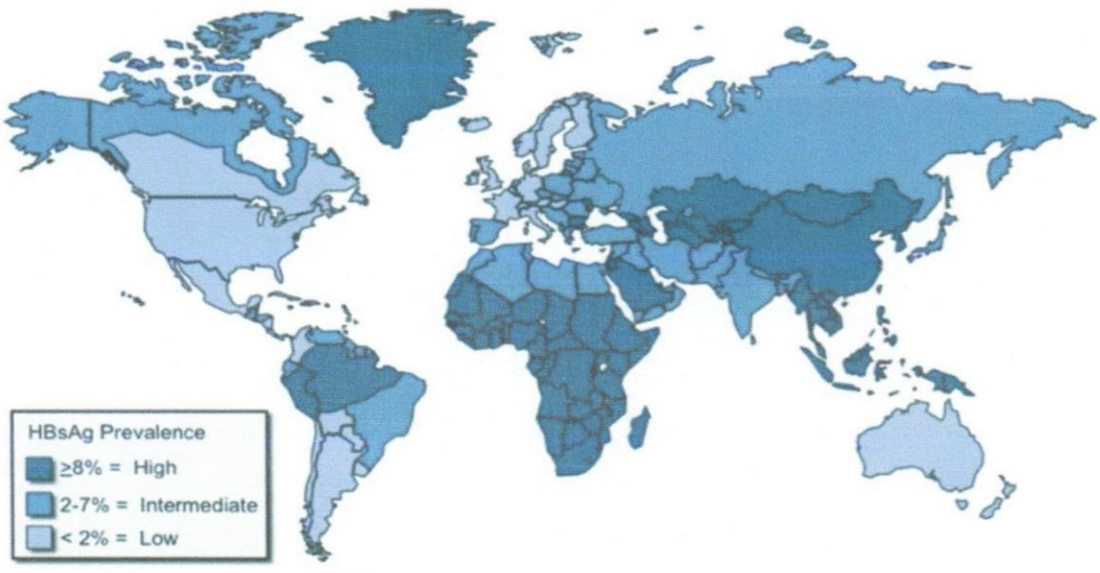
(Chowdhury & Eapen, 2009; Siakwa, *et al*., 2014). Greater percentage of the global chronic carrier cases of HBV, especially in children, is due to mother-to-child transmission (Siakwa, *et al*., 2014). As compared to adults, such children have about 80-90% more chance of developing chronicity and possible liver complications later in life (Siakwa, *et al*., 2014). Trans-placental (intra-uterine) transmission is presumed the least risk of infections although cannot be prevented by prompt immunization. The threat factors comprise expectant HBeAg positivity, high HBsAg titre and HBV DNA level (Maureen, 2009) . Most mother-to-child transmissions occur at or near the time of birth (Siakwa, *et al*., 2014). Risks for HBV spread at delivery include infant's contact with cervical secretions and mother's blood (Maureen, 2009). Transmission of HBV through breast-feeding is known to be minimal and do not post serious risk of mother-to-child transmission (Yogeswaran & Fung, 2011; Maureen, 2009 ; Chen, *et al*., 2013).

The hepatitis B vaccine is effective, widely-used and is known to produce protective antibodies levels in over 95% of vaccinated children and early adults, usually lasting for over 20 years (WHO, 2015). Health education and knowledge on hepatitis B transmission is crucial in disease control. Both vaccination and health education are important strategies used to reduce mother-to-child transmission of HBV. The use of antiretroviral drugs from the second to third trimester of pregnancy had been advocated for (Gentile & Borgia, 2014). Administration of hepatitis B immune globulin and hepatitis B vaccine to infants born to positive hepatitis B surface antigen mothers within 72 hours of delivery has been shown to achieve significant control of the disease (Lam, *et al*., 2010; CDC, 2014).

1.2 Research Problem Statement

Globally, over two hundred million persons alive today have been infected with the HBV at some time in their lives (WHO, 2015). Annually, over 4 million acute clinical cases of hepatitis B infections occur of which a quarter becomes chronic carriers. An estimated one million people die every year from protracted active hepatitis, cirrhosis or primary liver cancer (WHO, 2015). Sub-Saharan Africa has the highest endemicity of the hepatitis B virus (HBV) infections though the precise situation is problematic to measure due to data inaccuracies (Cheung, *et al.*, 2011; Siakwa, *et al.*, 2014; WHO, 2015). West Africa in particular is reported to have the uppermost endemicity with contact rate of up to 95% of its matured population. Prevalence of infection is generally variable (between 8 to 15%) but usually higher in the rural compared to the urban areas (Hwang & Cheung, 2011; Kew, 2012; CDC, 2014a). Figure 1.1 is the world map showing the worldwide endemicity of hepatitis B infection.

Figure 1.1: Map of Global Distribution of Viral Hepatitis B Prevalence



Source: Cheung, *et al.*, (2011).

In endemic areas, majority of infections occur in children less than 5 years and may be attributable to mother-to-child transmission. Children born to HBsAg- and HBeAg-positive mothers stand a 90% risk of acquiring the infection from their mothers at birth and has increased risk of progressing to chronicity (Siakwa, *et al.*, 2014). Chronic HBV infection in mothers is also associated with higher risk for preterm delivery and low birth weight as well as neonatal asphyxia at birth (Siakwa, *et a*l., 2014).

In Ghana, all expectant women are required to undergo screening for HBV infection during antenatal period to determine their hepatitis B status (Siakwa, *et al.*, 2014). Despite this, most women in Ghana and other developing countries still have insufficient knowledge regarding the mode of transmission of hepatitis B infection. Moreover, only less than 10% of women of childbearing age are fully immunized against HBV infection in Ghana (Siakwa, *et al.*, 2014). Expectant mothers' knowledge on mother-to-child transmission of the disease is significant in preventing the transmission from an infected mother-to-child (Chao, *et al.*, 2012). In many developing countries, health education on mother and child health including various aspects of hepatitis B infections is carried out at the ANC. Despite this, several studies show that existing knowledge about mother-to-child transmission of hepatitis B among expectant mothers is still limited (Chao, *et al.*, 2012).

In the Upper West region of Ghana, it is unclear to what extend expectant mothers know about mother-to-child transmission of hepatitis B infection. This study was therefore conducted in the UWR in order to assess the knowledge of mother-to-child transmission of Hepatitis B virus among expectant women. Knowledge level varies from place to place and depends on various socio-economic factors and educational level. As a result, the study was conducted in the Lawra district, a predominantly rural area and also in the Wa Municipality, a relatively urban area.

1.3 Research questions

1.31 Specific Research Question

1. What is the prevalence of HB virus disease among expectant mothers in the study area?
2. What is the level of general knowledge among expectant mothers about the HBV infection and disease in the Upper West Region?
3. What is the level of knowledge about mother-to-child infection of HBV among rural mothers compared to that of their urban counterparts?
4. What socio-demographic characteristics influence Expectant Mothers' knowledge about MTCT of HBV?

1.4 Research Objectives

1.41 General objective

The overall objective of the study is to assess the knowledge level about mother-to-child transmission of Hepatitis B virus infection among expectant mothers in the Upper West Region of Ghana.

1.42 Specific objectives

1. To determine the prevalence of hepatitis B infection among expectant mothers in the study area.
2. To assess the knowledge level of hepatitis B virus infection and disease among expectant mothers in the rural area compared to those in an urban part of the UWR.
3. To measure the level of knowledge about mother-to-child transmission of hepatitis B infection among rural expectant mothers compared to those in the urban area.

4. To identify the socio-demographic determinants of the knowledge of Pregnant Mothers about MTCT of HBV Infection.

1.5 Significance/Rationale of the study

Different academic and scientific studies have explored various aspects of the HBV disease in different areas around the globe but very little efforts have been made in assessing the knowledge of expectant mothers about the mother-to-child transmission route. Most studies focused on the general population rather than specifics. A review of literature suggests that no such comparative work at all has been done to ascertain the awareness level of rural and urban expectant mothers about the mother-to-child transmission of the HBV disease in the Upper West Region. Thus, this study sought to explore and fill this gap in order to offer a sound basis for informed and target-driven interventions alongside the vaccination and immunization intervention. It is hoped that the findings of this study will provide baseline information for the Upper West Region and for service providers to support decision-making efforts about the mother-to-child transmission of the HBV. The findings will also make available to stakeholders a valuable reference regarding the knowledge level about the mother-to-child transmission of the HBV disease among expectant mothers in the Upper West Region. It will provide an indication to health educators, ANC service providers, and the major decision makers of the Ghanaian health system as to the level of effort that is required to increase the knowledge level among expectant mothers about the mother to child transmission of the HBVD. This will empower mothers and the general WIFA population of the Upper West Region to take better decisions concerning their health towards attaining an optimum mother, child and general family health.

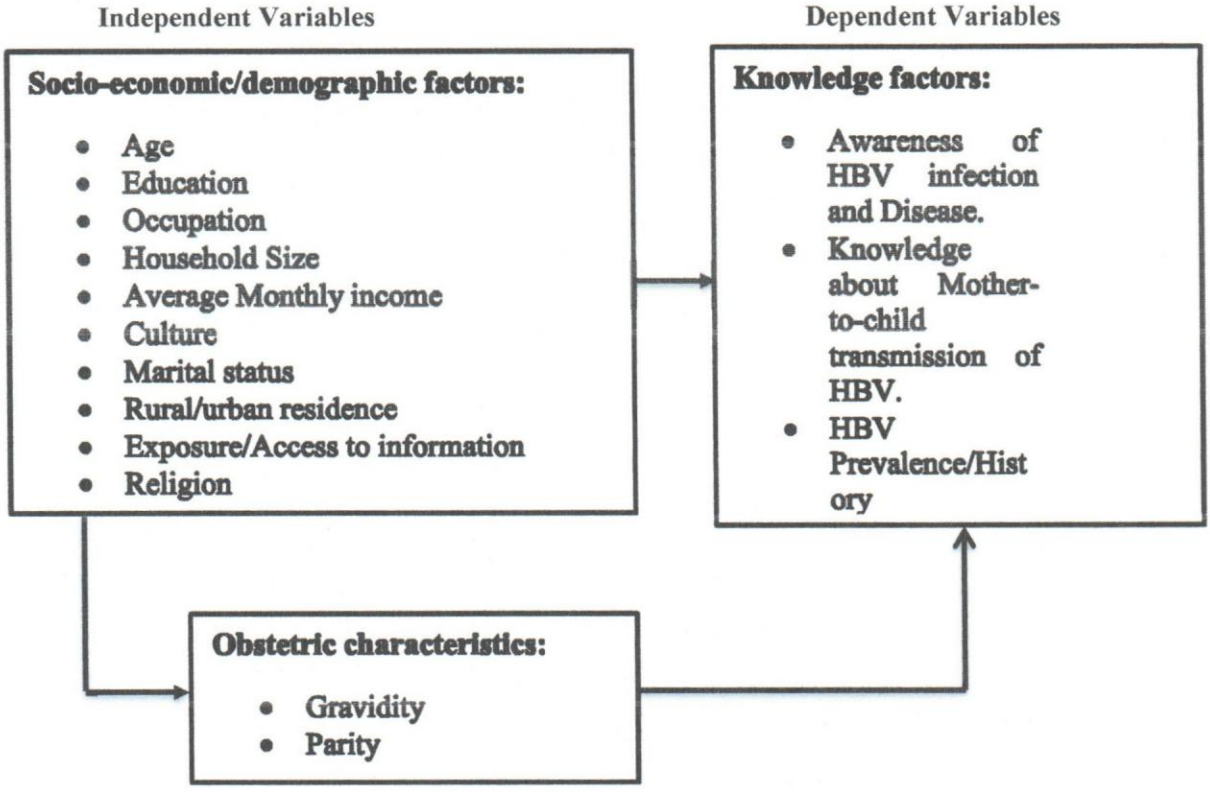
Consequently, it will help inform evidence-based policy design and implementation for the benefit of the general Ghanaian population, health stakeholders, policy makers and researchers in rolling out intervention programs so as to help reduce the disease burden in the country.

1.6 Scope of the thesis

The study was conducted only in two districts of the Upper West Region – the Wa Municipality as the urban area and the Lawra District as the rural district, respectively. The thesis is organized into six chapters (chapters 1 to 6). The chapter one provides the background to the study; the statement of the research problem; research objectives (General and Specific objectives); general and specific research questions; the significance of study; and the rationale of the study.

Chapter two reviewed literature on the various types of hepatitis viruses, literature related to respondents' knowledge about the HBV infection and disease, their knowledge about the mother-to-child transmission, their knowledge about the preventive measures against HBV infection, and the HBV prevalence as well. It is arranged in the order of the research specific objectives. Chapter three describes the research methodology used for this study. This include the study area and study population, the study design, study variables, sample size, sampling technique, data collection and analysis, limitations of the study, and ethical considerations. Chapter four presents the results of the analysis of the data in the form of tables and figures. Chapter 5 discusses the findings of this study and their interpretations and implications in relation to the literature in accordance with the research specific objectives. Chapter six draws the conclusions and makes recommendations based on the study findings.

Figure 1.2: Conceptual Framework



Source: Researcher's own construct.

1.6.1 Explanation of Conceptual Framework

The illustration above shows the pictorial relationship between the dependent and independent variables of this thesis. It shows that the socio-demographic, economic, and obstetric characteristics of an expectant mother, which are the independent variables, can directly influence her knowledge regarding the HBV infection and disease. For instance, an expectant mother's obstetric characteristics can also directly influence her knowledge about the HBV infection and disease in that a woman who has more ANC visits and/or more facility-based delivery is likely to be exposed to the information about HBV through the ANC education and counseling services. For instance, a mother's level of education has an influence on her knowledge about HBV because of her likelihood of exposure to information. On the other hand, the independent factors such as a mother's age can also determine how many children she can have or as to whether she is within fertility age.

Consequently, the interaction of a mother's socio-economic/demographic characteristics with her knowledge about HBV infection and disease as well as her obstetric characteristics will eventually influence the prevalence level of the HB disease.

1.6.2 Socio-economic/demographic factors:

Numerous available research literatures have affirmed that high knowledge about a disease condition among a community greatly influences practice of preventive and control strategies (Mkandawire, *et al.*, 2013). Other studies have also associated socio-demographic variables such as place of residence, age, education and poverty level, to one's practices towards prevention and control of a disease (Candotti, Danso, & Allain, 2007; Siakwa, *et al.*, 2014). Poor knowledge, less education, and poor access to reliable information about a disease usually breed knowledge (Mkandawire, *et al.*, 2013; Siakwa, *et al.*, 2014; Noreen, *et al.*, 2015). These are believed to have an influence on practices adopted by the community to prevent and control a disease condition (Noreen, *et al.*, 2015). A mother with higher income and/or high formal education as well as resident in an urban setting is much likely to be able to access correct information about the HBV disease than one with less/no income and little formal education. The later will therefore have less knowledge and more misconceived ideas about the disease unlike the former.

CHAPTER TWO

LITERATURE REVIEW

2.1 Types of Viral Hepatitis Diseases

2.1.1 Introduction

Hepatitis is a term usually referring to an infection or swelling of the hepatocytes, as evidenced by abnormal liver function tests commonly refer to as LFTs. This, however, is a general term since the laboratories combine hepatic enzyme tests such as aspartate aminotransferase (AST), alanine aminotransferase (ALT) and synthetic tests (albumin, bilirubin, and prothrombin time [PT]) into LFTs (Hall, 2007). The infectious causes of viral hepatitis include viral hepatitis A, B, C, D, E and G. These can lead to death from liver cirrhosis, cancer and liver failure (WHO, 2009).

2.2 Hepatitis A Viral (HAV) Disease

Hepatitis A is one of the oldest disease conditions known in human history. It usually results in fulminant hepatitis and death in only a small proportion of patients. However, it is a significant cause of morbidity and socio-economic losses in many parts of the world (WHO, 2000). It is one of the most common causes of hepatitis worldwide. However, the level of endemicity, median age at time of infection, and frequency of clinically apparent hepatitis caused by HAV varies by population (Kenrad, 2006). The first description of hepatitis (epidemic jaundice) is generally attributed to Hippocrates and outbreaks of hepatitis A have been recognized for centuries, affecting both military and civilian populations (Franco, Meleleo, Serino, Sorbara, & Zaratti, 2012). It is a small non-enveloped single-stranded RNA virus. It is thermostable and acid- resistant. For some time

after its identification, HAV was thought to be an enterovirus; in 1991, it was sub classified as a member of the Hepatovirus genus of the family Picornaviridae. HAV replicates in hepatocytes and interferes with liver function, sparking an immune response that causes liver inflammation.

2.2.1 Incidence/Epidemiology

HAV disease is said to occur sporadically, accounting for over one point four million infections per annum with a cyclic trend of occurrences (WHO, 2000). It is the most frequently reported vaccine-preventable viral condition in the United States (Bell, *et al.*, 1998) with an estimated incidence of about 150/100 000 annually (WHO, 2010a). In Africa, urban areas are transitioning to low rates of HAV infection while high rates of infection are still prevalent in rural areas, particularly among low socio-economic classes (Kanyenda, *et al.*, 2015). HAV is present in a worldwide distribution, with the highest prevalence of infection in regions where low standards of sanitation promote transmission of the virus (Lemon, 1997).

2.2.2 Transmission

Hepatitis A is HAV is commonly transmitted through the faecal-oral route either by person-to-person contact or consumption of food or water contaminated with the HAV (WHO, 2000; Wong, Liu, Ng, Young, & Lee, 2004; Lemoine, Eholié, & Lacombe, 2015). It is an enteric infection spread by contaminated excreta and its infection is noted to occur early in life (WHO, 2000; Halliday, *et al.*, 1991). However, in recent years, illicit use of parenteral drugs has been reported as a risk factor by only 2% of patients, but has been a much more prevalent risk factor in other studies (Lemon, 1997). Interestingly, there has

been some occasional association of hepatitis A with intravenous drug use. This association, as has been suggested, may largely reflect general living conditions and poor sanitation, but this may not be solely the case (Lemon, 1997) and transmission by blood contact is said to be rare (WHO, 2000).

2.2.3 Clinical characteristics/Presentations

Infection is usually acquired during early childhood as an asymptomatic or mild infection (Bell, *et al.*, 1998; WHO, 2010). More than 70% of cases of HAV infection in children below 6 years old are asymptomatic, or, if illness occurs at all, it is without jaundice. However, in older children and adults, HAV infection causes more-severe clinical illness, including jaundice, in 170% of cases (Kenrad, 2006). A classical symptomatic presentation includes non-specific prodromal symptoms with varied combinations of fever, malaise, weakness, anorexia, nausea, vomiting, arthralgias and myalgias. Prodromal symptoms tend to decline with the onset of jaundice, although anorexia, malaise and weakness may persist or increase transiently. The jaundice can persist for several weeks and is usually followed by a convalescent period. The peak infectivity occurs during the two weeks before the onset of jaundice or elevation of liver enzyme levels when the concentration of virus in the stool is highest. With the onset of jaundice, there usually is a reduction in the viral concentration in the stool and most patients are noninfectious after one week. The expression of clinical symptoms therefore varies greatly with the age of the victim (Franco, *et al.*, 2012).

2.2.4 Surveillance and Control

Surveillance and Control measures against HAV disease, according to the WHO, (2010) include the following among others: providing safe drinking water and proper disposal of sanitary waste; monitoring water beds where shellfish are harvested; monitoring disease incidence; determining sources of infection; identifying contacts of case-patients for post-exposure prophylaxis; detecting outbreaks; and containing spread. Studies suggest that having routine immunisation programmes against HAV in high-endemic settings may not necessary. In contrast, low and intermediate HAV endemic countries have a majority of children who do not get exposed during early childhood which can result into a large population of susceptible adolescents and adults later in life. Routine immunisation against HAV is recommended in these settings, (Kanyenda, *et al.*, 2015).

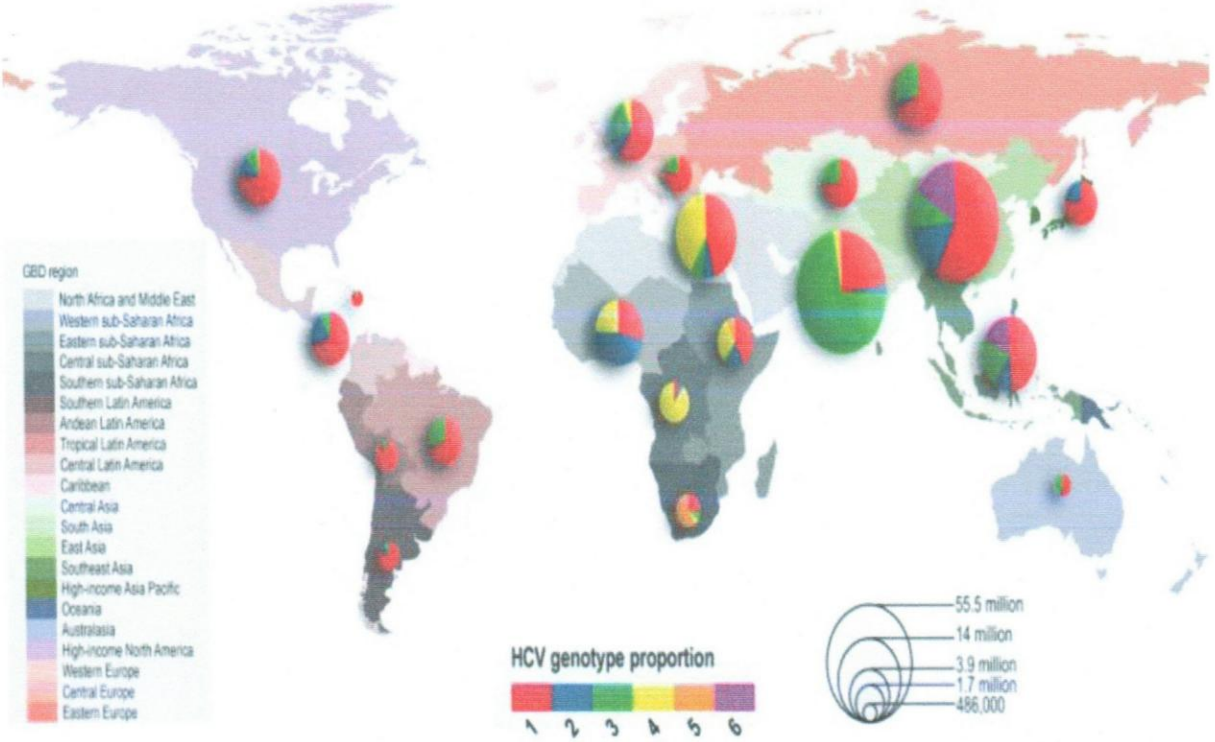
Within households, good personal hygiene, including frequent and proper hand washing after bowel movement and before food preparation, are important measures to reduce the risk of transmission from infected individuals before and after their clinical disease becomes apparent. For preexposure protection, the use of hepatitis A vaccines instead of IG is now highly recommended. Immunization should be a priority for persons at increased risk of acquiring hepatitis A. For post-exposure prophylaxis of non-vaccinated people, the passive administration of IG can modify the symptoms of infection, provided it is given within 2 weeks of exposure (WHO, 2000).

2.3 Hepatitis C Viral (HCV) Disease

2.3.1 Prevalence/Epidemiology

HCV a major cause of liver disease worldwide and a potential cause of substantial morbidity and mortality remains a large health care burden to the world (Shepard, *et al.*, 2005). Incidence rates across the world fluctuate and are difficult to calculate given the asymptomatic, often latent nature of the disease prior to clinical presentation (Sy & Jamal, 2006). Global estimates indicate a prevalence of around 2% to 3%, i.e., between 123 million and 170 million people with HCV infection worldwide. Although hepatitis C is considered endemic worldwide, there is a high degree of geographical variation in its distribution (Tatiana, *et al.*, 2011) with about 80% of them being chronic HCV infection, 5 times more than with human immunodeficiency virus (HIV) (Layden, *et al.*, 2014). Majority (104 million) of these infections are said to be among adults (defined as those older than 15 years old) with an anti-HCV infection rate of between 1.7 to 2.3% (Gower, *et al.*, 2014). It is further estimated that about 54,000 deaths occur annually and over 955,000 disability adjusted life-years associated with acute HCV infection (Mohd, Groeger, Flaxman, & Wiersma, 2013). The prevalence pattern across age is similar in East, Central, and Southern sub-Saharan Africa, with the latter two having considerably lower prevalence compared to other sub-Saharan African regions (Mohd Hanafiah, *et al.*, 2013).

Figure 2. 1: Global Map of HCV Distribution



Source: (Messina, *et al.*, 2015)

2.3.2 Transmission

The most efficient transmission of HCV is through large or repeated direct percutaneous exposures to blood (e.g., transfusion or transplantation from infectious donors, injecting drug use). It is therefore important to remember that HCV has long been recognized as essentially a parenterally transmitted infection (Klevens, Hu, Jiles, & Holmberg, 2012). There is also evidence that the environment can serve as a reservoir for infectious virus. HCV transmission by unapparent percutaneous exposures has been caused by cross-contamination from reused needles and syringes, multiple-use medication vials, infusion bags, and injecting-drug use paraphernalia (Alter, 2007; Tatiana, *et al.*, 2011). Other studies suggest an associations with cultural or traditional practices, such as scarification,

tribal markings, home circumcision and birth, as well as the possibility of intra-familial transmission (Layden, *et al.*, 2014).

2.3.3 Clinical characteristics/Presentations

Most people (80%) with acute HCV infection have no symptoms (Dickson, 1997; CDC, 2015). If symptoms occur, they may include loss of appetite, abdominal pain, fatigue, nausea, dark urine, and jaundice. Of those who develop chronic HCV infection, the most common symptom is fatigue. Severe liver disease develops in approximately 10%–20% of chronically infected people, but progression to end-stage liver disease is slow and typically does not occur until ≥20 years after infection. Its advanced stage characteristics may include cirrhosis and hepatocellular cancer (CDC, 2015). Depression, though nonspecific, might be an important clinical marker of a more severe disease (Uto, Mawatari, Kumagai, Ido, & Tsubouchi, 2012).

2.3.4 Surveillance and Control/Prevention

Primary prevention of hepatitis C should target reduction of transmission of the virus. Prevention should target those at risk of acquiring the virus and should involve providing education, risk reduction counseling, HCV screening and substance abuse treatment. Prevention in healthcare setting should also take place by having better sterilization, safer injections, reducing opportunities for percutaneous exposures to blood. In developing countries, better screening for donors and blood screening should take place to reduce the number of transfusion related transmissions (Sy & Jamal, 2006). Because there is no vaccine and no post-exposure prophylaxis for HCV, the focus of primary prevention efforts should be safer blood supply in the developing world, safe injection practices in

health care and other settings, and decreasing the number of people who initiate injection drug use (Shepard, *et al.*, 2005). Extra attention should be given to populations in specific settings such as correctional institutions, drug treatment programs, programs for high risk youth, HIV counseling and testing sites, and STD clinics. In these settings, physicians should always screen for intravenous drug use (Sy & Jamal, 2006). No vaccine is available to prevent HCV infection, nor does immune globulin provide protection. Before traveling, people should check with their health care providers to understand the potential risk of infection (CDC, 2015).

2.4 Hepatitis D Viral (HDV) Disease

2.4.1 Prevalence/Epidemiology

Hepatitis D is caused by the hepatitis D virus (HDV), a defective RNA pathogen that requires the hepatitis B surface antigen (HBsAg) for its own replication (WHO, 2010b; Rizzetto, 2015). The virus-like delta agent was subsequently shown to be associated with the most severe forms of acute and chronic hepatitis in many HBsAg infected patients. However, although overlap- ping with HBV, the prevalence of HDV did not always coincide with that of HBV (Rizzetto, 2015). The disease it caused was designated delta or type D hepatitis (WHO, 2010b). Close to 1/3 of European patients with hepatitis D are also infected with HCV. It is important to note in this case that HDV does not only suppress HBV replication but also suppress HCV replication in patients with triple infection (Wedemeyer & Manns, 2010). HDV is highly prevalent in the Mediterranean Basin, West Africa, the Middle East, Central Asia, certain South Pacific islands and the Amazon Basin of South America. Severe, often fatal, acute and chronic type D hepatitis occurs among indigenous people of Brazil, Venezuela, and Peru, Colombia, all regions with high chronic

HDV infection rates. It is however uncommon in Eastern Asia, but is present in India, Taiwan, and China (WHO, 2010b).

2.4.2 Transmission

According to Hall, (2007), the main route of HDV transmission is through infected blood and blood products. The WHO, (2010b) indicates that the transmission of HDV is similar to that of HBV and include the following: blood borne and sexual; percutaneous (injecting drug use, hemophiliacs); per mucosal (sexual); rare perinatal. The groups of people at risk also include: intravenous drug users using HDV-contaminated injection needles; promiscuous homosexual and heterosexual groups (although HDV infections are less frequent than HBV or HIV infections); people exposed to unscreened blood or blood products; haemophiliacs; and persons with clotting factor disorders.

2.4.3 Clinical characteristics/Presentations

HDV infection of chronically infected HBV-carriers may lead to fulminant acute hepatitis or severe chronic active hepatitis, often progressing to cirrhosis. Chronic hepatitis D may also lead to the development of hepatocellular carcinoma (WHO, 2010b). A number of studies around the globe have shown that chronic HDV infection results in more severe liver disease compared to chronic HBV monoinfection, and is associated with an accelerated course of fibrosis progression, an increased risk of hepatocellular carcinoma, and early decompensation in the presence of cirrhosis (Wedemeyer & Manns, 2010).

2.4.4 Surveillance and Control/Prevention

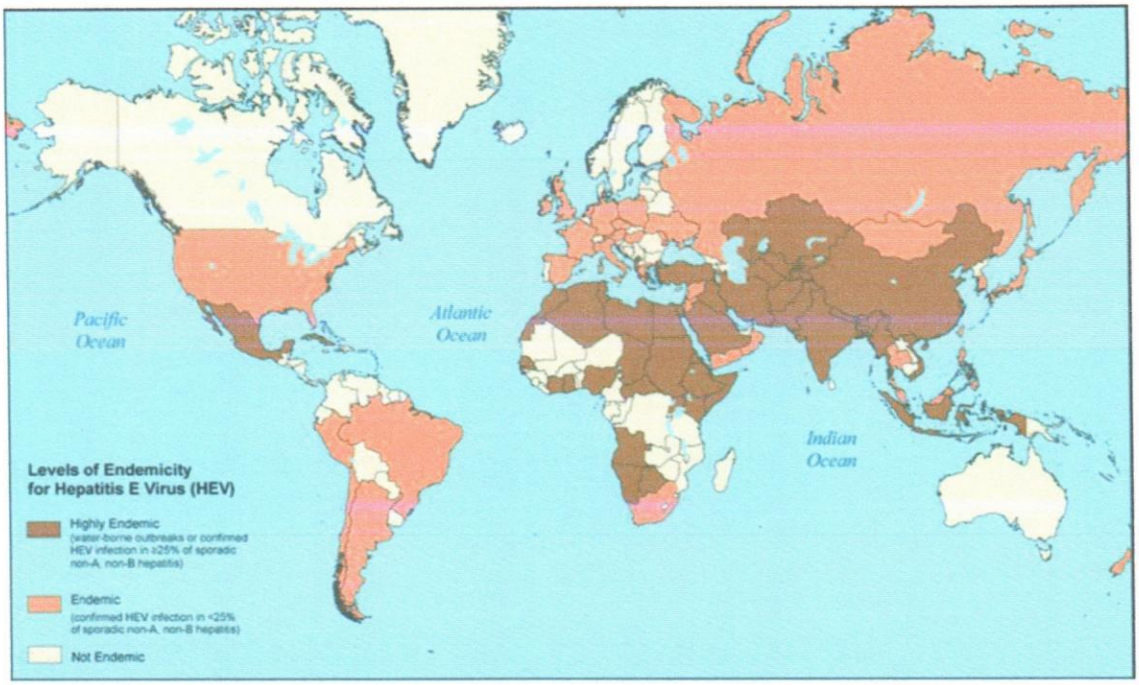
Hepatitis D is the only form of viral hepatitis for which there is not an established treatment. However, several therapeutic strategies can be employed (Wedemeyer & Manns, 2010). The only preventive measure against HDV is through primary education about its risk factors or through vaccination against HBV (Hall, 2007).

2.5 Hepatitis E Viral (HEV) Disease

2.5.1 Prevalence/Epidemiology

The hepatitis E virus (HEV) is a self-limiting RNA virus with four genotypes, enterically transmitted disease like hepatitis A but is more severe, easily transmitted, and distributed worldwide (Hall, 2007). The HEV is a spherical, non-enveloped, single-stranded, positive sense RNA virus that is approximately 32 nm to 34 nm in diameter and is the only member in the family Hepeviridae and genus Hepevirus (Teshale, *et al*., 2010). Every year there are an estimated 20 million hepatitis E infections, over 3 million symptomatic cases of hepatitis E, and 56 600 hepatitis E-related deaths (World Health Organization, 2016). Its highest incidence is in developing countries, and it is the second most common cause of sporadic hepatitis in northern Africa and the Middle East (Hall, 2007). To date, few studies have attempted to quantify the incidence of hepatitis E in the general population (Teshale, *et al.*, 2010).

Figure 2. 2: Global Map of HEV Distribution



Source: (Teshale, *et al.*, 2010)

2.5.2 Transmission

HEV is usually spread by fecally contaminated water, but it can also be spread by blood and blood products. There is a low incidence of person-to-person transmission (Hall, 2007). Other transmission routes have been identified, which include: foodborne transmission from ingestion of products derived from infected animals; transfusion of infected blood products; vertical transmission from a pregnant woman to her fetus (World Health Organization, 2016). The ingestion of raw or uncooked shellfish has also been identified as the source of sporadic cases in endemic areas.

2.5.3 Clinical characteristics/Presentations

The epidemiologic characteristics of epidemic hepatitis E have remained consistent since the first described outbreak in New Delhi with the highest attack rates among young adults

and a high mortality among women in the third trimester of pregnancy. Pregnant women (especially those infected during the second or third trimester) may present with or progress to liver failure and their fetuses are at risk of spontaneous abortion and premature delivery (Teo, 2015). This latter characteristic has remained to be the hallmark of HEV associated acute viral hepatitis that leads to the initial suspicion of an epidemic in the absence of capacity for serological diagnosis (Teshale, *et al.*, 2010). People with pre-existing liver disease may undergo further hepatic decompensation with HEV infection (Teo, 2015). Hepatitis E clinically manifests with icterus, malaise, anorexia, fever, hepatomegaly, and pruritus. HEV-infected persons exhibit a wide clinical spectrum, ranging from asymptomatic infection to fulminant hepatitis (Teshale, Hu, *et al.*, 2010). It presents like other acute hepatitis illnesses but with prolonged cholestatis. The acute state usually lasts for up to six weeks and for those that recover there is no chronic state (Hall, 2007).

2.5.4 Surveillance and Control/Prevention

Prevention HEV entails avoiding contaminated water and uncooked foods in endemic areas (Hall, 2007). No vaccine is available, nor are drugs for preventing infection. Travelers should avoid drinking unboiled or unchlorinated water and beverages that contain unboiled water or ice. Travelers should eat only thoroughly cooked food, including seafood, meat, offal, and products derived from these (Teo, 2015). WHO (2016) recommends that at the individual level, infection risk can be reduced by: maintaining hygienic practices such as hand washing with safe water, particularly before handling food; avoiding drinking water and/or ice of unknown purity; adhering to WHO safe food practices. In 2011, the first vaccine to prevent hepatitis E infection was registered in China.

Although it is not available globally, it could potentially become available in a number of other countries (World Health Organization, 2016).

2.6 Hepatitis G Viral (HGV) Disease

2.6.1 Epidemiology/Prevalence

The HGV was identified in a search for hepatitis viruses but no disease is currently known to be associated with it (Tillmann, *et al.*, 2001). The HGV is a blood-borne virus that is spread by contaminated blood and blood products. It has a worldwide distribution and is especially common in blood donors in the United States. Because this virus may not produce disease in humans, blood is not routinely screened for HGV (Hall, 2007). GB virus C (GBV-C) and hepatitis G virus are RNA viruses that were independently identified in 1995, and were subsequently found to be two isolates of the same virus (Zhang, *et al.*, 2006). There is a high rate of GBV-C viremia among HIV-infected persons (Xiang, *et al.*, 2001). Studies have found that in the United States, 10%–20% of HGV patients are also co-infected with HCV. Mounting evidence has also shown a protective role of HGV in HIV patients (Hall, 2007) and people co-infected with HIV and GB virus C (GBV-C) have lower mortality than HIV-positive individuals without GBV-C infection (Xiang, *et al.*, 2004).

2.6.2 Transmission

Studies suggest that GBV-C is a parenterally transmitted infection as well as the increased risk for infection in patients treated with multiple hemodialysis procedures and higher units of transfused blood products (Reshetnyak, Karlovich, & Ilchenko, 2008). HGV/GBV-C can be transmitted by sharing personal items contaminated with the virus and other similar

behaviours (parenterally), from mother-to-newborn child at birth (vertical), or various sexual activities (Health Canada, 2003).

2.6.3 Clinical Characteristics/presentation of Symptoms

The clinical significance of GBV-C infection with respect to acute or chronic hepatitis is not well understood, but the preponderance of other evidence suggests that GBV-C does not cause hepatitis in humans (Sanjiv, 2016). There is little proof that Hepatitis G (Hep G) causes serious liver disease at any age. It is possible that HGV/GBV-C may not be a true 'hepatitis' virus (Health Canada, 2003)

2.6.4 Prevention and Control

If you are regularly exposed to blood or blood products from others, try to protect yourself with gloves to reduce the risk of the spread of viruses. If you use injection drugs, ensure you use clean, sterile needles. Sharing needles, syringes or other drug-use equipment with others can put you at risk of infection.

2.7 Viral Hepatitis B (HBV) Infection and Disease

2.7.1 Introduction

Worldwide statistics indicate that about two billion individuals have been infected by the HBV at one time or the other, over 240 million suffer from long-lasting infection while about one million annual deaths occur from HBV-related liver diseases of which the eventual stage is always liver cancer (Michel & Tiollais, 2010; WHO, 2015). Chronicity of the HB infection can result in liver cirrhosis and hepatocellular carcinoma (Trépo, Chan, &

Lok, 2014). It is said that HBV infected women are usually the source of spread to the spouse, and to the child in delivery (Arfaoui, *et al.*, 2010). Without recommended treatment and monitoring, about 15-25% of the infected population will die prematurely from cirrhosis, liver failure, or liver cancer (hepatocellular carcinoma - HCC) (Cohen, *et al.*, 2013). In fact, chronic HBV infection is the leading cause of HCC worldwide. Auspiciously, a very modest and quick blood examination is commonly available to diagnose the infection. There is an efficacious vaccine that can prevent the HBV infection. Some medications are currently approved in many countries for the treatment of chronic HBV infection (Cohen, *et al.*, 2013). A mother-to-child transmission of the HBV occurs when an infected mother transmits the virus directly to the neonate during or shortly after child birth. Such transmissions are usually possible when the mother suffers an acute infection of hepatitis B during pregnancy or if she is a chronic carrier during that period. The mode of this perinatal transmission isn't so distinct, but indications are that, infection might occur through a placenta cutting during childbirth (Chireh & Lennarth, 2011).

Mother-to-Child transmission of HBV combines different means of infection. Particularly, the term is known to refer to the transmission within the antenatal period, at birth (parturition) and postpartum stage – after birth. However, worthy of important note is that most mother-to-child infections occur at the stage of birth (Daley, 2011). Intrauterine (*antenatal transmission*) infection refers to HBV infection that occurs within the period before birth. This route of infection has been predicted to be responsible for about between 10% and 44.4% of all HBV infections in among at-risk newborns. The placenta is pointed to be the medium of transmission in this case, either by "cellular transfer" or by trans-placental seepage of the mother's blood. The key risks for the placental diffusion consist of untimely labor, the mother's positive status of HBeAg, as well as the DNA of the HBV in the blood of the cord. The viral arrangement, HB virus gene transformations, placental

barrier as well as the mother's immune condition and that of the unborn baby have correspondingly been connected. The antenatal HB viral transmission has also been projected, though yet to be verified, to occur via infected oocytes (Daley, 2011). *Transmission at birth,* debatably stances the utmost risk to the newborn. HBV-DNA has been detected in amniotic fluid samples and vaginal secretions. The perceived benefits of caesarian section to babies of HBV-positive mothers remains a subject of debate. The *postpartum infection* is suspected to take place via body fluid within the mucosal exteriors when the infant comes in contact with the infected (Daley, 2011). Majority of countries in Southeast Asia, the Western Pacific and Africa have high endemicity of HBV. In these settings the foremost mode of HBV transmission has been identified as vertical, where by mothers directly transmit virus to their infants during expectant periods (Chireh & Lennarth, 2011).

2.7.2 Prevalence of HBV among Expectant mothers

The prevalence of chronic hepatitis B virus (HBV) infection varies widely according to geographical area, and is closely interlinked with the predominant routes of HBV transmission (Candotti, *et al.*, 2007). The age at which HBV infection occurs is one of the main factors that are inclined to the acquisition as well as the occurrence of the chronic carriage status. Almost 90% of infants born to HBV "surface antigen- (HBsAg) and HB e antigen (HBeAg)-positive" mothers and approximately 30.0% of children infected before 6 years of age become chronic carriers, compared with less than 10.0% of older children or adults (Candotti, *et al.*, 2007). Babies born to infected mothers may be infected perinatally through the following three suggested routes of transmission: (i) trans-placental intrauterine; (ii) transmission during delivery by contact with expectant infected fluids in the birth canal and (iii) postpartum infection in the process of providing childcare

(Candotti, *et al.*, 2007). A North American Chinese general population study, regrettably, reports that vaccination was not seen as primary, as about 65.0% who were aware of HB vaccine availability did not associate it with the HB prevention until they were further probed (Chen, *et al.*, 2006).

In a demonstrative sample of expectant women who accessed public health services of São Luís in the state of Maranhao in Brazil, five clients were found to have had the marker of current HBV infection (HBsAg). The study eventually stated an HBV occurrence rate 0.94% (95% CI, 0.3% to 2.3%). This finding was similar to the outcome of many other researches in several other cities of Brazil, alternating from 0.5% to about 1.7%. Consequently, the prevalence sustained the expectation that the state of Maranhão was a region of low HBV endemicity. In furtherance from this study a minimal prevalence of lingering HBV infection among expectant mothers who undergo skilled delivery in the government maternity hospitals of São Luís. Unlike in other studies elsewhere, socio-demographic factors of respondents in this particular study, such as lower educational levels, and family history of HBV infection were found to have associated with existence "of serological markers for" HB viral infection. It therefore confirmed that efforts in education are very key for the prevention of the HBV disease and most others, (Ferreiral, *et al.*, 2012). In a recent Hong Kong study, Lao, *et al.*, (2014) found that the HBV prevalence also increased with age among women who underwent antenatal screening health facilities: they reported 2.5%, 2.7%, 8.8% and 8.0% in those aged $\leq$ 16, 17, 18 and 19 years, respectively. These findings suggest that immunity against HBV infection wanes in late adolescence, which possibly explained the persistently high prevalence of HBsAg carriage observed in expectant women (Lao, *et al.*, 2014). An occurrence of surface antigen HBV (HBsAg) among expectant women, reportedly, range from 3 to about 4%

with a 20 to as much as 90% high risk of mother-to-infant transmission., dependent on the viral burden in the mother (Arfaoui, *et al.*, 2010).

Sub-Saharan Africa is an area of high endemicity in which more than 75% of adults have been exposed to HBV, with an estimated 5–25% being chronic carriers (Candotti, *et al.*, 2007). A significant number of different strategies have been recommended to tame hepatitis B infections. These among others include screening of the expectant mothers, the free global hepatitis B immunization of all newborns, and the immunoglobulin cover for babies at risk. The screening of expectant women for the HBV infection reportedly not regularly carried out by ANC service providers as required (Shamsuddin & Marmuji, 2010). Out of a total of 3,522 samples of serum collected from antenatal clients and tested for HBsAg, an overall HBV prevalence was found to be 0.56% but 1.04% in women from immigrant groups. It was compared with that of hepatitis C and found that the Hepatitis B carriage was therefore four times more common than hepatitis C carriage in the antenatal population comprised of various ethnic origins (Boxall, Skidmore, Evans, & Nightingale, 1994). An overall HBV prevalence was 0.65% and 6.52% among 22,859 expectant mothers of Sub Saharan African origin in Limoges University Hospital who were screened for hepatitis B surface antigen (HBs Ag) (Denis, *et al.*, 2004). The HBV prevalence rate among expectant Nigerian women was 11.0% with an HBeAg positivity of 33% (Bayo, Ochola, Oleo, & Mwaka, 2014) and 12.0% among ANC expectant women in post-conflict northern Uganda; 15% of the 12.0% HBsAg positive women were also positive of HBeAg. The infection was higher among women who were 20 years or younger (20%) compared to their older counterparts (8.7%) (Bayo, *et al.*, 2014).

From 36,379 expectant women screened for HBsAg by a Rapid Test, a weighted average prevalence of 0.82% (95% CI, 0.72, to 0.91) was determined. Consequently, the study concluded that the Indian prevalence of HBV carrier state in pregnancy was low considering previous reports (Kinikar, *et al.*, 2009). A cross-sectional study of 5,760 expectant women in a Benin based University Teaching hospital from 2009 to 2010 also reports that an HBV prevalence of 12.5% (720) out of 5,760 subjects screened for Serum antibodies to hepatitis B. About 0.57% (33) had combined infections of both hepatitis HBV and HCV. In conclusion therefore, the study categorized the area as intermediate endemicity (12.5%) of the Hepatitis B virus (HBV) among expectant women, (Ugbebor, *et al.*, 2011). Andreas and colleagues also report their Cameroonian findings of their cross-sectional study involving expectant mothers. They recorded a prevalence of HBsAg in pregnancy of 9.7% (95% CI, 5.7 to15.0). Thus, the highest rate was observed in the age group 15–19 (20%), followed by the age group 30–34 (13.64%). They however found none of the assessed participant characteristics to be significantly associated with HBsAg positivity. Exactly 50% of the participants with HBsAg positivity were found to be within 7 to 9 months of pregnancy; the multigravidas (64.7%) were the majority of HBsAg positive women. Twenty (20) respondents had right upper quadrant tenderness among whom 4 (20%) were positive for HBsAg (Frambo, *et al.*, 2014).

Closely related to the Benin study is Ghana's. As reported by Bonsu, *et al.*, (2012), the overall HBsAg positive rate was found to be 10.6%, out of 1,500 expectant women screened. This however varied among districts (13.8% for Kwahu West, 12.4% for Upper Manya, and 2.2% for Yilo Krobo). HBsAg positivity was significantly higher in women with depression (odds ratio [OR], 3.74; 95% confidence interval [CI], 2.13 to 6.57) and HIV (OR, 2.03; 95% CI, 1.06 to 3.89). Respondents' socio-demographic factors such as

age, education, and gravidity were found unrelated to HBsAg positivity (Cho, *et al.*, 2012).

2.7.3 Knowledge about the HBV Infection and Disease

Knowledge is formed through relations with the surroundings where individuals themselves consciously craft their understanding of the world around them 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 – his/her own construct of the surroundings and its resultant effects. Human knowledge is mostly acquired through communication and its processes; it is the key to prevention while education is the key to knowledge (Chireh & Lennarth, 2011). In a previous study, knowledge about proposed HBV prevention and treatment in women, 78 (64.46%) women knew about the availability of treatment but only 51 (42.14%) women knew that a potent vaccine for preventing HBV infection is available. A hand full of 23 (19.0%) women could correctly identify that HBV infection can be prevented by avoiding anomalous sexual affairs (Haider & Haider, 2008). Noreen, *et al.*, (2015) recorded that knowledge regarding hepatitis B and vaccination among women of childbearing age in a rural region of Punjab was strongly associated with education level. Since a majority of the participants were illiterate. This revelation went further to support that the overall level of knowledge regarding hepatitis B and its vaccination was poor or incorrect (Noreen, *et al.*, 2015). A 2013 study among Nigerian women also reported that 'majority of their women had poor level of awareness about the HBV infection; over 75% of their respondents had meager scores regarding knowledge of HBV transmission (Adeyemi, *et al.*, 2013).

A North American Chinese population based findings indicated that many interviewees perceived causes of hepatitis to include hypothetically unsafe foods such as fried foods or potentially unwholesome diets, alcohol, contact with carriers, and poor respite (Chen, *et al.*, 2006). A 2014 study in Cameroon also records a smaller (2.3%) had poor knowledge that only particular people could be affected by the hepatitis B virus (Frambo, Atashili, Fon, & Ndumbe, 2014). Their finding was far lower than that of a 2011 Hong Kong study which rather found majority (75%) of expectant mothers who believed that the HBV can be transmitted through food, and that a balanced life style and nutrition would have insignificant influence in its prevention (Chan, Lao, Suen, Lau, & Leung, 2011).

Issues of little knowledge about how hepatitis B infection occurs have also been reported by a Pakistan based cross sectional study, suggesting that the HBV infection could occur via insect bites, by handshake, and droplets infection from coughing and sneezing. Other perceived routes included sharing food with the hepatitis infected, shared use of toilet, etc., as perceived by majority of women (Haider & Haider, 2008). A very recent Punjab community based cross sectional study in Pakistan reveals participants associate a number of myths to the vaccine, for example: "*This vaccine is only meant for expectant or married women*", "*The vaccine will be more effective in expectant women*", "*Hepatitis B vaccine campaigns are just a show off, Boiling water can prevent hepatitis B*" and "*Not eating outside is enough for hepatitis B prevention*"(Noreen, *et al.*, 2015). Inadvertently, knowledge about the deadly disease in Ghana is low (Chireh & Lennarth, 2011).

2.7.4 Knowledge of Expectant mothers about mother-to-child transmission of HBV

The timely and sufficient access to relevant information usually leads to sufficiency of knowledge and consequently the right application of that information to make it worth its

existence. A simple clinical test for HBV infection is available and a compulsory component of the array of tests required of every expectant woman who visits the health facility for antenatal services. As such, it is by default expected that expectant mothers should have adequate knowledge about the HBV disease and especially the perinatal route of transmission. Globally speaking, there are few reported studies on the knowledge of HBV infection among expectant women (Chan, *et al.*, 2012). In spite of the fact that infection with the Hepatitis B Virus (HBV) is still a universal public health concern, not much is known about its epidemiology for the duration of pregnancy in sub-Saharan Africa (Frambo, *et al.*, 2014). More worrying is the realization that knowledge of HBV is unexpectedly insufficient even among highly trained health service providers. Out of 250 participants who completed a study, 34.0% didn't know that long-lasting HB Viral infection is mostly *"asymptomatic"*. Exactly 29% did not also know that chronic HBV infection convenes a high risk of liver damage and/or cancer, and early death. Furthermore, 34% failed to distinguish all the modes of HB viral infections; the importance of the HB vaccine in preventing liver disease was not also known by about 30% of the sampled (Son, *et al.*, 2010).

Lao, *et al.*, (2011) also discovered that Self-regulating factors associated with poor hepatitis B knowledge include women not in the healthcare settings, lower formal education attainment, and history of no previous HB status testing. The majority of the respondents could however offer right answers regarding the common phases of HBV disease, as well as blood-borne spread and perinatal screening, and prevention by vaccination. However, about 47.1% didn't know of sexual intercourse as a means of transmitting the HB virus to an unimmunized person (Suen, *et al.*, 2011). Various clinical health providers disapprove breastfeeding in HBV carrier mothers, since other studies

suggest the presence of the HBV DNA in breast milk and breast lesions and may heighten risks of infants to the HBV (Chen, *et al*., 2013).

More evidence from the northern part of Uganda records of limited awareness on the occurrence of HB infection in expectant women (Bayo, *et al*., 2014). A 2011 study highlighted as an issue of debate the associations between Mother-to-Child Transmission (MTCT) of HBV, the bottle feeding, as well as the caesarean section of child delivery, in bits to inhibit the incident infections and deaths resulting from this disease. It further stated that the literature is not strong enough to confirm whether an HBV positive mother should avoid breastfeeding the baby normally. This is, however, a rather contentious idea because there's insignificant evidence to sustain that the HBV can be transmitted from an infected mother to her infant via the breast milk. Interestingly, other studies reported that among HBV reactive women who breastfed, the transmission rate of MTCT was comparatively lesser unlike among their bottle-fed counterparts. Contrariwise, some other evidence found no variance in transmission rates between these two groups. It is therefore emphasized that HBV-infected mothers are recommended against donating breast milk (Daley, 2011).

Andreas, *et al*., (2014) also reported on knowledge of perinatal HBV from Cameroon that, majority of the expectant mothers sampled were yet to hear of the viral condition called hepatitis and 80% did not even know that HB was an infectious pathogen called virus. Just about 16.0% knew that an HBV infection could eventually affect the liver as the basic organ. The knowledge of HBV regarding transmission was equally minute as very little (< 20%) had the spot-on knowledge. About 81.0% among the 176 who participated in the study were unaware that an infected person may not show any signs and symptoms

associated to the disease (Ndumbe, *et al.*, 2014). Out of all socio-demographic characteristics of respondents assessed, the level of education was found to be significantly ($p = 0.0037$) associated with their knowledge (Frambo, *et al.*, 2014). A 2014 study among Ghanaian expectant women also further confirms that most (80%) women in developing countries, regrettably, have deficient knowledge regarding mode of transmission of hepatitis B and less than 10% of women of childbearing age are fully immunized against HBV infection (Siakwa, *et al.*, 2014).

2.7.5 Knowledge level regarding the prevention of HBV

In high prevalence countries of chronic hepatitis B, mother-to-child transmission accounts for the most cases of chronic hepatitis B. Passive-active immunoprophylaxis with hepatitis B immunoglobulin and hepatitis B vaccine at birth is 95% considered effective in lowering the risk of HBV infection but less effective among HBeAg-positive mothers of very high serum HBV DNA levels. In the last 4 weeks of gestation, lamivudine is thought to provide extra protection for expectant women with high viremia levels (Tran, 2013). Hepatitis B vaccine and HB immunoglobulin are recommended for new-borns of HBsAg-positive mothers to prevent the infection (Lee, *et al.*, 2006). Arfaoui and colleagues, in their 2010 Tunisian study also reports that the HBV mother-to-child transmission can be avoided by sero-vaccination of the new-born. The women with very high viral loads may receive lamivudine treatment at the end of pregnancy to diminish viral load and thus the risk of chronic carriage in the child. They however prompted that the role of this drug in this situation was not yet clearly defined (Arfaoui, *et a*l., 2010). Bzowej (2010) in his study advised that all decisions about initiating, continuing, or stopping therapy of the hepatitis B virus (HBV) during pregnancy must include an analysis of the risks and benefits for mother and fetus. The trimester of the pregnancy and the stage of the mother's liver disease are important factors.

Treatment in the third trimester may be initiated to aid in preventing perinatal transmission, which appears to be most pronounced in mothers with high viral loads. Consideration of initiating treatment in the third trimester should occur after a high viral load is documented in the latter part of the second trimester, to allow adequate time for initiation of antiviral therapy with significant viral suppression before delivery. This discussion should include the topic of breastfeeding, because it is generally not recommended while receiving antiviral therapy. Currently, lamivudine and tenofovir seems to be the therapeutic alternatives with the most even-handed protection data in gravidity (Bzowej, 2010). On the controversy as to whether it is safe enough for expectant women to be administered the HBV vaccines, the Centers for Disease Control (CDC) in a March 2014 update reports that the perceived risk to a developing fetus from vaccination of the mother during pregnancy is only theoretical. No evidence exists of risk to the fetus from vaccinating expectant women with inactivated virus or bacterial vaccines or toxoids. Live vaccines administered to an expectant woman pose a theoretical risk to the fetus; therefore, live, attenuated virus and live bacterial vaccines generally are contraindicated during pregnancy.

The benefits of vaccinating expectant women usually outweigh potential risks when the likelihood of disease exposure is high, when infection would pose a risk to the mother or fetus, and when the vaccine is unlikely to cause harm (CDC, 2014). The CDC emphasizes that expectant women who are identified as being at risk for HBV infection during pregnancy such as those having more than one sex partner during the previous 6 months, those been evaluated or treated for an STD, recent or current injection drug use, or those who have had an HBsAg-positive sex partner ought to be vaccinated (CDC, 2014). In another development, the CDC further stressed that expectant women who are at risk for one of the reasons stated above should be vaccinated and other expectant women who want

protection may be vaccinated. It however added that anyone with a life-threatening allergy to yeast, or to any other component of the vaccine, should not get hepatitis B vaccine; anyone who has had a life-threatening allergic reaction to a previous dose of hepatitis B vaccine should not get another dose; and anyone who is moderately or severely ill when a dose of vaccine is scheduled should probably wait until they recover before getting the vaccine (CDC, 2014a).

A 1991 study also reported that because of reported high risks of MTCT of HBV and the safety and efficacy (seroconversion 90 to 100%) of HB vaccine in preventing HB infection, it is recommended that HB vaccine be given to expectant women at high risk. However, its safety to the fetus is not well documented. Only one human study reports the safety and efficacy of Heptavax, but only when administered (to 72 expectant women) in the last trimester of pregnancy when embryopathy cannot occur (Maurice & Gideon, 1991). They also reported pregnancy outcome in ten women, mostly health care personnel or patients traveling to endemic areas exposed to the vaccine during the first trimester of pregnancy and found that no congenital abnormalities were observed and all the infants are physically and developmentally normal for their ages at 2 to 12 months. Although trivial, their cohort indicated safe use of the vaccine in early pregnancy (Maurice & Gideon, 1991). Anti-hepatitis B immunoglobulin for new-borns of HBsAg-positive mothers is not provided at birth in public health facilities in Ghana. However, hepatitis B vaccination is provided as part of a routine vaccination schedule starting at 6 weeks of age. To therefore successfully inhibit mother-to-child transmission of hepatitis B, they recommended that screening tests for HBsAg in expectant women and hepatitis B vaccination of new-borns immediately after birth need to be performed in the region (and the country as a whole) (Cho, *et al.*, 2012).

A recent related study also evaluated the effects of cesarean section delivery on perinatal transmission of HBV from women who tested positive for the hepatitis B surface antigen (HBsAg). It analysed data from 1409 infants born to HBsAg-positive mothers through vaginal delivery (VD) (n = 673), elective caesarean section (ECS) (n = 496), or urgent cesarean section (UCS) (n = 240) who completed appropriate immunization against HBV. The prevention was assumed to have failed for infants who were HBsAg positive when they were 7-12 months old; this information was used to assess transmission rates. Consequently, it was found that HBV infection was transmitted to a smaller percentage of infants born by ECS (1.4%) than by VD (3.4%, $P < 0.032$) or UCS (4.2%, $P < 0.020$). UCS had no effect on mother-to-child transmission, compared with VD (4.2% versus 3.4%, $P = 0.593$). Babies born by ECS had a considerably lesser rate of mother-to-child transmission than those born by non-ECS (1.4% against 3.6%, $P = 0.017$). However, women with HBV DNA levels <1,000,000 copies/mL did not transmit the infection to their infants, regardless of method of delivery (Pan, *et al.*, 2013). There were no differences in expectant or infant morbidity and mortality among the groups. The authors therefore concluded that there is a significantly lower rate of mother-to-child transmission of HBV infection to infants delivered by ECS, compared with those delivered vaginally or by UCS. As such, elective caesarean sections for HBeAg-positive mothers with pre-delivery levels of HBV DNA ≥1,000,000 copies/mL could reduce mother-to-child transmission (Pan, *et al.*, 2013).

CHAPTER THREE

METHODOLOGY

3.1 Introduction

Chapter 3 describes the study area, the study design, the study population and the sampling procedure as well as the recruitment of respondents and the data collection procedure. The data entry and analysis is also outlined in this chapter.

3.2 Study area and Study design

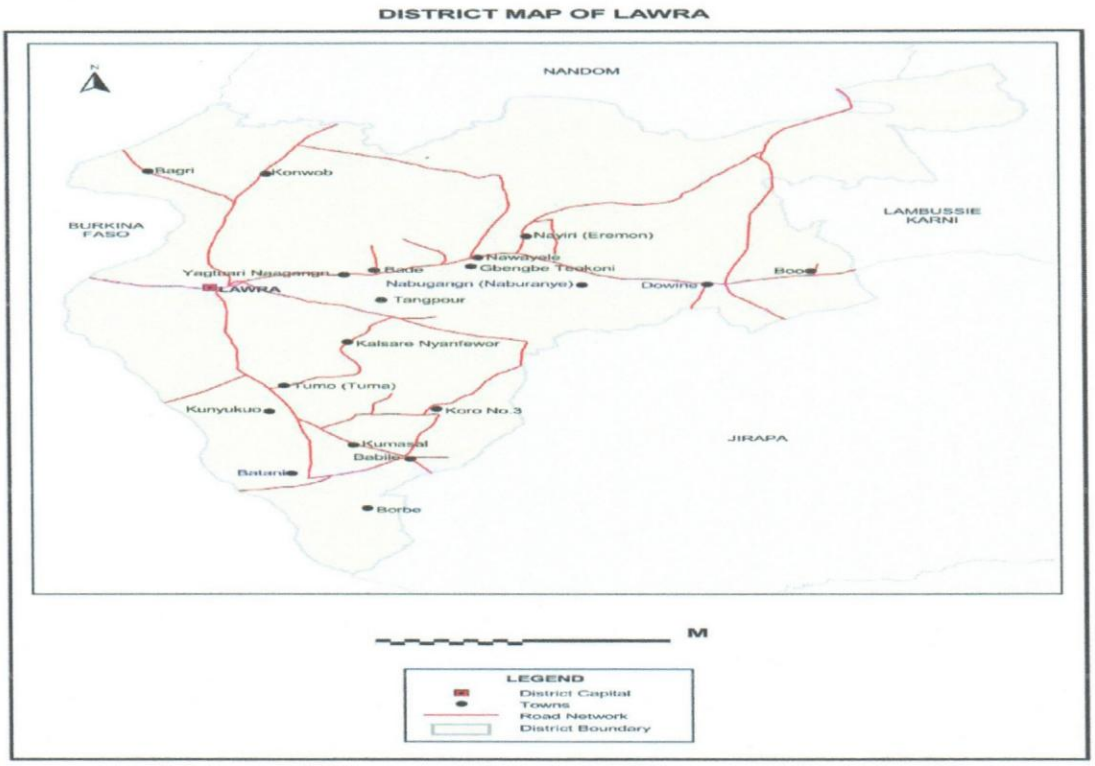
From March to April 2015, a cross-sectional study was conducted in the Upper West Region (UWR) of Ghana to determine the knowledge of expectant mothers concerning mother-to-child transmission of hepatitis B virus disease. The Upper West Region is situated in the north-western part of Ghana. Geographically, the region is located between longitude 1.25'' W and 2.45'' W and latitude 9.30'' N and 11.00'' N. It is bordered to the south by the Northern Region, to the east by the Upper East Region and to the North and West by the republic of Burkina Faso. Development in the region and availability of amenities is heterogeneous. The study was carried out in two areas; one (the Wa Municipality) relatively developed and the other (the Lawra District) relatively less developed.

3.2.1 Lawra District

The Lawra district is one of the eleven districts that make up the Upper West Region of Ghana and derives its legal existence from Legislative Instrument (L.I) 1434 of 1988. It lies in the North Western corner of the Upper West Region of Ghana between longitudes 2° 25"W and 2°45"W and Latitudes 10° 20" N and 11° 00"N. It is bounded to the East by

the Jirapa district, to the South by the Lambussie-Karni district, to the North by the Nandom district, and to the West the Republic of Burkina Faso. The total land area of the district is estimated at 483.6 square kilometers constituting about 5.7% of the upper west region's total area of 18,476 square kilometers. It has an estimated population of 50,703 projected from the 2010 population census, comprising 23,628 males and 27,075 females. The population of Women In Fertility Age (WIFA) is 13, 185 as at December 2014. The Lawra District on the other hand, had an ANC coverage rate of 59.8% out of its 1435 registrants with 96.0% skilled delivery coverage. Health care in the district is delivered through 11 static health facilities and 58 outreach points. Generally, accessibility to health service is adequate taking into consideration the compact nature of the district and its number of health facilities. The district health system is managed by the Lawra District Health Management Team (DHMT). The health system is organized into five sub-district health services managed by the Sub-District Health Management committee. The names of sub-districts together with some health indicators are presented in table 3.1.

Figure 3. 1: Map of the Lawra District showing the boundaries



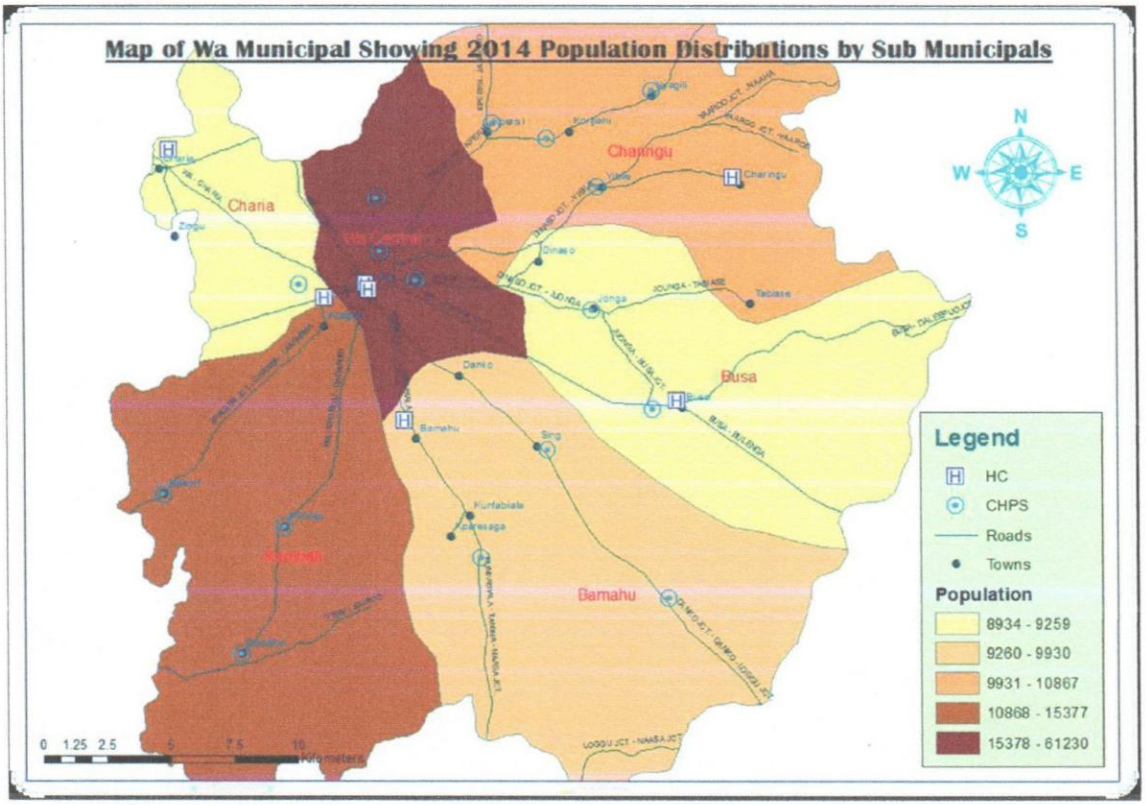
Source: Ghana Statistical Service, GIS (2014)

3.2.2 Wa Municipal

The Wa Municipality is one of the eleven districts that make up the Upper West Region of Ghana and derives its legal existence from Legislative Instrument (L.I) 1800 of 1988. It lies in the South Western part of the Upper West Region of Ghana between Longitudes 9° 32" W and 10° 20"W and latitudes 1° 40"N and 2°45"N. It is bounded to the East by the Wa East district, to the West and South by the Wa West district, and to the North by the Nadowli District. The Municipality has its capital as Wa which also serves as the regional capital of the Upper West Region. The total land area of the Municipality is estimated at 579.86 square kilometers constituting about 6.4% of the upper west region's total area of 18,476 square kilometers. It has an estimated population of 107, 214 projected from the 2010 population census, comprising 52,996 males and 54,218 females. The population of

Women In Fertility Age (WIFA) was 29,396 as at December 2014. It is the oldest and the relatively urban district of the Upper West Region with a population density of 185persons/km^2, (WMHD, 2014).

Figure 3. 2: Map of the Wa Municipal



Source: WMHD, 2014

Health care in the Municipality is delivered through its six Sub-municipalities with a total of 26 government health facilities including CHPS and 4 private health facilities. Generally, accessibility to health service is adequate taking into consideration the compact nature of the Municipality and its number of health facilities. The Municipal health system is managed by the Wa Municipality Health Management Team (WMHMT). The health system is organized into six sub-municipal health services managed by the Sub-Municipal

Health Management committee. The names of Sub-Municipalities together with some health indicators are presented in table 3.1 below.

Table 3. 1: Health facilities and Health indicators of the Wa Municipality and Lawra District

Health Facilities		Wa Municipal	Lawra District
1	Health Centres	6	4
2	Functional/ CHPS Zones	22	11
3	Clinics	4	2
4	Completed CHPS Compounds	15	18
5	Adolescent Health centre	1	0
6	Private Health Facilities	3	1
Total		**51**	**29**
Population & Health Indicators			
7	Population	107,214	50,703
8	WIFA	29,396	13185
9	ANC Registrants	12,340	1435
10	ANC Coverage rate	100.0%	59.8%
11	Skilled Delivery	100.0%	96.0%
12	HBV Prevalence	19.0%	15.1%
13	Total Fertility Rate	2.4	2.8

Source: GSS, 2013; WMHA, 2014; LDHD, 2014.

Table 3. 2: Ethnicity Composition of the Wa Municipality and Lawra District

Regional Population:	675,367	
Tribe	**Wa Municipality**	**Lawra District**
Dagaaba	32.3	72.8
Waala	48.1	7.5
Lobi	6.5	11.3
Akan	3.9	1.8
Others	9.2	6.6

Source: GSS, 2013

3.3 Study population and Sampling

The total population of the Wa municipality and the Lawra district was 162,103 persons according to the 2010 Population and Housing Census report. This comprises of 106,506 females and 101,637 males. The study targeted expectant women attending ANC clinics in the study areas. The total ANC attendance for the two districts stood at 13,775 and over 90% of them were registrants in the Wa Municipality alone. The fertility rate for the region is 3.45 and that for the study areas are 2.4 for the Wa Municipality and 2.8 Lawra District (Ghana Statistical Service, 2013).

3.3.1 Sample size calculation

The Cochran (1963), logical arithmetic procedure $N= \{Z^2 *(PQ)/d^2\}$ was used to compute the desired sample size for the study. Where N is the desired sample size, Z is the confidence level of 95% (1.96), P is the prevalence rate (19.0% and 15.1%) of hepatitis B in the Wa Municipality and Lawra Districts respectively. Q is a constant computed as 1-P (1-0.19), and d is (5% = 0.05) the set of margin of error. Therefore, for the Wa Municipality, giving hepatitis B prevalence of 19.0%, the sample size will be calculated as:

$$\frac{N = Z^2 \times PQ}{d^2} \quad \frac{= \{(1.96)^2 *(0.19(1-0.19)\}}{0.05^2} \quad \frac{= 0.5912}{0.0025} = 236$$

Assuming a 5%, non-response rate, an extra 12 subjects were added to arrive at a sample size of 248 subjects to be included in the study for the Wa Municipal area.

Similarly for the Lawra District, assuming hepatitis B prevalence of 15.1%, the sample size was calculated as:

$$\frac{N = Z^2 \times PQ}{d^2} \quad \frac{= \{(1.96)^2 *(0.15(1-0.15)\}}{0.05^2} \quad \frac{= 0.489804}{0.0025} = 199$$

Assuming a 5%, non-response rate, an extra 10 subjects were added to arrive at a sample size of 209 subjects to be included in the study for the Lawra district.

3.3.2 Sampling procedure

A three-stage sampling procedure was used to select the sub-districts, HFs and individual participants for the study. At the first stage of sampling, all sub-districts in both Wa municipality and Lawra district were included in the study. At the second and third stages of sampling the HFs and individual participants were selected respectively.

3.3.3 Selection of health facilities

Selection of the health facilities was done at the sub-district level. For each sub-district, list of all HFs where ANC services are available was compiled and through the lottery method, one HF was randomly selected from the list. Due to the fact that majority of women visit the Lawra district and the Wa regional hospitals for ANC services, these two hospitals were included in the study. Overall, 13 health facilities were included in the study; 7 in Wa Municipality and 6 in the Lawra district. Refer to table 3.3 for list of selected health facilities.

3.3.4 Selection of Participants

Selection of individual participants was carried out at the HF level using the quota sampling method. For each of the study areas, the calculated sample size was allocated among the selected HFs in proportion to their past ANC attendance. Table 3.3 outlines the list of selected HFs, past ANC attendance and sample size to be included in the study. All selected HFs were visited by our field team during ANC days. Each time a facility was visited, a written permission was obtained from the facility management. During ANC sessions, the study protocol was explained to all expectant mothers who turned up for ANC services for the day. An oral consent of the participant was usually sought and only those who agreed to take part in the study were included in the study.

3.4 Data collection:

Prior to data collection, 5 research Assistants were recruited and trained on the relevance and study protocol as well as the data collection tools to be used for the study. From April 1 to May 31 2015, the selected health facilities were visited during ANC days to administer the data collection tool. Each time we visited a facility, permission was sought from the authority of facility before data collection commenced. At the ANC level, the study protocol was usually clearly explained to the expectant mothers in English and/or in their local dialect for those who did not understand English. Their voluntary participation in the study was usually sought afterwards and only those who agreed to the study protocol were included in the study. Those who did not participate in the study were still attended to by the facility's ANC nurses and taken through the routine ANC procedures without discrimination.

Data collection involved administration of questionnaire Form 1A as shown in the appendix 2. The demographic data and knowledge about mother-to-child transmission of hepatitis B among the participants were captured in the data collection tool. Each component of the questionnaire was explained to the participants clearly and for those who did not understand the English language; it was explained in their own local dialect to understand before answering. Each time a facility was visited, participants were recruited until the quota for that facility was met if not, further visits were conducted until the quota for that facility was obtained. Refer to table 3.4 for list of selected HFs and number of participants interviewed.

3.5 Study variables

The dependent variables in this study include respondents' knowledge about the hepatitis B virus infection and disease; their knowledge about the mother-to-child transmission of

the HBV; their knowledge about the preventive practices against hepatitis B transmission; and the prevalence of the HBV disease. The independent variables of the study include the socio-demographic and economic factors of age, educational status, marital status, occupation, religious affiliation, residential status, income earning, household size (refer to table 3.3 for the summary of the variables).

Table 3. 3: Array of study variables

Study Variables	
Independent	**Dependent**
Age	Prevalence of HBV infection or HBV Reactivity status
Educational level	Knowledge about HBV Infection & Disease
Marital status	Knowledge s about MTCT of HBVD
Residential status	Knowledge about the Prevention of HBV infections
Family setup	
Monthly income	
Household Size	
Obstetric characteristics	
Gravidity	
Parity	

Table 3. 4: List of Health facilities sampled and the quota of sample size

Sno	Sub-District	Health Facility	ANC Attendance	% of Total Attendance	Quota Sample
WA MUNICIPALITY					
1	Kambale Sub	Kambale HC	697	5.64	14
2	Bamahu Sub	Bamahu HC	407	3.30	8
3	Charingu Sub	Charingu HC	282	2.28	6
4	Busa Sub	Busa HC	279	2.26	5
5	Wa Sub	Wa Reg. Hospital	1,341	10.87	27
6	Charia Sub	Dobile CHPS	392	3.18	8
7	Wa Urban Sub	Wa Central HC	8,942	72.50	180
Total			**12,340**	**100.00**	**248**
LAWRA DISTRICT					
8	Eremon Sub	Eremon HC	107	8.89	19
9	Lawra Main	Lawra Dist. Hospital	715	59.43	124
10	Babile Sub	Babile Polyclinic	194	16.13	34
9	Lawra Sub	Lawra Sub HC	28	2.33	5
11	Domwini Sub	Domwini HC	42	3.49	7
12	Zambo Sub	Zambo HC	117	9.73	20
Total			**1,203**	**100.00**	**209**

Quota sample is the product **percentage of total ANC attendance and the **Sample Size***

3.6 Data Analysis

The data was entered into Microsoft Office Excel for Windows version 2010 and then exported to the Statistical Package for Social Sciences (SPSS) software version 20.0 for Windows for analysis. Continuous data was tested for normality and logistic regression analysis performed to eliminate factors associated with incorrect responses. Descriptive statistical analysis of frequencies, Scatterplots and histograms were performed to further clean the data of errors. The data was then analyzed using descriptive statistics of frequencies, cross tabulations and correlation analysis. The association between socio-demographic factors and obstetric characteristics was analyzed against the outcome

variable of respondents' knowledge about the HBV infection and disease, and their knowledge about the mother-to-child transmission of the HBV disease. This was done in order to establish determinants of the knowledge of mother-to-child transmission of the HBV. Statistical test of significance was calculated using bivariate logistic regression. The test of significance (*p-value*) was set at 0.05 with a confidence interval of 95% though there was a 100% response rate of the targeted sample size.

3.7 Quality Control

To ensure data quality and reliability, each research assistant was assigned a special code that was used to identify the data. The questionnaires were also designed with provisions to duly capture the particular District, the Sub-district, the selected Health facility, and the respondent's number. That is, whether an expectant woman interviewed was the 1st, 2nd, 3rd, or the Nth respondent in that facility. Each research assistant was therefore required to carefully fill-in the above necessary details before commencing an interview with each respondent. The numbering of respondents was to ensure that the expected number of respondents needed from each sub-district was met. Each assistant, per the design of the questionnaire was mandated to indicate his/her initials and signature at the successful end of each administration session. Each questionnaire was usually read out and interpreted to each respondent in a language that she understood and preferred to be used. The completed questionnaires were cross-checked for any errors and corrected where possible at the end of each day. Logistic regression analysis was performed to eliminate the factors associated with incorrect responses.

3.8 Informed Consent

Prior to data collection, an introductory letter obtained from the Department of Community Health of the School of Allied Health Sciences of the University for Development Studies was sent to the Upper West Regional Health Directorate to introduce the researcher and also to request for permission to carry out the study. At the District and Municipal levels, permission was sought from the Lawra District and Wa Municipal health directorates, the sub-districts, sub-municipal and also from the facility management before commencing the data collection. At the individual level, informed consent was sought. The rationale of the study, the study design and procedure were all explained to all participants in their own language and only those who orally agreed to participate in the study were included in the study. At each point in time during the study, participants could freely opt out of the study. Those who did not participate in the study were offered normal ANC services without any discrimination. Data obtained was treated with confidentiality.

3.9 Participant Selection Criteria

3.9.1 Inclusion criteria

All expectant mothers in the Lawra district and Wa Municipality who reported to the selected HFs for ANC services and who agreed to be part of the study were included in the study.

3.9.2 Exclusion criteria

Any person or group of persons who fell short of the inclusion criteria above was excluded in the study.

CHAPTER FOUR

RESULTS

4.1 Socio-Demographic characteristics of respondents

Table 4.1 above presents the socio-demographic characteristics of the respondents. In total, 450 expectant women were interviewed for the study: 46.7% (210) of them in the Lawra district and 53.3% (240) interviewed in the Wa Municipality. Their overall ages ranged from 14 to 48 years with median age of 29 years (IQR=22-33). The median ages of the respondents were comparable for those interviewed in the in the Lawra district (28 years) and those in the Wa municipality (29 years). Age group distribution showed 32.9% (148) of the respondents were aged between 20 to 30 years, whereas 12.0% (55) and 15.6% (70) of them were aged below 20 years and above 35 years respectively. Similar pattern of age distribution was observed in both the Lawra district and the Wa municipality (refer to table 4.1).

Regarding their occupation, 32.7% (147) and 23.8 (107) of the study population do Private businesses and subsistent farming respectively for their living. Comparatively, only 19% (20) were engaged in private business in the Lawra district and majority of the respondents 44.6% (107) were engaged in private businesses in the Wa Municipality. In the Lawra district, the dominant occupation was subsistent farming; 35.2% (74) whereas only 13.8% (30) were engaged in farming in the Wa municipality (table 4.1). In general, literacy level was 62.4% (280) while 37.6% (169) had no formal education. Of those who had formal education, 33.9% (95) were educated to the Junior High School (JHS) level, 27.1% (76) to

the Primary school level, 17.1% (48) to the Senior High level and 21.8% (65) to the tertiary level (table 1).

The respondents' obstetric history showed that, overall 77.0% (347) were expectant for the second or more times at the time of the study (gravida 2 or more) whereas only 23.0% were expectant for the first time (primidgravida). This was comparable for both the Lawra district and the Wa municipality (77.1% vs. 76.2%). Overall, 95.3% (429) of the respondents earned GHS500 or less as average monthly income and this was similar in both the Lawra District and the Wa Municipality (table 4.1). With respect to the type of family setup in the study area, 58% (261) of the respondents had a monogamous family structure whiles 33.6% (151) of them had polygamous family structure. In both the Lawra District (61.4%) and the Wa Municipality (55%) monogamous family is the dominant structure (table 4.1).

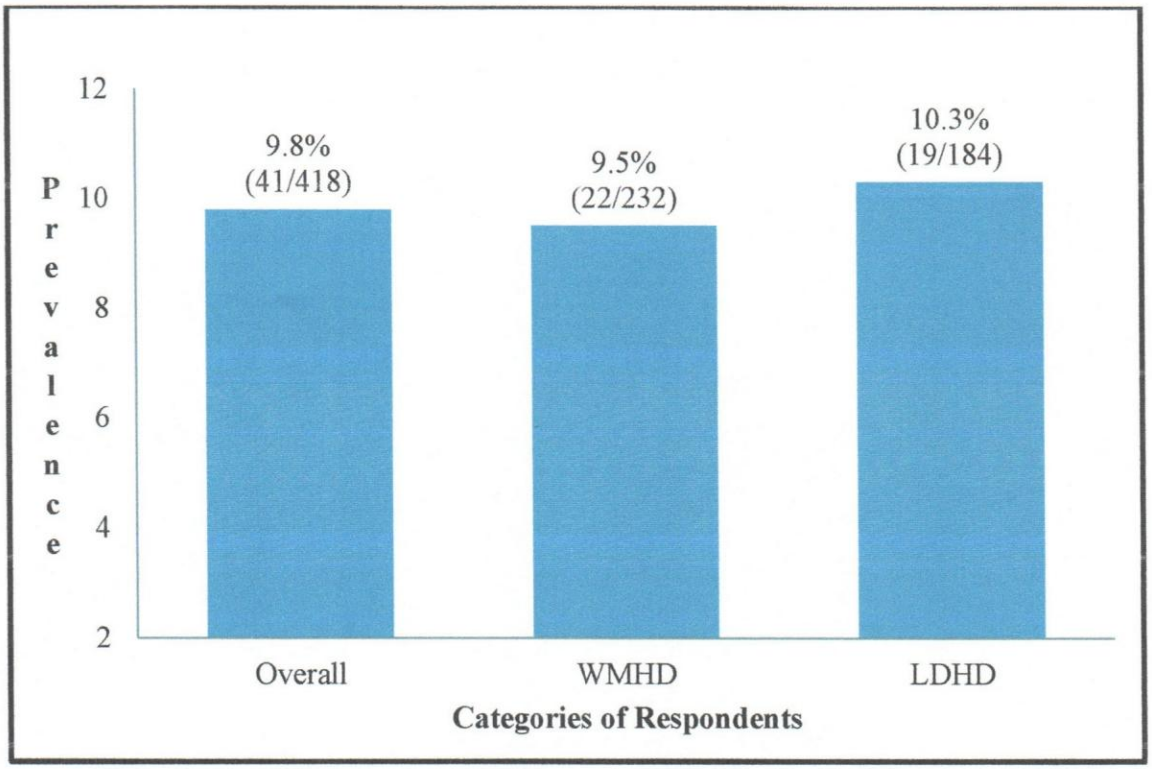
Table 4. 1: Socio-Demographic Characteristics of Respondents

Variable	Total		Wa Municipality		Lawra District	
	N	%N	N	%N	N	%N
Age group						
<20	55	12.2	22	9.2	33	15.7
20-24	82	18.2	42	17.5	40	19.0
25-30	148	32.9	90	37.5	58	27.6
31-35	95	21.1	50	20.8	45	21.4
>35	70	15.6	36	15.0	34	16.2
Total	**450**	**100.0**	**240**	**100.0**	**210**	**100.0**
Occupation						
Farming	107	23.8	33	13.8	74	35.2
Civil/Public Service	51	11.3	28	11.7	23	11.0
Private Business	147	32.7	107	44.6	40	19.0
Unemployed	39	8.7	24	10.0	15	7.1
Student	106	23.6	48	20.0	58	27.6
Total	**450**	**100.0**	**240**	**100.0**	**210**	**100.0**
Educational level						
Primary	76	27.1	48	20.0	28	13.3
JHS	95	33.9	48	20.0	47	22.4
SHS	48	17.1	36	15.0	12	5.7
Tertiary	61	21.8	39	16.3	22	10.5
Total*	**280**	**62.2***	**171**	**71.3***	**109**	**51.9***
Gravidity						
Primidgravida	105	23.3	57	23.8	48	22.9
Gravida 2	89	19.8	46	19.2	43	20.5
Gravida 3	100	22.2	62	25.8	38	18.1
Multigravida	156	34.6	75	31.2	81	38.5
Total	**450**	**99.9**	**240**	**100.0**	**210**	**100.0**
Average Monthly Income group						
GHS 0-500	429	95.3	227	94.6	202	96.2
GHS 501-1000	17	3.8	9	3.7	8	3.8
Above GHS1000	4	0.9	4	1.7	0	0.0
Total	**450**	**100.0**	**240**	**100.0**	**210**	**100.0**
Family Set-up						
Polygamous	151	33.6	89	37.1	62	29.5
Monogamous	261	58.0	132	55.0	129	61.4
Other	37	8.2	18	7.5	19	9.0
Total	**449**	**99.8**	**239**	**99.6**	**210**	**100.0**

4.2 The Prevalence of HBV among Expectant Mothers

Figure 4.1 indicates an overall HBV prevalence of 9.8% (41/418) respondents. The HBV prevalence in the Lawra District was 0.8% higher than that in the Wa Municipality (9.5%).

Figure 4. 1: Prevalence of HBV Infection among Expectant Mothers



**N: sum of positive and negative HBV cases; n = HBV Positive cases only*

4.3 General Knowledge about HBV Infection and Disease

Table 4.2 shows the results of respondents' knowledge about hepatitis B Infection and its disease. Out of the overall 450 respondents interviewed in the study, 46.2% (208) of them knew about hepatitis B infection and its disease. Knowledge about the infection and the disease was lower in the Lawra District (40.1%) compared to that in the Wa Municipality (51.6%). Overall, respondents' knowledge about liver damage/cirrhosis as consequence of hepatitis B infection was 47.1%. The knowledge was higher in the Lawra District (50%)

compared to that Wa Municipality (45%). About 49% (219) of respondents in general knew that the HBV can be transmitted through blood and/or blood products. Respectively in the Lawra District and the Wa Municipality, 35.2% (74) and 60.4% (145) of the respondents knew that HBV infection could occur through contact with blood or blood products. In total 42.8% (193) of the respondents knew that unprotected sex could lead to HBV transmission. The awareness was higher in Wa Municipality compared to that of the Lawra district (57.0% vs. 26.7%), (table 4.2).

Table 4. 2: Genera Knowledge about Hepatitis B Infection and Disease

Knowledge	Overall N (%)	Wa Municipality N (%)	Lawra District N (%)
HBV is more Infectious than HIV/AIDS	132 (29.3)	62 (25.8)	70 (33.3)
HBV can lead to liver damage/cirrhosis	212 (47.1)	107 (44.6)	105 (50.0)
There's blood test for HBV infection	341 (75.8)	199 (82.9)	142 (67.6)
HBV can be transmitted via blood/products	219 (48.7)	145 (60.4)	74 (35.2)
HBV infection is possible via sharing of food, drinks, witchcraft, etc.	40 (8.9)	21 (8.8)	19 (9.0)
The HBV can be transmitted through unprotected sex with an infected person	193 (42.8)	137 (57.0)	56 (26.7)
An HBV infected infant may not show any sign and symptoms	349 (77.5)	189 (78.8)	160 (76.2)
Do you know your HBV status?	349 (77.5)	131 (54.6)	48 (22.9)
Percentage Knowledgeable	**208 (46.2)**	**124 (51.6)**	**84 (40.1)**
Total number of respondents	**450***	**240***	**210***
**Percentages do not add up to 100% due to multiple responses*			

4.4 Knowledge about Mother-to-Child Transmission of HBV

In general, 35.1% (158) of the respondents had knowledge about the mother-to-child transmission of hepatitis B infection. Knowledge about mother-to-child transmission of hepatitis B infection was higher (45.1%) among respondents in the Wa Municipality compared to that of Lawra District (24.0%), (table 4.3). Generally, majority (76.2%) of the respondents knew that Hepatitis B infected expectant woman can pass the virus to her unborn child in the uterus. Comparatively, knowledge among respondents in both Wa Municipality and Lawra District were respectively high (84.2% and 67.1%). An overall minority of 1.7% (8) of the respondents knew that breast milk is not a possible HBV transmission route. Only few respondents in both Lawra District (2.4%) and the Wa Municipality (1.2%) also knew that breast milk does not pose risk of transmitting the HB virus. An overall of 39.3% (177) of the respondents knew that a new born child who is not vaccinated against the HBV infection could still contract the infection from close contact with their infected mothers. A comparison of the two study areas indicates that the knowledge level among respondents in the Lawra District was less (19.5%) than that in the (56.7%) in the Wa Municipality (table 4.3).

Table 4. 3: Expectant Mothers' Knowledge about Mother-to-child Transmission of HBV

Knowledge about MTCT of HBV	Overall N (%)	Wa Municipal N (%)	Lawra District N (%)
An HBV infected Mother can infect her baby in the uterus (intrauterine) before birth	343 (76.2)	202 (84.2)	141 (67.1)
Breast milk can transmit HBV	8(1.7)	3(1.2)	5(2.4)
Newborns are too young to contract HBV from Infected Mothers	177 (39.3)	136 (56.7)	41 (19.5)
MTCT of HBV can only occur before child birth	177 (39.3)	130 (54.2)	47 (22.4)
The HBV vaccine is harmful to the unborn	75 (16.7)	51 (21.1)	24 (11.4)
HBV infection of the child cannot occur after the child is born	175 (38.9)	128 (53.3)	47(22.4)
Average Knowledge about MTCT	**158 (35.1)**	**108 (45.1)**	**50 (24.0)**
Total number of respondents	**450***	**240***	**210***
**Percentages do not add up to 100 due to multiple responses.*			

4.5 Socio-demographic Determinants of Mothers' Knowledge and Prevalence

4.5.1 Socio-Demographic Determiners of General Knowledge about HBV Infection& Disease

Table 4.4 displays findings on how the socio-demographic characteristics of respondents are associated with their general knowledge about the HBV Infection and disease in the study area. Each socio-demographic factor was exclusively fitted into the binary regression model to determine its relationship with their knowledge about HBV infection and Disease.

The findings of overall analysis indicate that, there was a statistically significant association between respondents' *age* and their general knowledge about HBV Infection and disease (*P=0.021*); older pregnant mothers were about two times more likely not to have knowledge about HBV infection and disease compared to the younger pregnant mothers (OR= 1.97, 95% CI: 1.11-3.49). However, unlike in the Wa Municipality where age of

respondents had no statistically significant influence on their general knowledge about HBV Infection and Disease (*P=0.424*), it had a statistically significant association with the level of knowledge among respondents in the Lawra District (*P=0.006*). Older pregnant (>30years) mothers in the Lawra District had increasing odds (OR = 2.93) of not having knowledge about HBV Infection and Disease unlike as compared to younger pregnant mothers (95% CI: 1.36-6.28). Also, there was a statistically significant association between *marital status* and their general knowledge about the HBV infection and disease (*P=0.002*) in that unmarried pregnant mothers had 0.42 lesser odds of HBV general knowledge as compared to married pregnant women. Comparatively in the Wa Municipality however, marital status had no statistically significant relationship with general HBV knowledge (*P=0.117*) unlike in the Lawra District (*P=0.002*). Unmarried pregnant women in the Lawra District had 0.31 lesser odds of having knowledge about the HBV infection and disease (95% CI=0.15-1.64).

Expectant mothers' *educational level*, generally, was statistically significant and associated with their level of knowledge about the HBV infection and disease (*P=0.014*). Compared to uneducated pregnant mothers, the educated pregnant mothers had 1.63 times higher odds of having general HBV infection and disease (95% CI=1.10-2.40). In the specifics however, educational level did not have a statistical significant association with general HBV knowledge (*P=0.698*) unlike in the Lawra District (*P=0.016*). Educated pregnant mothers in the Lawra district had 2.02 times higher odds of general HBV knowledge as compared their uneducated counterparts (95% CI=1.14-3.56). Generally, there was no statistically significant association between expectant mothers' *occupation* and their general HBV knowledge (*P=0.537*) though employed pregnant mothers had 1.13 times higher odds of general HBV knowledge compared to the unemployed pregnant mothers

(95% CI= 0.77-1.64). Maternal occupation equally had no statistically significant relationship with their general knowledge about HBV infection and disease in both Wa Municipality (*P=0.637*) and Lawra District (*P=0.477*) though there 1.13 times higher odds for employed mothers in the Wa Municipality compared to the unemployed mothers (95% CI=0.68-1.88). Employed pregnant mothers in the Lawra District had 0.80 times lesser odds of general HBV knowledge compared to the unemployed pregnant mothers (95% CI=0.43-1.48).

Overall maternal *family setup* had no statistically significant influence on their knowledge about HBV infection and disease (*P=0.512*) as both monogamous and polygamous pregnant mothers contributed equally to the general HBV knowledge (95% CI=0.60-1.29). In comparing the two areas of study, maternal family set up had a statistically significant (*P=0.036*) association with their general HBV knowledge in the Wa Municipality unlike in the case of the Lawra District (*P=0.274*). Monogamous pregnant mothers in the Wa Municipality had 1.73 times higher odds of knowing about general HBV infection and disease (95% CI=1.04-2.90). in terms of *gravidity*, it was generally found to be statistically significant and related to pregnant mothers' general knowledge about the HBV infection and disease (*P=0.011*); compared to primidgravida mothers, multigravida mothers were 1.77 times more knowledgeable than their primidgravida mothers (95% CI=1.14-2.76). Similar trend was observed in the Lawra District (*P=0.011*) where multigravida mothers had 2.34 times higher odds of knowledge than primidgravida mothers (95% CI=1.21-4.51). Maternal gravidity was however found not statistically significant with general knowledge about HBV infection and disease in the Wa Municipality (*P=0.267*) tough multigravida mothers had 1.41 times higher odds of knowledge compared to primidgravida mothers (95% CI=0.77-2.56) (table 4.4).

Table 4. 4: Socio-Demographic Determinants of General Knowledge about HBV Infection& Disease using Binary Logistics Regression Analysis

	Overall		WMHD		LDHD	
Age	**P-value**	**OR(95% CI)**	**P-value**	**OR(95% CI)**	**P-value**	**OR(95% CI)**
≤30years	**0.021**	1.97(1.11, 3.49)	0.424	1.42(0.58, 3.46)	**0.006**	2.93(1.36, 6.28)
>30years		1.00		1.00		1.00
Marital status						
Married	**0.002**	0.42(0.25, 0.72)	0.117	0.53(0.24, 1.17)	**0.002**	0.31(0.15, 1.64)
Not Married		1.00		1.00		1.00
Education						
Educated		1.00		1.00		1.00
Not Educated	**0.014**	1.63(1.10, 2.40)	0.698	1.12(0.64, 1.96)	**0.016**	2.02(1.14, 3.56)
Occupation						
Employed		1.00		1.00		1.00
Not Employed	0.537	1.13(0.77, 1.64)	0.637	1.13(0.68, 1.88)	0.477	0.80(0.43, 1.48)
Family Setup						
Polygamous	0.512	0.88(0.60, 1.29)	**0.036**	1.73(1.04, 2.90)	0.274	0.73(0.41, 1.29)
Monogamous		1.00		1.00		1.00
Gravidity						
Primigravida	**0.011**	1.77(1.14, 2.76)	0.267	1.41(0.77, 2.56)	**0.011**	2.34(1.21, 4.51)
Multigravida		1.00		1.00		1.00
Income						
≤GHS500	0.829	0.91(0.38, 2.18)	0.706	1.24(0.40, 3.81)	0.502	0.62(0.15, 2.54)
≥GHS500		1.00		1.00		1.00

4.5.2 Socio-demographic Determinants of Knowledge about MTCT of HBV

Table 4.5 presents findings on how the socio-demographic characteristics of respondents are associated with their knowledge about MTCT of HBV infection in the study area. Each socio-demographic factor again was exclusively fitted into the binary regression model to determine its relationship with their knowledge about MTCT of HBV infection. The findings of overall analysis indicate that, there was no statistically significant association between respondents' *age* and their general knowledge about MTCT of HBV infection (*P=0.472*); pregnant mothers who were older than 30years had 1.24 times higher odds of knowledge about MTCT of HBV infection compared to the younger pregnant mothers (95% CI= 0.69-2.20). The situation was similar in both Wa Municipality (*P=0.404*) and Lawra

District (*P–0.130*) where older pregnant mothers had 1.60 times higher odds (95% CI=0.53-4.82) and 0.56 lesser odds of knowledge respectively (95% CI=0.27-1.19).

Also, there was a statistically significant association between *marital status* and their general knowledge about the HBV infection and disease (*P=0.007*) in that unmarried pregnant mothers had 2.13 times higher odds for knowledge of MTCT of HBV infection as compared to married pregnant women (95% CI=1.23-3.69). Comparatively, marital status in the Wa Municipality also had a statistically significant relationship with knowledge of MTCT of HBV infection (*P=0.020*) unlike in the Lawra District (*P=0.480*). Unmarried pregnant women in the Wa Municipality had 0.27 lesser odds of having knowledge about the MTCT of HBV infection (95% CI=1.12-0.62).

Expectant mothers' *educational level*, generally, was statistically significant and associated with their level of knowledge about the MTCT of HBV infection (*P=0.007*). Compared to uneducated pregnant mothers, the educated pregnant mothers had 1.83 times higher odds of knowledge about MTCT of HBV infection (95% CI=1.18-2.84). In the specific study areas however, educational level did not have a statistical significant association with knowledge about MTCT of HBV infection (*P=0.977*) in the Wa Municipality (95% CI=.046-2.12) unlike in the Lawra District (*P=0.017*). Educated pregnant mothers in the Lawra district had 0.49 times lesser odds of not knowing about MTCT of HBV infection as compared their uneducated counterparts (95% CI=0.27-0.88). Generally, there was a statistically significant association between expectant mothers' *occupation* and their knowledge MTCT of HBV infection (*P<0.001*) as employed pregnant mothers had 2.46 times higher odds of knowledge of MTCT of HBV compared to the unemployed pregnant

mothers (95% CI= 1.54-3.95). However, maternal occupation had no statistically significant relationship with their knowledge about MTCT of HBV infection in Wa Municipality (*P=0.122*) unlike in the Lawra District (*P=0.015*); there was a 0.58 times lesser odds for employed mothers in the Wa Municipality compared to the unemployed mothers (95% CI=0.29-1.16). Employed pregnant mothers in the Lawra District had 0.42 times lesser odds of not knowing about MTCT of HBV infection as compared to the unemployed pregnant mothers (95% CI=0.21-0.85).

Overall maternal *family setup* had no statistically significant influence on their knowledge about HBV infection and disease (*P=0.965*) as both monogamous and polygamous pregnant mothers contributed equally (OR=1.01) to the knowledge of MTCT of HBV infection (95% CI=0.65-1.57). In comparing the two areas of study, maternal family set up had a statistically significant (*P=0.015*) association with their MTCT of HBV knowledge in the Wa Municipality unlike in the case of the Lawra District (*P=0.092*). Monogamous pregnant mothers in the Wa Municipality had 2.44 times higher odds of knowing about MTCT of HBV infection (95% CI=1.19-4.99).

In terms of *gravidity*, it was generally found to be statistically significant and related to pregnant mothers' knowledge about MTCT of HBV infection (*P=0.008*); compared to primidgravida mothers, multigravida mothers were 1.92 times more knowledgeable than their primidgravida mothers (95% CI=1.83-3.10). Similar trend of relationship was observed in the Wa Municipality (*P=0.003*) where multigravida mothers had 2.99 times higher odds of knowledge about MTCT of HBV infection than primidgravida mothers (95% CI=1.43-6.24). Maternal gravidity was however found not statistically significant with

general knowledge about HBV infection and disease in the Lawra District (*P–0.272*) tough multigravida mothers had 1.45 times higher odds of knowledge compared to primidgravida mothers (95% CI=0.77-2.56) (table 4.6). Maternal income level was generally not statistically significant and had no association with their knowledge about MTCT of HBV infection (*P=0.998*) though mothers who earned more than GHS500 had 5.37 times higher odds of knowledge compared to mothers who earned GHS500 or less (95% CI=0.00-0.00) (table 4.5).

Table 4. 5: Socio-demographic Determiners of Knowledge about MTCT of HBV using Binary Logistics Regression Analysis

	Overall		WMHD		LDHD	
Age	**P-value**	**OR(95% CI)**	**P-value**	**OR(95% CI)**	**P-value**	**OR(95% CI)**
≤30years	0.472	1.24(0.69, 2.20)	0.404	1.60(0.53, 4.82)	0.13	0.56(0.27, 1.19)
>30years		1.00		1.00		1.00
Marital status						
Married	**0.007**	2.13(1.23, 3.69)	**0.02**	0.27(0.12, 0.62)	0.48	0.77(0.37, 1.60)
Not Married		1.00		1.00		1.00
Education						
Educated		1.00		1.00		1.00
Not Educated	**0.007**	1.83(1.18, 2.84)	0.977	0.99(0.46, 2.12)	**0.017**	0.49(0.27, 0.88)
Occupation						
Employed		1.00		1.00		1.00
Not Employed	**<0.001**	2.46(1.54, 3.95)	0.122	0.58(0.29, 1.16)	**0.015**	0.42(0.21, 0.85)
Family Setup						
Polygamous	0.965	1.01(0.65, 1.57)	**0.015**	2.44(1.19, 4.99)	0.092	0.59(0.32, 1.09)
Monogamous		1.00		1.00		1.00
Gravidity						
Primigravida	**0.008**	1.92(1.82, 3.10)	**0.003**	2.99(1.43, 6.24)	0.272	1.45(0.75, 2.84)
Multigravida		1.00		1.00		1.00
Income						
≤GHS500	0.998	5.37(0.00, 0.00)	0.999	3.24(0.00, 0)	0.999	8.38(0.00, 0)
>GHS500		1.00		1.00		1.00

4.5.3 Socio-Demographic determinants of Pregnant Mothers' HBV Prevalence

Table 4.6 provides findings on how the socio-demographic determiners of respondents' HBV prevalence in the study area. Each socio-demographic factor again was exclusively fitted into the binary regression model to determine its relationship with their HBV prevalence.

The findings generally indicate that, there was no statistically significant association between respondents' *age* and their HBV prevalence (*P=0.199*); pregnant mothers who were older than 30years had 0.59 times lesser odds of HBV prevalence compared to the younger pregnant mothers (95% CI= 0.27-1.32). The situation was similar in the Wa Municipality (*P=0.444*) though older pregnant mothers here had 1.80 times higher odds of HBV prevalence compared to their younger colleagues (95% CI=0.40-8.07). In the case of the Lawra District maternal age was statistically significant and related to their HBV prevalence (*P=0.011)* as older pregnant mothers had 0.26 times lesser odds of HBV prevalence (95% CI=0.09-0.73).

Generally, *marital status* did not show a statistically significant association with their general HBV prevalence (*P=0.0.237*) in that unmarried pregnant mothers had 0.62 times lesser odds of HBV prevalence as compared to married pregnant women (95% CI=0.28-1.37). Comparatively, marital status in the Lawra District also had a statistically significant relationship with HBV prevalence (*P=0.040*) unlike in the Wa Municipality (*P=0.575*). Unmarried pregnant women in the Lawra District had 0.35 lesser odds of HBV prevalence (95% CI=0.13-0.96). Overall maternal *family setup* had no statistically significant influence on their HBV prevalence (*P=0.221*) as both monogamous and polygamous

pregnant mothers contributed equally (OR=1.50) to the HBV prevalence (95% CI=0.79-2.86). In comparing the two areas of study, maternal family set up had a statistically significant (*P=0.033)* association with their HBV prevalence in the Wa Municipality unlike in the case of the Lawra District (*P=0.0566*). Monogamous pregnant mothers in the Wa Municipality had 2.78 times higher odds of HBV prevalence (95% CI=1.09-7.10). Overall, socio-demographic characteristics of education (*P=0.709*), occupation (*P=0.703*), Gravidity (*P=0.660*), and income level (*P=0.914*) were not statistically significant and were not associated with expectant mothers' HBV prevalence. This finding was similar in both the Wa Municipality and Lawra District (table 4.6).

Table 4.6: Socio-Demographic determinants of Pregnant Mothers' HBV Prevalence using Binary Logistic Regression Analysis

	Overall		WMHD		LDHD	
Age	**P-value**	**OR(95% CI)**	**P-value**	**OR(95% CI)**	**P-value**	**OR(95% CI)**
≤30years	0.199	0.59(0.27, 1.32)	0.444	1.80(0.40, 8.07)	**0.011**	0.26(0.09, 0.73)
>30years		1.00		1.00		1.00
Marital status						
Married	0.237	0.62(0.28, 1.37)	0.575	1.54(0.34, 6.94)	**0.040**	0.35(0.13, 0.96)
Not Married		1.00		1.00		1.00
Education						
Educated		1.00		1.00		1.00
Not Educated	0.709	0.88(0.46, 1.71)	0.641	0.80(0.31, 2.06)	0.996	0.99(0.39, 2.58)
Occupation						
Employed		1.00		1.00		1.00
Not Employed	0.703	1.13(0.59, 2.17)	0.427	1.45(0.58, 3.59)	0.824	0.89(0.30, 2.58)
Family Setup						
Polygamous	0.221	1.50(0.79, 2.86)	**0.033**	2.78(1.09, 7.10)	0.566	0.74(0.27, 2.05)
Monogamous		1.00		1.00		1.00
Gravidity						
Primigravida	0.660	1.18(.57, 2.45)	0.650	1.26(0.47, 3.39)	0.877	1.09(0.37, 3.21)
Multigravida		1.00		1.00		1.00
Income						
≤GHS500	0.914	0.92(0.21, 4.14)	0.461	0.55(0.11, 2.67)	0.999	1.91(0.00, 0)
>GHS500		1.00		1.00		1.00

CHAPTER FIVE

DISCUSSION

5.0 Introduction

This study was conducted in two districts of the Upper West Region to assess the knowledge of expectant women about MTCT of the hepatitis B Viral Infection. This design compared the knowledge level of expectant mothers from rural parts of the region to that of their counterparts from a urban part of the region.

5.1 Socio-Demographic characteristics of respondents

This study included a total of four hundred and fifty (450) expectant mothers, some recruited from the Wa Municipality, a relatively urban setting, and others from the Lawra District, a relatively rural setting, both in the Upper West Region of Ghana. Overall, majority of the respondents were from the Wa Municipality and were within the very youthful ages of 20 to 35 years. Literacy rate among respondents was generally high as majority of them have had some form of formal education. Of those with formal education, majority of them were educated above primary level. As expected, there were more educated respondents in the Wa Municipality compared to the Lawra District, because the Wa Municipality is comparatively an urban setting than the Lawra District. The pattern observed in this study is comparable to the trend of education of the general population in the area.

Generally, most of the respondents earned monthly income of five hundred Ghana cedis or less than that per month on an average. This implies that on an average, majority of the

expectant mothers in the Upper West Region could conveniently afford basic health care services for themselves such as the blood screening for HBV, and the cost of the HBV vaccination. Commonly, majority of the respondents practiced the monogamous family system; three-quarters of them were multiparous (those expectant for the second or more time), and the average household density was six persons. This suggests that majority of the families in the Upper West Region are relatively large and therefore may require more financial resources to be able to access a comprehensive blood screening test and vaccination cover for the whole family against HBV infection.

5.2 Prevalence of Hepatitis B Infection

Overall, the prevalence of the HBV infection among the expectant women who tested for the infection was high; it is more than three times the national average of 10% - 15% in the general Ghanaian population. The prevalence among respondents in the Wa Municipality and in the Lawra District were comparable. This result is within the national average range but higher than the 8% HBV prevalence reported among the general population in the region by Mkandawire, *et al.*, in their 2013 study. This could be due to the fact that a significant proportion of the expectant mothers are co-wives to one or more other women (that is, these women are married to men who have other wives in addition to them) especially in the Wa Municipality, respondent's family type is statistically significant and related to their HBV infection. As such, there is a high chance of HBV transmission from an infected woman to her co-wife(s) if the husband and/or the other colleague wives are not vaccinated against the virus. The high prevalence could also be due to the fact that there is low knowledge about the HBV infection and disease among expectant mothers: few of them knew their HBV status and that of their husbands'.

This finding is comparable to a 2007 publication that there is high prevalence of chronic hepatitis B infection and it varied widely according to geographical settings (Candotti, *et al.*, 2007). The prevalence in the current study is however comparatively higher than the 6.4% prevalence among Ghanaian pregnant women in an earlier study (Acquaye & Mingle, 1994) and yet lower than findings among Nigerian (11%) and Ugandan (15%) expectant women respectively who were commonly aged 20 years or older (Bayo, *et al.*, 2014). Furthermore, finding on prevalence in the current study is also comparatively lower than the 12.5% among the Beninois (Chatterjee, *et al.*, 2009) and yet similar to the 9.38% in a 1999 study, 9.3% in a 2006 study, and 10.6% in a 2012 study on HBV prevalence respectively reported among Kenyan, Peruvian and Ghanaian expectant mothers (Vasquez, *et al.*, 1999; Okoth, *et al.*, 2006; Cho, *et al.*, 2012), though their sample sizes were respectively larger than the sample size of the current study. The overall high prevalence in the current study is not much surprising because Mkandawire, *et al.*, (2013), described the Upper West Region as one of the regions with an "*...explosive spread of the HBV...*" in Ghana due to perceived pervasiveness of risks factors such as precarious sexual behaviours, expensive HBV screening services and vaccines, and the lack of health insurance coverage, among others.

5.3 General Knowledge about HBV infection and Disease

Generally, the knowledge level regarding hepatitis B virus infection and disease was low in this study as less than half of the respondents knew about the HBV infection and the disease. Most respondents did not know their HBV status and also didn't know that there is an available simple blood screening test to help detect HBV infection. A minority of the respondents also knew that the hepatitis B infection could be transmitted through blood and/or blood products and also via unprotected sex (with an infected person).

Comparatively however, majority of the respondents in the Wa Municipality knew about the HBV infection and its disease unlike in the case of the Lawra District. This could be explained by the fact that many of the respondents in the Wa Municipality were educated compared to their counterparts in the Lawra District since education level was found to be statistically significant and associated with knowledge.

These findings are similar to reports of Haider & Haider (2008) who also found that minority of their respondents knew that avoiding unprotected/anomalous sexual behaviour could keep one from being infected with the HBV. Studies conducted among expectant mothers in North American and Chinese mothers equally showed that knowledge about the HBV infection and disease was low. In these studies, many of the respondents (expectant mothers) also thought that HBV can be transmitted through mere physical contact with carriers, through unwholesome foods, and sharing of drinks with the infected person (Chen, *et al*., 2006; Chan, *et al*., 2011).

Results of a similar study among Pakistanis expectant women were not very different from their Chinese and North American counterparts. The Pakistanis held that the transmission of HBV could be through social contacts from handshake, communal eating (especially outside one's home), shared use of toilet facilities and droplets contaminants from the cough or sneeze by an HBV infected persons (Haider & Haider, 2008). Haider, *et al.*, (2008) and Chan, *et al.*, (2011) respectively reported poor knowledge among their respondents that the HBV can be transmitted through handshake, shared use of toilets, droplets infection from coughing and sneezing, food, and shared drinks. The current findings further props a 2014 study among Cameroonian expectant mothers which found

that majority of the expectant mothers had not even heard of the viral condition called hepatitis B and over 80% of them didn't know it was infectious (more than the HIV). Their level of knowledge was also found to be significantly related to their level of formal education (Frambo, *et al.*, 2014).

5.4: Knowledge about Mother-to-Child Transmission of Hepatitis B Infection

This study showed that the knowledge of mother-to-child transmission of hepatitis B virus disease is low in the study area among the expectant mothers as only few of the respondents could correctly answer questions regarding the issue. Specifically, only few expectant mothers in the Lawra District knew about the mother to child transmission of the Hepatitis B infection as compared to a majority in the Wa Municipality. Majority of respondents across the study areas knew that it is possible for an unborn baby to contract the HBV from an infected mother in the womb (intrauterine infection). Few mothers also said that the transmission is not possible via breast milk. This low knowledge, especially in the Lawra District was probably due to the fact that it has less number of educated respondents compared to the Wa Municipality; knowledge level was generally high among respondents in the Wa Municipality than in the Lawra District. This finding therefore goes to support the findings of a 2014 Ghanaian study which reported that most expectant mothers in less developed geographical settings, have poor knowledge about the transmission patterns of hepatitis B virus and less than 10% are usually fully immunized against the HBV infection (Haider, *et al.*, 2008; Siakwa, *et al.*, 2014). This revelation further supports report of Noreen, *et al.*, (2015), who also found that overall knowledge among their participants regarding hepatitis B was simply poor, incorrect, and strongly associated with their level of formal education. It also confirmed results from a 2013 study among Nigerian women which showed that majority of the participants who had poor level

of awareness about HBV transmission didn't have formal education (Adeyemi, *et al.*, 2013).

5.5: Determinants of General Knowledge about Infection and Disease, Mother-to-child Transmission, and Prevalence of HBV

Bivariate logistic regression tests were performed to identify the socio-demographic predictors of maternal knowledge about the MTCT of HBV as well as their HBV prevalence.

5.5.1 Determinants of HBV Prevalence among Expectant Mothers

The overall finding indicates that, there was no statistically significant association between respondents' *age* and their HBV prevalence (*P=0.199*); pregnant mothers who were older than 30years had 0.59 times lesser odds of HBV prevalence compared to the younger pregnant mothers. The situation was similar in the Wa Municipality (*P=0.444*) though older pregnant mothers here had 1.80 times higher odds of HBV prevalence compared to their younger colleagues The lack of association between maternal age and their HBV prevalence is similar to a 2012 study among Ghanaian expectant mothers in the Volta region which found that respondents' socio-demographic factors such as age did not show any association to HBsAg positivity (Cho, *et al.*, 2012). In the case of the Lawra District however, maternal age was statistically significant and related to their HBV prevalence (*P=0.011*) as older pregnant mothers had 0.26 times lesser odds of HBV prevalence. This finding on *age*, unlike in the case of the overall results and that of the Wa Municipality, is similar to the findings by other studies who reported that mothers younger than 30years and 35years, respectively, had the highest HBV prevalence as compared to mothers who

were older than 30years (Khan, *et al.*, 2011; Strong, *et al.*, 2015 & Adekanle, *et al.*, 2015) possibly due to risky life style (Dongdem, *et al.*, 2012).

Generally, *marital status* did not show a statistically significant association with their general HBV prevalence (*P=0.237*) in that unmarried pregnant mothers had 0.62 times lesser odds of HBV prevalence as compared to married pregnant women. Comparatively, marital status in the Lawra District also had a statistically significant relationship with HBV prevalence (*P=0.040*) unlike in the Wa Municipality (*P=0.575*). Unmarried pregnant women in the Lawra District had 0.35 lesser odds of HBV prevalence. Summarily, the lack of statistically significant association between pregnant mothers' socio-demographic characteristics and their overall HBV prevalence in this study supports the findings of other studies (El-shabrawi, *et al.*, 2013; Bayo, *et al.*, 2014). Except in the respective cases where family setup in the Lawra District and age and marital status in the Wa Municipality statistically significant and associated to their HBV prevalence.

A significant and novel finding worthy of note is the statistically significant association *family setup* and HBV prevalence in the Wa Municipality where polygamous pregnant mothers were over two-and-half times more likely to be HBV positive as compared to their monogamous counterparts. This is not however surprising because thirty-seven percent of the pregnant mothers in this area were in polygamous family setups as compared to the same situation in the Lawra District. This finding is different from the findings reported by similar studies around the globe (Kolawole, *et al.*, 2012; Afzali, *et al.*, 2015).

5.5.2 Determinants of Knowledge HBV

Tests of association indicate that there was a statistically significant association between respondents' *age* and their general knowledge about HBV Infection and disease (*P=0.021*); older pregnant mothers were about two times more likely not to have knowledge about HBV infection and disease compared to the younger pregnant mothers. However, unlike in the Wa Municipality where age of respondents had no statistically significant influence on their general knowledge about HBV Infection and Disease (*P=0.424*), it had a statistically significant association with the level of knowledge among respondents in the Lawra District (*P=0.006*). Older pregnant (>30years) mothers in the Lawra District had about three times increasing odds of not having knowledge about HBV Infection and Disease as compared to younger pregnant mothers. The significant association between age and knowledge in this study supports the findings of earlier studies which also reported higher knowledge among younger mothers compared to their older counterparts (Noreen, *et al.*, 2015).

Overall *marital status* of pregnant mothers was statistically significant and associated with their knowledge about MTCT of HBV (*P=0.007*) in that, unmarried pregnant mothers had 2.13 times higher odds for knowledge of MTCT of HBV infection as compared to married pregnant women. Comparatively, marital status in the Wa Municipality also had a statistically significant relationship with knowledge of MTCT of HBV infection (*P=0.020*). Result in the Wa Municipality also indicate that the unmarried pregnant women in had 0.27 lesser odds of having knowledge about the MTCT of HBV infection unlike in the Lawra District (*P=0.480*). This outcome could be due to the assumption that, the unmarried women are, comparatively, more explorative in their routine social and occupational activities. This finding is similar to the finding of Abbasi, *et al.*, (2013) who also recorded

a statistically significant association between marital status and knowledge of their respondents about hepatitis B though their study recruited both males and females. It is however different from the result from a study in rural Vietnam which found low marital status as a statistically significant predictor knowledge but with poor knowledge among unmarried women. Their study however was not solely on hepatitis B but sexually transmitted infections in general (Lan, Lundborg, Mogren, Phuc, & Chuc, 2009). Findings of non-statistically significance association between marital status and knowledge about mother-to-child transmission of HBV in the Lawra District is similar to findings by Adekanle, e*t al.*, (2015), though their study was not directly among pregnant mothers but tertiary hospital workers. Similarly, other studies did not also find any statistical association of pregnant mothers' marital status on their knowledge about HBV (Adeyemi, *et al.*, 2013) (Noreen, *et al.*, 2015).

Also, the overall respondents' *educational background* was statistically significant and associated with their knowledge about MTCT of HBV. Respondents who had *formal education* were two times more knowledgeable about mother-to-child transmission of the HBV disease than their counterparts who had no formal education. This finding supports that of Frambo, *et al.,* (2014) and Noreen, *et al.*, (2015) who respectively found that the level of education was statistically significant and associated with respondents' knowledge (Adeyemi, *et al.*, 2013). Similarly, reports of other studies around the globe also found poor maternal knowledge about HBV to be associated with low formal education (Chan, *et al.*, 2011; ul Haq, *et al.*, 2013; Karaivazoglou, *et al.*, 2014; Afzali, *et al.*, 2015). This is because pregnant mothers who are formally educated are more likely to have come across information about the HBV disease in the course of their study or exploration unlike their uneducated counterparts. The lack of association between respondents' educational status

and their knowledge about MTCT of HBV in the Lawra District as recorded in this study is similarly to finding of a 2012 study among Nigerian pregnant women (Kolawole, *et al.*, 2012).

Generally, there was a statistically significant association between expectant mothers' *occupation* and their knowledge about MTCT of HBV infection ($P<0.001$); employed pregnant mothers had 2.46 times higher odds of knowledge of MTCT of HBV compared to the unemployed pregnant mothers. In the Wa Municipality however, maternal occupation had no statistically significant relationship with their knowledge about MTCT of HBV infection ($P=0.122$) unlike in the Lawra District ($P=0.015$). There was a 0.58 times lesser odds for employed mothers in the Wa Municipality compared to the unemployed mothers in the same area. Employed pregnant mothers in the Lawra District had 0.42 times lesser odds of not knowing about MTCT of HBV infection as compared to the unemployed pregnant mothers.

Maternal occupation as a statistically significant predictor of knowledge about MTCT of HBV in the current study is similar to reports from a study among Pakistani pregnant women (ul Haq, *et al.*, 2013; Adeyemi, *et al.*, 2013). However, the statistically insignificant association between maternal occupation and their knowledge about mother-to-child transmission of HBV in the Wa Municipality also supports that of Noreen, *et al.*, (2015) & El-shabrawi, *et al.*, (2013) though the latter study was on the prevalence of HBV among pregnant mothers rather than knowledge as in the case of current study.

Maternal *family setup* in the overall results as well as in the Lawra District had no statistically significant influence on their knowledge about MTCT of HBV (*P=0.965*) as both monogamous and polygamous pregnant mothers contributed equally (OR=1.01) to the knowledge of MTCT of HBV infection. In the Wa Municipality however, maternal family set up was a statistically significant (*P=0.015*) determinant of their knowledge about MTCT of HBV. Monogamous pregnant mothers in the Wa Municipality had 2.44 times higher odds of knowing about MTCT of HBV infection. This is similar to finding of an earlier study on knowledge of HBV infection among Nigerian pregnant mothers in Ibadan State which also recorded family setup as a strong predictor of knowledge (Adeyemi, *et al.*, 2013).

In terms of maternal *gravidity*, it was generally found to be a statistically significant determinant of pregnant mothers' knowledge about MTCT of HBV infection (*P=0.008*); compared to primidgravida mothers, multigravida mothers were 1.92 times more likely to be knowledgeable than their primidgravida mothers. Similar trend of relationship was observed in the Wa Municipality (*P=0.003*) where multigravida mothers had 2.99 times higher odds of knowledge about MTCT of HBV infection than primidgravida mothers. This could be due to the fact that multigravida women would have had more exposure to the HBV knowledge from their regular counseling and ANC education they receive at the Health Facilities. Maternal gravidity was however found not statistically significant with their knowledge about MTCT of HBV infection and disease in the Lawra District (*P=0.272*) tough multigravida mothers had 1.45 times higher odds of knowledge compared to primidgravida mothers.

Maternal *income level* was generally not statistically significant and had no association with their knowledge about MTCT of HBV infection (*P=0.998*) though mothers who earned more than GHS500 had 5.37 times higher odds of knowledge compared to mothers who earned GHS500 or less. Similarly, study by Noreen, *et al.*, (2015) did not also find maternal income level as a statistically significant determinant of their knowledge about mother-to-child transmission of HBV (Chan, *et al.*, 2011).

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

In this chapter, summary of the study results, conclusions and recommendations are presented.

6.1 Conclusion

6.1.1 Prevalence of HBV Infection

Overall, the prevalence of Hepatitis B virus infection among expectant mothers was 9.8%; that in the Lawra District was 10.3% and that in the Wa Municipality was 9.3%. Therefore, the prevalence of Hepatitis B virus infection among expectant mothers in the Upper West Region is high.

6.1.2 General Knowledge about HBV Infection and Disease

In general, 46.2% expectant mothers knew about hepatitis B virus infection and disease. Only 40.1% in the Lawra District compared to more (51.6%) expectant mothers in the Wa Municipality knew HBV infection and the disease. As such, the knowledge about the hepatitis B infection and its disease among expectant mothers in the study area was low.

6.1.3 Knowledge about Mother-to-child Transmission HBV

Generally, 35.1% of the expectant mothers knew about mother-to-child transmission of hepatitis B virus; 24.0% in the Lawra District compared to 45.1% in the Wa Municipality.

Therefore, the knowledge level of expectant mothers about the mother-to-child transmission of HBV in the study area is low.

6.1.4 Socio-Demographic determinants of Pregnant Mothers' Knowledge about MTCT of HBV

Results of the bivariate logistic regression tests indicate that maternal marital status ($P=0.007$), educational level ($P=0.007$), occupation ($P<0.001$), and gravidity ($P=0.008$) had statistically significant association with their knowledge about mother-to-child transmission of hepatitis B viral infection and disease with some minor variations in the specific areas. Therefore, marital status, educational level, occupation, and gravidity of the pregnant mothers were their socio-demographic factors which determined their knowledge about MTCT of HBV.

6.1.5 General Conclusion

Deductively, the knowledge about mother-to-child transmission of Hepatitis B among expectant mothers in the upper West Region is low.

6.2 RECOMMENDATIONS

6.2.1: Prevalence of HBV Infection among Expectant Mothers

Given that the HBV prevalence is 9.8% in this study and could be higher in the general population, the health authorities in partnership with other stakeholders should increase and sustain budgetary commitments to the fight against HBV disease by providing free

HBV vaccination and immunoglobulin G for the uninfected and children of infected registered expectant mothers respectively, giving priority to the rural areas.

6.2.2 Knowledge about MTCT of HBV infection and Disease

The Upper West Regional and District Health Management Teams should build up a comprehensive educational program to include free HBV screening and counseling centers in all HFs in the region. In the interim, the free antenatal care screening for pregnant women should be expanded to also cater for spouses of all expectant mothers who visit the HF for ANC services.

6.2.3. Recommendation for Future Research

- This thesis only included the expectant mothers in the Upper West Region. It is therefore recommended that indebt studies be conducted across the region so as to update the regional prevalence of HBV in other significant groups such as the barbers, *wanzams*, and in the general population.
- It will also be appropriate to assess the knowledge level and prevalence of the HBV infection and disease among health workers who provide ANC services to expectant mothers in the region.
- To better understand the needs of expectant mothers in the region concerning the HBV Infection, a qualitative study could also be conducted.

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APPENDICES

Appendix 1: INFORMED CONSENT

RESEARCH TITLE: Assessing Expectant Mothers' Knowledge level about Mother-to-Child Transmission of Hepatitis B Virus in the Upper West Region

Institution: University for Development Studies, School of Allied Health Sciences, Department of Community Health.

Background: Dear participant, I am Frederick Dun-Dery, a student from the School of Allied Health and Sciences, University for Development Studies Graduate School, Tamale. The purpose of this study is to assess the Knowledge level about Mother-to-Child Transmission of Hepatitis B Virus among Expectant Mothers.

Procedure: A structured questionnaire was developed and administered to participants who voluntarily provided their responses. The questions were usually explained and/or translated to participants in the language of their preference.

Potential risks and Benefits: The procedure was non-invasive and did not cause any discomfort to participants. Any participant who felt uncomfortable about any question had the right not to answer without any further coercion.

The Right to Refuse: Participating in the study was purely voluntary and respondents were duly informed of their right to agree or disagree to answer any question. Respondents were at liberty to withdraw from the study at any stage. Participation was however encouraged since it allows your opinion to be heard.

Confidentiality: Any Information given would be respected and kept confidential and would be used for the sole purpose of the study. Are there any questions you may wish to ask before consenting or not to the study?

If *Yes,* please state here……

CONSENT:

I,……., declare that the purpose, procedures, risks and benefits of this study have been explained to me. All questions and doubts have been answered and I have understood and willing to participate.

…… ……

(Signature/thumbprint of participant) (Date)

I verify that the purpose, procedures, risks and benefits of this study have been well explained to the participant. That all questions and doubts have been answered to the understanding of the participant; and that the participant has willingly agreed to be included in the study.

…… ……

(Signature of Interviewer) (Date)

Appendix 2: Form 1A - THESIS QUESTIONNAIRE

UNVERSITY FOR DEVELOPMENT STUDIES
SCHOOL OF ALLIED HEALTH SCIENCES
(DEPARTMENT OF COMMUNITY HEALTH)
MPHIL. COMMUNITY HEALTH AND DEVELOPMENT

Topic: Knowledge about Mother-to-Child Transmission of Hepatitis B among Expectant Mothers in the Upper West Region of Ghana.

Interviewer's Code:..... **Respondent's Number.....**

District:..... **Cluster/Sub-Dist.:.....** **HF/ANC Name:.....**

PREAMBLE

I, Frederick Dun-Dery, am a final year MPhil student of the above named University. I'm undertaking a comparative quantitative study to assess the knowledge level of Expectant mothers about mother-to-child transmission of Hepatitis B Virus (*wur duru* or *popaal/Saorii baalong*) in the Upper West Region. The information you would provide shall solely be used for an academic purpose and your absolute confidentiality shall be maintained. However, your agreement or disagreement to partake in this study is purely voluntary and at your discretion; in either way you would not be penalized in any way.

NOTE: *Please carefully choose your response to each question (by ticking or writing in the provided space) as you deem right.*

A. SOCIODEMOGRAPHY

1. Age (years)....
2. Marital status? A. Married [ ] B. Widowed [ ] C. Co-habiting [ ] D. Separated [ ]
3. Highest Educational level completed? A. None [ ] B. Primary [ ] C. D. JHS [ ] E. SHS [ ] F. Tertiary [ ]
4. Main Occupation? A. Farming [ ] B. Civil/Public Service [ ] C. Private Business [ ] D. Student [ ] E. Unemployed [ ]
5. Religious Affiliation? A. Islam [ ] B. Christianity [ ] C. ATR [ ] D. Other (State).....
6. Residential status? A. Resident [ ] B. New Immigrant [ ] C. None [ ]
7. Family set up? A. Polygamous [ ] B. Monogamous [ ] C. Other (State.....)
8. Household Size (number of persons feeding from same pot)? State number.....
9. Average Monthly Income .....

B. Obstetric Characteristics:

10. Gravida: A. Primigravida [ ] B. Gravida 2 [ ] C. Gravida 3 [ ] D. Multigravida [ ]
11. Parity: A. Nullipara [ ] B. Para 1 [ ] C. Para 2 [ ] D. Para 3 [ ] E. Multipara [ ]

C. General Knowledge about HBV Infection and Disease

12. Hepatitis B Virus is more infectious than the HIV. A. Yes [ ] B. No [ ] C. Don't Know [ ]

13. HBV Infection can lead to liver damage (cirrhosis) or cancer. A. Yes [ ] B. No [ ] C. Don't Know [ ]

14. There is a blood screening test for hepatitis B infection. A. Yes [ ] B. No [ ] C. Don't Know [ ]

15. Hepatitis B Virus can also be transmitted through blood or blood products. A. Yes [ ] B. No [ ] C. Don't Know [ ]

16. One can get infected with Hepatitis B disease through sharing of drinks, food with infected person or through witchcraft. A. True [ ] B. False [ ] C. Don't know [ ]

17. Hepatitis B Virus can be transmitted through unprotected sex with an infected person. A. Yes [ ] B. No [ ] C. Don't Know [ ]

18. An infected child may not show any signs and symptoms until late in life A. True [ ] B. No [ ] C. Don't Know [ ]

19. Do you know your HBV status? A. Yes [ ] B. No [ ]

D. Knowledge about mother-to-child Transmission of HBV

20. An HBV infected pregnant woman can infect her unborn child too. A. Yes [ ] B. No [ ] C. Don't Know [ ]

21. A child born to an infected mother can still be infected through breast feeding A. Yes [ ] B. No [ ] C. Don't know [ ]

22. New born babies are too young to get hepatitis B infection from positive mothers A. True [ ] B. False [ ] C. Don't know [ ]

23. The Mother-to-Child transmission of HBV can only occur before birth. A. Yes [ ] B. No [ ] C. No [ ]

24. The HBV vaccine during pregnancy is harmful to the unborn baby A. True [ ] B. False [ ] C. Don't know [ ]

25. Hepatitis B Infection cannot occur once the child is born (to an infected mother) A. True [ ] B. False [ ] C. Don't Know [ ]

E. Knowledge about Preventive MTCT of HBV

26. The following are all appropriate ways to help prevent the infection/spread of the Hepatitis B Virus.

a. Screening and vaccination A. True [ ] B. False [ ] C. Don't know [ ]

b. Childhood HBV vaccine A. True [ ] B. False [ ] C. Don't know [ ]

c. There is a hepatitis B vaccine available for uninfected but non-immunized adults. A. Yes [ ].

e. The unborn child can be protected from hepatitis B infection by drinking some herbs A. True [ ] B. False [ ] C. Don't know [ ]

f. If an HBV infected mother is on treatment there is no need vaccinating the child at birth against the disease A. True [ ] False [ ] C. Don't know [ ]

g. Post-Exposure prophylaxis (Mother)/Treatment A. True [ ] B. False [ ] C. Don't know [ ]

] B. No [ ] C. Don't Know [ ]

h. Avoid sharing of and pricks from hypodermic objects A. True [ ] B. False [ ] C. Don't know [ ]

F. HBV Status/Medical History

33. Premarital/Pre-pregnancy HBV check-up? A. Yes [ ] B. No [ ]
34. Family history of HBV infection? A. Yes [ ] B. No [ ] C. Don't know [ ]
35. Do you know your husband's HBV status? A. Yes [ ] B. No [ ]
36. HBsAg Status (*Observation from ANC Booklet*). A. Reactive [ ] B. Non-Reactive [ ] C. Untested/Undeclared [ ]

Your honest participation and time spent are greatly appreciated.

Important!!!

Please read over all the questions to ensure that all are fully answered. Repeat and/or rephrase any questions you might have skipped for clarity of understanding and ensure they are answered fully before allowing the respondent to leave.

Interviewer's Signature and (Initials).....

Thank you