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# Health Perceptions of Hepatitis B virus (HBV) Transmission in the Upper West Region of Ghana

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## Abstract

This thesis sought to examine factors influencing Hepatitis B transmission and voluntary screening in the Upper West Region (UWR) of Ghana. It analyzed a cross-sectional data collected on household heads (n=1374), and health facility (n=42) in four districts using multinomial logit regression and hierarchical multilevel regressions. Overall, only a quarter (25%) of respondents possessed correct knowledge of HBV transmission, while disparities in HBV knowledge was explained by both individual and health facility level factors. Further, the analysis showed that approximately 28% of respondents reported ever testing for HBV. For instance, although the source of healthcare influenced HBV testing, traders (RRR=0.29, $p \leq 0.001$) and farmers (RRR=0.34, $p \leq 0.01$) were significantly less likely to test voluntarily. Based on these findings, Ghana's national hepatitis policy should target lower level primary health facilities such as CHPS, and also reduce financial barriers by covering cost of HBV testing under the national health insurance scheme.



**Keywords**: hepatitis B (HB); hepatitis B virus (HBV); community-based health planning and services (CHPS); voluntary testing; upper west region (UWR); Ghana

## Co-Authorship Statement

This thesis is an integrated article comprising two papers which have been submitted for publication and are currently under peer review. The study problem, research objectives and the relationship between outlined in chapters 1 and 2. Chapters 3 and 6 cover the research methods and conclusions respectively. The two manuscripts are as follows:

Chapter 4: Anfaara, F.W., and Luginaah, I., Factors influencing Knowledge of Hepatitis B Virus Transmission in the Upper West Region of Ghana: a multilevel analysis.
Submitted: Health Policy and Planning

Chapter 5: Anfaara, F.W., and Luginaah, I., Factors Associated with Voluntary Testing for HBV in the Upper West Region of Ghana
Submitted: Health & Place

While the two manuscripts are co-authored with my thesis supervisor, as the first author I conducted the actual research which involved problem identification, literature review, data analysis, and writing.

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## List of Abbreviations

| | |
|---|---|
| CHPS | Community-based Health Planning and Services |
| GDHS | Ghana Demographic and Health Survey |
| GHS | Ghana Health Service |
| GHSS | Global Health Sector Strategy |
| GLSS | Ghana Living Standard Survey |
| HA | Hepatitis A |
| HB | Hepatitis B |
| HBIG | Hepatitis B Immune Globulin |
| HC | Hepatitis C |
| HCC | Hepatocelullar Carcinoma |
| HAV | Hepatitis A virus |
| HBV | Hepatitis B virus |
| HCV | Hepatitis C virus |
| HDV | Hepatitis D virus |
| HEV | Hepatitis E virus |
| IDUs | Injection drug users |
| JICA | Japan International Cooperation Agency |
| MSM | Men who have sex with men |
| NGO | Non-Governmental Organization |
| NHIS | National Health Insurance Scheme |
| NMEB | Non-medical Ethics Board |
| PE | Political Ecology |
| PEH | Political Ecology of Health |
| PHC | Primary Health Care |
| PLWHIV | People Living With HIV |
| UDS | University for Development Studies |
| UWR | Upper West Region |
| SDGs | Sustainable Development Goals |
| SPSS | Statistical Package Social Sciences |

| | |
|---|---|
| SSA | Sub-Saharan Africa |
| STD | Sexually Transmitted Disease |
| WHO | World Health Organization |

# Chapter One

# Introduction

This thesis examines the role of health perceptions on hepatitis B virus (HBV) transmission in Ghana with specific focus on the Upper West Region (UWR). This chapter provides a brief background to infectious diseases and HBV, the research questions that guided the study, and the structure of the thesis.

## 1.1 Background to the study

Despite advances in medicine over the last century which led to improvements in overall health, infectious diseases have remained pervasive and continue to be a major global health threat (Boutayeb, 2010; Inhorn & Brown, 1990). Infectious/communicable diseases are caused by virus, bacteria or fungi, and easily transmitted through exposure to infected blood and bodily fluids (e.g. HIV/AIDS, HBV & gonorrhea); inhaling infected air (TB & measles); and through animal or insect bites (e.g. malaria, Ebola, yellow fever) (Hotez & Kamath, 2009; Inhorn & Brown, 1990; Lopez, Mathers, Ezzati, Jamison, & Murray, 2006; Murray, Lopez, & World Health Organization, 1996). Over the past several decades, diseases such as measles, and HIV have had devastating impacts not only on the health of individuals, but the healthcare systems and economies of endemic countries in the global south (Murray et al., 1996).

While infectious diseases are considered a global burden, some parts of the globe including sub-Saharan Africa (SSA) tend to be disproportionately impacted (Bhutta, Sommerfeld, Lassi, Salam, & Das, 2014; Morens, Folkers, & Fauci, 2004). For instance, the World Health Organization (WHO) reports that over 13 million people die annually from infectious and parasitic diseases, of which 80% occur in SSA (World Health

Organization, 2014). Over the past two decades, infectious diseases have topped the disease chart for SSA, affecting the majority of economically vulnerable people including children under 14 years, while in the Global North these diseases affect mostly minority and indigenous populations who constitute less than 5% of the entire population (Morens et al., 2004). According to Murray et al.'s (1996) projection of disease burden spanning 1990 to 2020, SSA alone bears about 24% of the global burden of diseases. This trend continues to increase with the (re)emergence of new infectious diseases amid an already dysfunctional and weak health care system (Mathers & Loncar, 2006). The pervasive nature of infectious diseases in SSA overstretches the already weak health care and economic systems. This reinforces the poverty situation by drawing back the development agenda of this region and depleting its human resource base (Lopez et al., 2006; Smith, 2006). Consequently, the population with the greatest risk tend to be those in poor and deprived communities and other vulnerable populations such as women, the elderly and children (Hotez & Kamath, 2009). Furthermore, besides the associated high rate of mortality, most infectious diseases including malaria, dengue, tuberculosis, Ebola, HIV/AIDS, and hepatitis can cause lifelong disabilities resulting in serious social and economic challenges for individuals and their families (Deribe et al., 2012; Manderson, Aagaard-Hansen, Allotey, Gyapong, & Sommerfeld, 2009). Some scholars (Bhutta et al., 2014; Whiteside & Zebryk, 2017) have bemoaned the economic and social costs of infectious diseases given that most deaths from these diseases are among children and young adults.

To address the burden of infectious diseases in SSA, the WHO recommends the strengthening of health systems, improving disease surveillance and heightening

awareness and sensitization (Hotez & Kamath, 2009). For instance, new infections can be prevented through vaccinations, treatment of chronic conditions, avoiding contacts with infected persons, and through personal hygiene practices (Morens et al., 2004). However, in most instances, researchers point to low awareness/knowledge, religious beliefs about the etiology of infectious diseases, risky cultural practices, and other institutional challenges including poor access to preventive healthcare as barriers to the sustainable eradication and management of these diseases in SSA (Lok & Mcmahon, 2001; Martinson et al., 1998; Mkandawire, Richmond, Dixon, Luginaah, & Tobias, 2013). Indeed, the WHO has suggested that increasing awareness creation and screening will likely to reduce the global HB prevalence by 65% in 2030 (World Health Organization, 2016).

Although some studies have suggested that increased global and governmental surveillance and interventions may be yielding some dividends in eradicating infectious diseases (*see* Misganaw et al., 2017; World Bank, 2013), new and re-emerging infectious diseases including the Hepatitis B Virus (HBV) make progress towards total eradication difficult. According to Whiteside & Zebryk (2017), the (re)emergence of these diseases in particularly SSA can be attributed to poor disease surveillance, broken health care system, ill-equipped laboratories and facilities for providing prompt diagnosis and addressing the rampant outbreaks.

The persistence and (re)emergence of HBV for instance, as the leading cause of deaths for all infectious diseases in SSA (Lemoine, Eholié, & Lacombe, 2015), has not only been blamed on the weak health care system but policy reprioritization which has stifled initiatives at eradicating it. The diversion of resources to the eradication of other topical

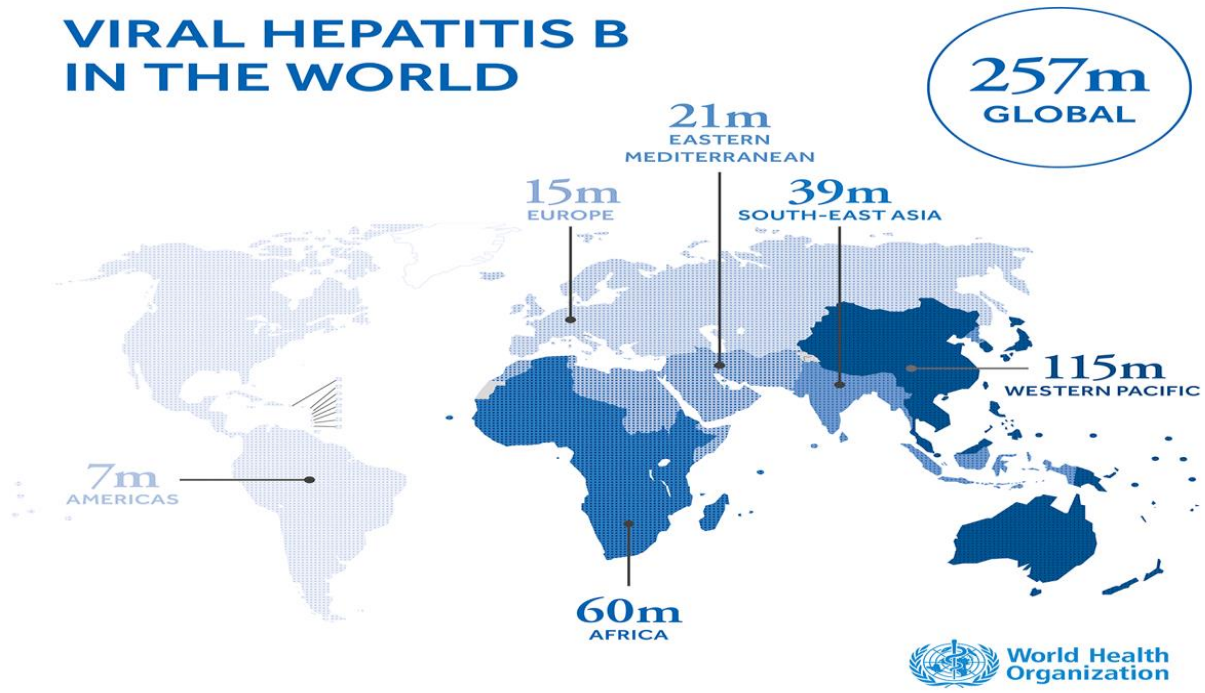
infectious diseases particularly HIV/AIDS, tuberculosis, and malaria has resulted in a drastic decline in their prevalence while HBV is left afloat in public health policy (François et al., 2008). The limited focus on HBV in policy discourse and interventions is worrying as the WHO reports that it is 50-100 times more virulent than other infectious diseases including HIV/AIDS (WHO, 2013). Indeed, among the family of infectious diseases, untreated HBV infection can degenerate into other chronic non-communicable diseases such as liver cirrhosis and cancer (World Health Organization, 2013). As hepatitis (HB) is also asymptomatic in earlier stages, it quickly develops into hepatitis-related complications; and becomes chronic before infection may be detected. Thus, a late diagnosis implies infected persons may have already developed advanced liver cirrhosis or cancer, leaving medical practitioners the option of palliative care (Candotti, Danso, & Allain, 2007; Lok & Mcmahon, 2001; Perz, Armstrong, Farrington, Hutin, & Bell, 2006). Moreover, with the long latency of HBV, infected individuals could expose other persons to the disease unknowingly before symptoms manifest.

Currently, close to a million people are reported to die annually due to HB related complications (Hyun, Lee, Ventura, & McMenamin, 2017). Particularly in the endemic countries of SSA, HBV related liver cirrhosis and cancer are the leading causes of deaths, accounting for over 80% of all deaths resulting from infectious diseases (Lok & Mcmahon, 2001; Taylor et al., 2005). Moreover, more than 8% of the adult population in SSA are chronic carriers of the HBV in comparison with a general prevalence of less than 2% in countries such as Canada, UK, US, and Australia (Figure 1.1).

Akin to other infectious diseases, the widespread nature of the HBV in SSA is attributed to poor knowledge and lack of awareness, mother to child transmission, and horizontal

transmission in early childhood from an infected child to an uninfected child (Choe et al., 2006; Upadhyaya et al., 2010). These routes of HBV transmission in the region attests to the role of a weak health system and persistent misconceptions on the spread of the disease, given that sexual contacts and high-risk behaviors such as injection drug use represent the common routes of transmission in low prevalent countries (François et al., 2008; Maddrey, 2000). To help address this global disease burden, the world community under the auspices of the United Nations pledged in the Sustainable Development Goals (SDG 3.3) to among other diseases eradicate hepatitis-related diseases by 2030 (World Health Organization, 2016). At the core of the strategies to achieve SDG 3.3 is the intensification of awareness creation, testing and vaccination programs, which the WHO estimates to reduce the incidence of the disease by 65% in moderate to endemic prevalence countries (World Health Organization, 2016).

**Figure 1.1: HBV global prevalence**




**Source:** Adapted from the World Health Organization

http://www.who.int/entity/hepatitis/news-events/WHO_Global-Hepatitis-Infographic-1.gif?ua=1

Among studies from varying contexts in SSA, the intersection of low awareness, traditional and religious understanding of the etiology of HBV, and other risky cultural practices such as Female Genital Mutilation (FGM) are highlighted as key to the rapid spread of the disease (Martinson et al., 1998; Mkandawire et al., 2013). Similar to misconceptions about the spread of HIV, many people in SSA relate the spread of HBV to religious and other traditional beliefs, hence holding the misconception that HBV infection is a punishment from a supernatural being, or is transmitted through witchcraft (Tenkorang, 2013). Evidence further suggests that many people are quick to self-

diagnose symptoms of HB such as fever, headaches, and jaundice as malaria and may therefore start to treat with over the counter medications. In such cases, people may only report at medical facilities when the disease has advanced to chronic stages making treatment difficult (Lok & Mcmahon, 2001). Yet, the persistence of these misconceptions despite attempts to create accurate knowledge, partly accounts for the increasing HB prevalence and related complications in many economically poor countries including Ghana (Rufai, Mutocheluh, Kwarteng, & Dogbe, 2014).

Ghana has an estimated 10% of HBV prevalence though there are reports of intra-country differences. For instance, Merrill & Hunter (2011) suggest that on a global scale, Ghana is one of the most HBV endemic countries with wide in-country disparities in prevalence rates. The Upper West Region (UWR) though the least populated in Ghana, has the highest estimated HB prevalence rate of 18.5%, which is 8.5% more than the national prevalence of 10% (Rufai et al., 2014). This situation in contrast to the rest of the regions in the country could be attributed to low health access, risky cultural practices, negative health behaviors and widespread poverty (Mkandawire et al., 2013). While there have been attempts by the Ghana Health Service (GHS) and other Non-Governmental Organizations (NGOs) to reduce the incidence of the disease, especially through public sensitization to create awareness and provide avenue for testing, the high prevalence rates continue to persist in the region, and indeed the rest of the country (Owiredu, Osei-Yeboah, Amidu, & Laing, 2012). Research, however suggests that perception about health risk is influenced by contextual factors such as social (Anson, Paran, Neumann, & Chernichovsky, 1993), cultural (Wildvasky & Dake, 1990), and environmental factors

(Ott, Stevens, Groeger, & Wiersma, 2012) that may drive misconceptions and beliefs about the etiology of a given disease and its spread.

### 1.2 Research Questions

In spite of the importance of awareness creation in the prevention of infectious diseases including the HBV transmission, there is limited research on how people's perceptions about HBV in endemic areas may inform factual knowledge of HB transmission and prevention. This study sought to address this critical knowledge gap by examining people's awareness of HBV transmission in a highly endemic area like the UWR of Ghana. The study aimed to provide an understanding of how people's interaction with their social environment such as religion, and traditional beliefs inform their construction of the disease and their health behavior by asking an overarching research question: 'What factors influence perceptions of hepatitis B (knowledge of modes of transmissions) and utilization of hepatitis B services in the UWR of Ghana?. It further examined the role of institutions (e.g. source of healthcare) on the health-seeking behavior of individuals with regards to preventive healthcare. To address the study objectives and make informed policy recommendations, these specific research questions were addressed:

1. What is the level of knowledge of HB transmission in the UWR of Ghana?
2. What factors (individual/community) influence HB knowledge in the UWR of Ghana?
3. Does source of healthcare influence the utilization of HB services in the UWR of Ghana?

### 1.3 Organization of the thesis

This thesis is structured in an integrated manuscript format consisting of six chapters. Aside the general introduction in chapter one, the next chapter discusses the overview of viral hepatitis with specific emphasis on hepatitis B. It further discusses the healthcare system in Ghana highlighting the role of the National Health Insurance Scheme (NHIS) and the community-based health planning services (CHPS) in facilitating healthcare access in the country. The chapter concludes with a brief description of the study context, and the theoretical framework informing the research.

Chapter three describes the research methodology, the philosophical/epistemological reasoning that supports this thesis, and the study design, data collection, methods and analytical tools used to obtain the findings of this thesis. Chapter four which is the first manuscript assesses the level of knowledge of HBV transmission at both the individual and institutional levels. The paper highlights how individual characteristics, as well as the community factors in tandem influence and shape individual's perception and knowledge about disease etiology. Manuscript two (chapter 5) examines how institutional characteristics affect the modification/adoption of positive health behaviors and habits. It demonstrates how the presence of primary health facilities such as CHPS can potentially influence people's willingness to voluntarily seek HBV testing. Chapter six is the final chapter of the thesis and thus, sums up the study by highlighting its empirical and theoretical contribution, and provides relevant policy recommendations and directions for future research on HB.

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# Chapter Two

# Literature Review

## 2.1 Introduction

This chapter reviews literature on the burden of infectious diseases and viral hepatitis in SSA. Emphasis is placed on the burden of HBV globally and within the context of SSA. Furthermore, I provide a description of the study context including Ghana's healthcare system. This is followed by a description of the political ecology of health framework (PEH) - the underlying theoretical framework used for this study. The chapter concludes by situating the entire thesis within the field of health geography.

## 2.2 Burden of Infectious diseases in sub-Saharan Africa

SSA is noted to be the hub of infectious diseases accounting for over 80% of all associated mortality and morbidity (Boutayeb, 2010). Although eradication of some childhood diseases including polio and measles have been successful through vaccination programs in this context, prevalence rates for others including malaria, HIV/AIDs, and hepatitis are on the rise (Ndihokubwayo, 2016). The burden of infectious diseases in SSA therefore extends beyond mortality and morbidity to other economic and social challenges in an already deprived context. For instance, the projected cost of prevention and treatment for HIV/AIDS alone in the seven most endemic countries in SSA for the period spanning 2015 to 2050 is $261 billion (Atun et al., 2016). This forms a substantial financial resource that could be used to improve general healthcare access and wellbeing in these contexts. Therefore, given an estimated mortality of 2.4 million in SSA out of a global estimate of 3 million deaths in 2002, HIV/AIDS as a public health crisis in SSA is not only having a devastating impact on the healthcare systems of affected countries, but

also the entire social structure with negative consequences on its human capital (World Health Organization, 2017). Consequently, it is reported that HIV/AIDS has resulted in the decline in life expectancy across SSA, reduced economic production and made an estimated 11 million children orphans (Gouede, Barrie, & Kanhema, 2006). Although the general view is that the HIV/AIDs epidemic may have stabilized, many SSA countries are still confronting infectious diseases such as HBV (World Health Organization, 2017).

### 2.3 General overview of viral hepatitis

Viral hepatitis – the inflammation of the liver – is caused by five viruses (A, B, C, D, and E) and accounts for about 1.4 million annual deaths from both acute infections and chronic hepatitis related complications such as liver cirrhosis and cancer (World Health Organization, 2017d). Depending on the mode of transmission, viral hepatitis can be acute or chronic. Acute viral hepatitis caused by hepatitis A and E viruses, is mostly transmitted through the consumption of food or water contaminated with fecal matter of an infected person or eating uncooked meat. Chronic viral hepatitis (B, C &D) which mostly develops into liver complications is primarily transmitted through contact with an infected person's blood or bodily fluids and/or through vertical transmission – from an infected mother to her baby before/during childbirth.

Approximately 90% of hepatitis-related deaths are attributed to HBV and Hepatitis C virus (HCV) due to the associated complication of liver cirrhosis and hepatocellular carcinoma (Perz, Armstrong, Farrington, Hutin, & Bell, 2006). Currently, chronic viral hepatitis is said to pose a serious public health challenge as it affects an estimated 550 million people globally compared to 33 million for HIV. In total about 257 million people are HBV carriers, 71 million HCV and 15 million with Hepatitis D virus

(Lemoine, Eholié, & Lacombe, 2015; Mohd Hanafiah, Groeger, Flaxman, & Wiersma, 2013; Ott, Stevens, Groeger, & Wiersma, 2012). However, despite the widespread nature of viral hepatitis, it is rather worrying that most infected people are not aware of their status. This may be because symptoms related to viral hepatitis are not easily visible. For instance, whereas 75% of infected people in US and Europe blame the lack of awareness of viral hepatitis on the absence of systemic screening and poor emphasis on treatment options, however, financial limitations, unavailability and inaccessibility of hepatitis testing, limited number of trained health workers explain the low awareness among the chronic carriers in SSA (Lemoine et al., 2015).

### 2.4 Global burden and geography of Hepatitis B virus

HB is a strand of viral disease which poses a public health threat and is largely responsible for chronic hepatitis, cirrhosis and hepatocellular carcinoma (HCC) (Ott et al., 2012). Globally, statistics from clinical surveillance and screening shows that about 2 billion people have had HBV infection in the past or are currently living with the virus (Hou, Liu, & Gu, 2005). The WHO global estimate of the HBV infection prevalence for 2015 was 3.5%. Approximately, 257 million people worldwide are infected with HBV, with concentration in Africa and the Western Pacific regions (Table 2.2) (World Health Organization, 2017a). Lok & Mcmahon (2001) suggest that globally between 15-40% of people infected with HBV will progress to chronic hepatitis and subsequently develop liver cirrhosis, HCC or liver failure. The estimated annual HBV related deaths resulting from liver complications range from 500,000 to 1.2 million (Spearman et al., 2017). Similarly, a recent WHO report on viral hepatitis estimated deaths from HBV related cirrhosis and HCC alone to be 887,000 (World Health Organization, 2017a). As

suggested by the WHO, the high mortality and morbidity associated with HBV makes it a significant global problem that requires urgent attention.

### *2.4.1 Epidemiology*

Acute HB is mostly asymptomatic and resolves within 5 weeks to 6 months. Chronic HB – the persistence of acute HB infection for more than 6 months – is responsible for the high rates of liver complications and mortality. The endemicity of HBV infection can be characterized as low, intermediate and high, with marked variation in prevalence rates across the world (Table 2.1). Low endemic regions are areas where HBV prevalence is less than 2%. Most countries in the Global North e.g. North American and European countries are considered low HBV endemic areas (Maddrey, 2000). Unlike childhood infection which is the commonest route in highly endemic areas such as SSA, adolescents/young adults and people in high-risk groups such as Injection Drug Users (IDU), Men who have sex with Men (MSM), healthcare workers and regular hemodialysis patients are at increased risk of HB infection in these contexts (François et al., 2008). In moderate/intermediate regions such as the Eastern Mediterranean, South-East Asia, Japan and parts of South America, 2-7% of the adult populations are chronically infected with the HBV (Margolis, Alter, & Hadler, 1991). Highly endemic regions are places with more than 8% HBV prevalence. The African and Western Pacific regions of the world have high HBV endemicity. Blood works in these regions suggest that about 70-95% of people have at least been infected with HBV in the past, that is during childhood (Alter, 2006; Margolis et al., 1991). It is not surprising that the adult population in these regions record high rates of liver-related complications including cirrhosis and HCC (Alter, 2003).

**Table 2.1: Estimates of HBV prevalence by WHO Regions**

| WHO Regions | Estimated HB prevalence (%) | Estimated number of persons living with HBV (millions) |
|---|---|---|
| **Africa** | 6.1 | 60 |
| **The Americas** | 0.7 | 7 |
| **Eastern Mediterranean** | 3.3 | 21 |
| **Europe** | 1.6 | 15 |
| **South-East Asia** | 2.0 | 39 |
| **Western Pacific** | 6.2 | 115 |
| **Global** | **3.5** | **257** |

Source: Global Hepatitis Report, 2017

*2.4.2 Modes of HBV Transmission*

HBV is spread through contact with blood and bodily fluids of an infected person. While blood is the commonest route of transmission, other bodily fluids such as semen and saliva are potential mediums for the spread of the disease (Mkandawire, Richmond, Dixon, Luginaah, & Tobias, 2013; Ofori-Asenso & Agyeman, 2016). Three modes of HBV transmission have been widely documented, namely parenteral/percutaneous, sexual, and perinatal (vertical transmission) (Hou et al., 2005). HBV parenteral transmission may include injection drug use, transfusion and dialysis, tattooing and nosocomial route. Evidence suggests injection drug use as the main route of HBV transmission in North America and Europe (Margolis et al., 1991). Although blood transfusion is one of the routes of transmission in highly endemic areas, screening of blood for HBV markers and exclusion of donors who engage in high-risk activities (e.g. IDUs and MSM) has considerably reduced its transmission. Nevertheless, evidence shows that transmission is still possible among asymptomatic blood donors (Luo et al., 1993). Also, HBV can be transmitted through infected blood and blood products, HBV

contaminated surgical instruments especially during surgery and, through needlestick injuries in healthcare settings. There is evidence suggesting that nosocomial transmission of HBV in the hospital particularly in dialysis and dental units still occur even when control practices are followed (Margolis, 1991). Other parenteral sources of transmission include ear piercing, acupuncture, circumcision, and scarification.

Globally, sexual transmission is reported as the second leading source of HBV infection particularly in the Global North (e.g. North America) where HBV endemicity is very low. Until recently, HBV was considered a solely sexually transmitted disease, where just like HIV, MSM were considered those at the greatest risk of infection (Huo et al., 2005). Although heterosexual transmission has been reported, the increased risk of HB transmission is associated with multiple sexual partners and past history of STD (e.g. syphilis) (Alter, 2006).

Highly endemic regions (e.g. Western Pacific and Africa) record the highest rates of perinatal/vertical transmission from infected mothers to new-borns. Before the introduction of the HBV birth dose vaccine, between 10-30% of babies born in this region to Hepatitis B surface Antigen (HBsAg) positive mothers were infected with the virus. This was even greater for mothers who were positive for both HBsAg and HBeAg as transmission of the virus to babies is estimated at 70-90% (Stevens, Neurath, Beasley, & Szmuness, 1979). Vertical transmission occurs in 3 ways; 1) trans-placental in the womb, 2) natal during delivery and, 3) postnatal during breastfeeding (Hou et al., 2005). Epidemiological studies from China on HBV intrauterine infection revealed that HBV intrauterine infection occur in 3.7-9.9% of expectant mothers with positive HBsAg and 9.8-17.39% among pregnant women who tested positive for both HBsAg and HBeAg

(Xu, Yan, & Xu, 1999). Given that trans-placental transmission occurs in the womb before birth, vaccination is mostly not successful in preventing this kind of transmission (Xu et al., 1999).

*2.4.5 HBV-related complications - Cirrhosis and HCC*

Globally, an estimated 2.5% of all annual deaths are attributable to liver cirrhosis and HCC (Perz et al., 2006). Although other factors such as excessive alcohol intake increases the likelihood of developing liver cirrhosis, chronic HB is considered the major cause (Zhou et al., 2017). Acute HB left untreated scars the liver which then progresses into cirrhosis. Liver cirrhosis is frequently reported among people previously infected with HBV during childhood, compared to those whose infection occurred only during adulthood (Kao & Chen, 2002). Similar to the symptoms of most viral hepatitis, cirrhosis is undetected until the liver is badly damaged. Depending on the level of damage, cirrhosis could be categorized as *compensated* (i.e. relatively functioning liver) or *decompensated* (i. e. not functioning well) (Thornton, 2015). Early symptoms for compensated cirrhosis are not clear and in most times difficult to detect. However common symptoms such as loss of appetite, lack of concentration, impotence, shrinking of testicles for men, weight loss, jaundice, swelling of feet and legs may be experienced. Symptoms of decompensated cirrhosis include swelling of the body, brain disorder (hepatic encephalopathy) and severe internal bleeding (Thornton, 2015). The only treatment available for HBV liver cirrhosis is liver transplant (Thornton, 2015).

An extreme complication of the development of chronic HBV is liver cancer. Liver cancer could be primary or secondary. While primary liver cancer starts directly from the liver, secondary liver cancer develops from other parts of the body and spread to the

liver. One of the widely known primary liver cancers is HCC. HCC is the sixth most common cause of cancer in the world and is associated with a third of all recorded cancer related mortality globally. Annually, out of the estimated 630,000 newly diagnosed cases, 55% are attributed to HBV with most of these cases occurring in endemic regions of the world. In 70-90% of the cases, liver cirrhosis is the underlying cause of HCC (Perz et al., 2006). However, HCC can develop directly in patients with chronic HBV in the absence of cirrhosis. Noticeable symptoms of HCC are: unpleasant feeling in the abdomen, unexplained extreme weight loss, bloated stomach, low blood sugar, breast enlargement in men among others. It is recommended that people with chronic HBV do routine blood tests every 6 months and annual ultrasounds to allow for early detection and treatment of liver cancer to prevent further damage of the liver. Aside reducing exposure to viral hepatitis and cirrhosis, avoiding massive alcohol consumption, smoking, and managing weight through regular exercises offer protection against developing HCC.

### *2.4.6 HBV Prevention*

Prevention of HB varies according to the endemicity of the virus. While behaviour change/modification is suggested for areas with low endemicity, immunisation/vaccination is highly recommended for hyperendemic regions of the world (Hou et al., 2005). The immunisation process comes in two ways; passive and active. Passive immunisation using hepatitis B immune globulin (HBIG) provides short term immunity against HBV while the active immunisation yields lifelong immunity (Chang & Chen, 2015). Active immunisation vaccines come in 3 doses. The administration of which builds strong antibodies against the HBV and provides protection for at least 20 years and, in some cases protection may be life-long. Oral antiviral drugs/pills such as the

WHO recommended tenofovir and enlecavir are available to treat people chronically infected with HBV, although it may be costly.

In recent times however, the international community's attention has been drawn to the massive impact of viral hepatitis especially HBV. International response to combating viral hepatitis is evidenced in the sustainable development goal 3.3 and the first WHO "Global Health Sector Strategy (GHSS) on viral hepatitis 2016-2020". The GHSS emphasizes the role of universal health coverage in the fight against viral hepatitis including HBV. Their mandate is to among other things 1) raise awareness, promote partnership and mobilize resources to fight and reduce the spread of the diseases in highly endemic regions of the world, 2) generate empirical data and formulate evidence-based policy for action since these are the major challenges in highly endemic regions of Africa particularly SSA, 3) prevent perinatal transmission especially perinatal, and 4) scale-up screening, diagnosis and treatment services. According to the WHO, the success of these targets will reduce new infections by 90% and hepatitis-related deaths by 65% (World Health Organization, 2016).

### 2.5 Hepatitis B in Sub-Saharan Africa

Compared to other major infectious diseases such as malaria, tuberculosis, and HIV, viral hepatitis is considered a major public health concern in in SSA because of its hyperendemicity (Ott et al., 2012). In this context, viral hepatitis is prominent in low and middle-income countries where access to healthcare and hepatitis services is limited. Of all the 5 types of viral hepatitis, the impact of HB is most devastating in SSA. For instance, about 23% of all reported cases of HBV are found in the sub-Saharan region where HCC and cirrhosis alone account for about 2% of all recorded total deaths (World

Health Organization, 2017a). While these figures are alarming, poor disease surveillance, and inefficient data collection might have resulted in underreporting the real burden of HBV in the SSA (Stockdale et al., 2017). Whereas SSA is considered hyperendemic with more than 8% of their adult population chronically infected, North Africa (e.g. Morocco, Tunisia, Egypt and Algeria) report low prevalence (< 2%) (Kramvis & Kew, 2007; Zampino et al., 2015).

SSA has the burden of HBV related liver complications among the younger adults which contrasts with other regions of the world such as Western Europe and Asia where associated liver complications mostly develop in late years (i.e. 50-60 years) (Howell, Ladep, Lemoin, Thursz, & Taylor-Robinson, 2014). For SSA therefore, there are implications of HBV infection for the active and productive labour force. In this regard, there is the need for immediate intervention especially in rural and resource-poor areas. Most common route of HB transmission in SSA is through perinatal transmission (mother-child). Other horizontal transmissions include sharing bath towels with an infected person, sharing a partially eaten sweet/cookie with an infected person, using the toothbrush of an infected person, scratching the back of an infected person or biting the fingernails of an infected person (Mkandawire et al., 2013). Risky cultural practices such as tattooing, scarification (e.g. tribal marks) and use of unsterilized sharp objects for initiation (e.g. FGM) are also known to increases the risk of HBV infection in SSA (Ofori-Asenso & Agyeman, 2016).

While the primary preventive strategy for reducing viral HB and its complications is through early detection, diagnosis, and treatment, lack of awareness, access to medical care, cost of screening, diagnosis and treatment militate against this goal in the SSA

context. For instance, access to HB services such as testing and liver biopsy are very limited, and in situations where they may be available the cost of testing and treatment is so high that at-risk groups and infected persons are not able to afford ( Lin et al., 2005). Regular testing and surveillance activities for the entire populace in SSA are not readily available although NGOs and other organizations voluntarily provide some of these services at reduced cost. Even in situations where people are screened and their status known, most countries in SSA lack the medical infrastructure to support infected people due to the cost of treatment (Spearman et al., 2017). If the burden of HB in SSA will reduce, there is the need to make HB treatment accessible and affordable to the most vulnerable and infected people. Vaccination and immunization are foundational for HBV prevention. To prevent perinatal transmission therefore, both passive and active immunization should be administered for new-born within the first 24 hours after birth (François et al., 2008). Nonetheless, evidence suggests that combined vaccination of infants in SSA has been effective in preventing chronic HBV infection among children and have reduced the risk of developing HCC in adulthood (Hou et al., 2005; Spearman et al., 2017).

Co-infection of HBV and HIV adds to the burden of HBV in SSA. About 25 million of the estimated 36 million persons infected with HIV globally live in SSA (Kourtis, Bulterys, Hu, & Jamieson, 2012), with 1.96 million co-infected with the HBV. HIV-HBV infection is observed to be more dangerous than HBV infection alone and thus, increases the risk of HBV transmission especially perinatal transmission (World Health Organization, 2017). West Africa and Southern African regions are reported to have the highest prevalence of HIV-HBV chronic co-infections (Matthews, Geretti, Goulder, &

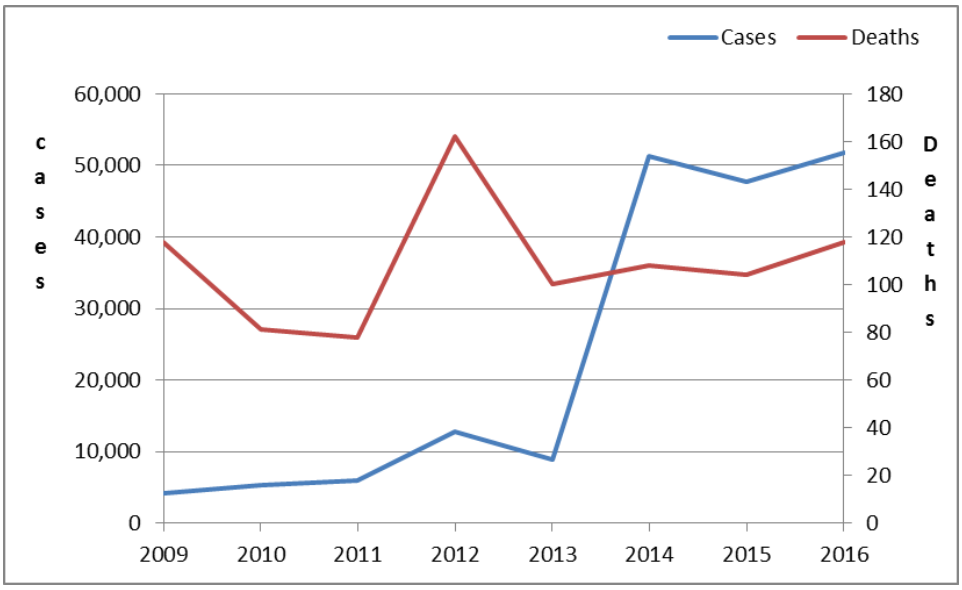
Klenerman, 2014). Given that early diagnosis of HBV among pregnant women in some SSA countries is inadequate, coupled with the fact that most of the PLWHIV have already suppressed immune systems, the impact of HBV among HIV positive individuals is enormous. For instance, HIV positive individuals co-infected with HBV have higher risks of developing acute liver failure, chronic HB and OHB infection. Cirrhosis and liver cancer progresses quicker and in early stages of HIV diagnosis than mono-infected HB persons (Matthews et al., 2014).

The co-infection of HBV among HIV positive individuals has curtailed the progress made with the treatment of the HIV antiretroviral therapy with increasing number of HIV positive individuals quickly developing AIDS and liver complications (World Health Organization, 2017). According to Burnett et al. (2005) mortality associated with liver complications is twice as likely for HIV-HBV co-infected persons than people co-infected with HCV. To reduce the impact of HIV-HBV co-infections, the WHO recommends the treatment of HBV (tenofovir) for all persons infected with HIV irrespective of the stage of infection, although about 50% of HIV positive persons are actually receiving treatment (World Health Organization, 2017). According the WHO, tenofovir will simultaneously treat chronic HBV in HIV positive persons' particularly infected pregnant women and reduce the risk of perinatal transmission (World Health Organization, 2016). Even though some SSA countries have adapted this recommendation, data on the actual implementation and coverage of tenofovir among HIV persons is lacking.

## 2.6 The prevalence of viral hepatitis in Ghana

Viral hepatitis is a major public health challenge in Ghana. The country is endemic for both acute and chronic viral hepatitis. Prevalence rates for HBV (≥8%), HCV (5-10%) and HEV (>5.8%) are all above global averages (Ministry of Health, 2017). Country wide clinical disease surveillance from the ten regions of Ghana suggests an annual increasing trend (figure 2.1).

**Figure 2.1: Annual Trend of Reported Acute Viral Cases and Deaths: 2009-2016**




Source: DHIMS GHS, 2016- National Guidelines for the prevention, care and treatment of Hepatitis (2017)

Although there are no national estimates for the five types of viral hepatitis in Ghana, individual studies (e.g. clinical and cross-sectional) suggest varying high prevalence rates across different populations. For instance, HAV prevalence was estimated at 10% after a study was conducted among viral hemorrhage patients across the ten regions of Ghana (Bonney et al., 2013). Similarly, Asmah et al. (2014) conducted two studies among

HBsAg positive individuals and HB related liver cancer patients and reported HDV prevalence between 8.4-11.3%. For viral hepatitis B, C and E, variation in estimated prevalence among different populations across the country is also observed (Table 2.2).

**Table 1.2: Population variation prevalence of selected viral hepatitis in Ghana**

| Population | Percentage of Viral Hepatitis (%) |
|---|---|
| **Blood donors** | |
| ***HBV*** | 6.75-15.3 |
| ***HCV*** | 1.3-8.4 |
| ***HEV*** | 5.8-71.55 |
| **Pregnant Women** | |
| ***HBV*** | 10.5-16.0 |
| ***HCV*** | 2.5 |
| ***HEV*** | 28.66 |
| **Children** | |
| ***HBV*** | 15.8 |
| ***HCV*** | 5.4 |
| ***HEV*** | 4.4 |
| **Prisoners** | |
| ***HBV*** | 14.3-22.1 |
| ***HCV*** | 18.7-20.1 |
| **HIV-Co-infection** | |
| ***HBV*** | 13-16.7 |
| ***HCV*** | 1-3.6 |
| ***HEV*** | 46.0 |

Even though Ghana strives to eliminate viral hepatitis, the focus currently is on HBV and HCV owing to the public health burden they pose. The Ministry of Health and the Ghana Health Service are keen on suppressing the two viruses with the belief that mortality and morbidity associated with liver cancer and cirrhosis will concurrently reduce substantially in the country. This desire culminated in the launching of the first ever national policy on HBV in 2015. According to the Health Minister, the policy aims to provide "quality-driven, results-oriented, client-focused and affordable viral hepatitis prevention and

control services to improve the health status of all people living with and at risk of viral hepatitis in Ghana" (Ghana News Agency, 2015). Two years later, the guidelines for health workers on the treatment and prevention of viral hepatitis was released. The document according to the Health Minister will "provide evidence-based step by step instructions for healthcare workers required in the prevention, detection and reporting, care and treatment of viral hepatitis cases" (Ministry of Health, 2017). In addition, the national control programme on viral hepatitis has been instituted to manage issues related to viral hepatitis in the country. Although efforts to completely eliminate viral hepatitis are worth mentioning, full implementation of this policy is yet to be achieved. Further, the exclusion of viral hepatitis services such as screening and vaccination from the national health insurance scheme (NHIS) leaves doubt on whether Ghana can/will be able to eliminate viral hepatitis by 2030 considering that over 70% of the population are poor and may face financial barriers in accessing these services (Ghana Statistical Service, 2015). Nonetheless, successes in implementing HBV birth-dose vaccine, screening of pregnant women for viral hepatitis and dual treatment therapy for HIV infected persons have been reported (Blankson, Wiredu, Gyasi, Adjei, & Tettey, 2005; Ofori-Asenso & Agyeman, 2016).

### 2.7 The Healthcare System in Ghana

Healthcare provisioning in Ghana is pluralistic in nature. Traditional medicine, faith-based healing and orthodox medicine have dominated Ghana's health sector for several decades. Complementary and alternative sources of healthcare such as Chinese traditional medicine, chiropractic and acupuncture are also prominent in the country (Kretchy, Owusu-Daaku, & Danquah, 2014; Yarney et al., 2013). The multiplicity of the types of

healthcare in the country could be as a result of the geographical disparities in access to healthcare services delivery. Whereas sophisticated orthodox treatment centers such as hospitals and clinics are prominent in the urban areas particularly to the south of the country, traditional medicine and faith-based healing seem to dominate in rural areas (Aikins & Koram, 2017). Increased poverty resulting from colonialism and other neoliberal policies such as structural adjustment could partly be blamed for the health disparities in the country. Particularly to the northern parts of the country, British colonial policies deliberately left it as a labour reserve while concentrating economic and social infrastructure in the southern parts of the country (Lobnibe, 2010).

Further, economic hardships from the retrenchment of public servants and from political instability led to a massive brain drain where highly skilled health professionals in the public sector such as doctors, nurses and pharmacies left the country in search of better opportunities elsewhere in the Global North (Nyonator, Dovlo, & Sagoe, 2005). To salvage the health situation and to ensure that Ghana implemented the WHO primary health care policy, the expansion of healthcare to include allied health was adopted (Aikins & Koram, 2017). Allied health professionals such health assistants, psychologists, dieticians, community health workers, physiotherapists and medical technicians augmented the services of the few medical practitioners in the formal healthcare sector. In addition, a new health human resource policy was introduced to ensure trained health personnel were recruited into the Ghana Health Service in order to address the shortage of health practitioners and the equitable distribution of healthcare across the country (Aikins & Koram, 2017). However, these policies did not solve the health access challenges. There still remain significant disparities in the distribution of

health workers since most of them prefer postings to urban areas. For instance, in 2005 the doctor-population ratio in Accra (1:10,000) was more than the UWR (1:66,000) whose doctor-population was far below the WHO PHC standard of 20:100,000 (Nyonator et al., 2005). To make healthcare accessible and affordable to everyone in Ghana, the community-based health planning services (CHPS) and the national health insurance scheme were implemented in Ghana.

### *2.7.2 Primary healthcare and CHPS*

CHPS was developed and experimented in Navrongo by the Navrongo Health Research Centre to examine the feasibility of using trained health workers to provide basic primary health services in areas underserved by hospitals and clinics. The experiment was successful and subsequently adopted and up-scaled by the Ghana Health Service (Nyonator, Awoonor-Williams, Phillips, Jones, & Miller, 2005). Under this healthcare system, community health workers are trained to provide basic curative services or minor health issues and other preventive services in CHPS compounds located in rural communities (Baatiema, Sumah, Tang, & Ganle, 2016). Community health workers focus on immunizations/vaccinations, family planning, and health education/sensitization of both infectious and chronic diseases. Currently, there are about 3,335 CHPS compounds across the country (Table 4). There have been discussions by Ghana health service and donor partners (e.g. Japan International Cooperation Agency (JICA) to expand the CHPS program to include ‘functional CHPS zones’ and ‘Urban CHPS’. The former will target CHPS compounds that are yet to meet their mandate and ensure house to house health service delivery within a defined unit area (Ministry of Health, 2017), while the latter will specifically address the health needs of the urban poor (Adongo et al., 2014). Although

CHPS seems to be doing well in bridging the health disparity in Ghana by providing primary healthcare to the poor, vulnerable and underserved in the society, CHPS activities and programmes are undermined by logistics, financial and resource constraints. For instance, CHPS compounds are ill-equipped. Most CHPS do not have diagnostic tools, transport and medicines to treat ailments. Instead, they refer complex medical conditions such as snakebites, HB testing and vaccination and other laboratory works to higher level health facilities.

### *2.7.3 Ghana's National Insurance Scheme*

The history of health insurance in Ghana dates back to post-independence where Ghana's first President, Dr. Kwame Nkrumah attempted to introduce free healthcare for everyone. However, this policy failed owing to the devastating impact it had on the economy. The structural adjustment programme under President Jerry John Rawlings' administration introduced major health reforms. One of the health reforms was the 'cash and carry' system. Under this healthcare provisioning, individuals were asked to pay out of pocket for health services at hospitals (Akazili et al., 2014). This according to the World Bank and IMF will provide the country with revenue to enable it achieve the full cost of drugs used in the hospitals which were becoming increasingly difficult for the state to finance during that era. Though Ghana recovered from a collapsed economy and healthcare seems to have improved, the gap between the haves and have not widened through the 'cash and carry' system (Dixon, Tenkorang, & Luginaah, 2011; Waddington & Enyimayew, 1990). In 2003, President John Kuffour's administration introduced the National Health Insurance Scheme (NHIS) to 'provide financial risk protection against healthcare services for all persons residents in Ghana' (Mensah, Oppong, & Schmidt,

2010). Thus, the NHIS guarantees healthcare access to people without on-site out of pocket payment for services received. Under the NHIS, the poor and vulnerable populations including persons below age 18, and the elderly aged 60 years or more were offered premium payment and renewal exemption (NHIA, 2015). The NHIS covers about 95% of healthcare needs in the country including in/out patients services such as minor surgical operations, hospital accommodation, general and specialist care, prescription drugs, blood products, maternal and antenatal care as well as emergency treatment (Mensah et al., 2010). However, services such as organ transplants, HIV/AIDS therapy, HBV testing/vaccination, optical and hearings, cancer (except cervical and breast cancer) are not covered by the scheme.

Although NHIS is intended to make healthcare accessible to all Ghanaians irrespective of socioeconomic status, there seem to be major challenges with the operation of the scheme hence the difficulty in achieving universal healthcare as recommended by the WHO. Currently, the difficulty in operationalizing the identification criteria for the poor and indigent populations has made it difficult in enrolling the most marginalized in society for improved healthcare access. Although there has been some assistance from the department of social welfare in identifying the marginalized, this has not addressed the challenges with health equity problems (NHIA, 2014). For instance, a research by the national planning commission indicates that less than 30% of people within the lowest wealth quintile were registered members of the scheme (Alatinga & Williams, 2014). Currently, about 38% of the population in Ghana is enrolled into the NHIS, however regional variations indicate that the Upper West Region (UWR) has the lowest coverage (Table 2.3) (National Health Insurance Authority, 2013). Finally, focus of the scheme on

curative services to the neglect of preventive services such as education and immunizations/vaccination of chronic and infectious diseases including HBV could partly explain the double burden of disease in the country. Since the aim of the NHIS is to make healthcare accessible to all without upfront payment of services, exclusion of certain diseases results in out of pocket payment which defeats the purpose of the scheme.

**Table 2.2: NHIS enrolment coverage and regional distribution in Ghana for 2013**

| Region | NHIS enrolment coverage | Percentage (%) |
|---|---|---|
| Greater Accra | 1,280,257 | 12.6 |
| Ashanti | 1,715,388 | 16.9% |
| Eastern | 1,110,121 | 10.9% |
| Western | 961,873 | 9.5% |
| Central | 866,936 | 8.5% |
| Brong Ahafo | 1,353,840 | 13.3% |
| Volta | 910,569 | 9.0% |
| Northern | 880,517 | 8.7% |
| Upper East | 643,278 | 6.3% |
| Upper West | 422,417 | 4.2% |

**Source: NHIA 2013**

*2.7.4 Structure and functions of healthcare facilities in Ghana*

Healthcare delivery in Ghana is primarily provided by the government, with the assistance from faith-based organisations (Christian and Islamic health association of Ghana) and private/non-governmental organisations (Drislane, Akpalu, & Wegdam, 2014). These healthcare providers are collectively managed and supervised by the Ghana Health Service (GHS). Although Ghana has quite a number of health facilities that include CHPS, clinics, health centres, sub-district, district and regional hospitals, midwifery/maternity units, and psychiatry hospitals, the distribution of these facilities

across the regions are uneven (Table 2.4). Healthcare provisioning is decentralised and operated hierarchically from lower community-based level to higher tertiary levels (Ghana Statistical Service (GSS), Ghana Health Service (GHS), 2015). For instance, health centres are the first point of contact for patients and the formal health system in Ghana. They provide primary healthcare to people located in rural areas and estimated to serve about 20,000 people (Ghana Statistical Service (GSS), Ghana Health Service (GHS), 2015). The required health personnel for managing health centres include a medical assistant, midwife, laboratory technician, public health worker, and nutrition officer. Although this is the ideal structure for HCs, financial and personnel challenges act to constrain the full operation of many HCs in rural areas. Most of these health facilities remain dilapidated buildings and in some cases some have only one health personnel attending to the health needs of patients visiting this facility. In contrast, polyclinics mainly found in urban centres are relatively better equipped with modern diagnostic tools and adequate number of medical personnel. Health centres are referral points for community level facilities such as CHPS and clinics (Ghana Statistical Service, 2015a).

**Table 2.3: Regional distribution of health facilities in Ghana for 2015**

| Region | CHPS | Clinic/Polyclinic | Health Centre | Hospital | Maternity homes |
|---|---|---|---|---|---|
| Greater Accra | 176 | 289 | 20 | 78 | 86 |
| Ashanti | 906 | 116 | 141 | 119 | 71 |
| Eastern | 477 | 114 | 84 | 30 | 25 |
| Western | 267 | 115 | 59 | 38 | 36 |
| Central | 219 | 69 | 64 | 28 | 35 |
| Brong Ahafo | 423 | 111 | 83 | 31 | 41 |
| Volta | 273 | 41 | 146 | 28 | 16 |
| Northern | 185 | 61 | 83 | 27 | 9 |
| Upper East | 233 | 48 | 44 | 7 | 2 |
| Upper West | 176 | 20 | 68 | 9 | 2 |
| **National** | **3335** | **1014** | **792** | **395** | **326** |

Source: Health sector in Ghana, Ghana Health Service-Facts and figures 2015

The next point of healthcare after the health centre is the district hospital. Designed to serve an estimated 100,000-200,000 people, district hospitals provide in/out patient clinical care to people in the district. They mostly have a bed capacity of about 50-60 people. Health personnel at these facilities are reported to be relatively better skilled in disease management and treatment than those in CHPS and HCs. Services such as surgery and procedures that are not approved at health centres are provided at district hospitals. Furthermore, they directly supervise, train health personnel and receive referrals from lower level facilities.

Next in the hierarchy are regional hospitals meant to serve about 1.2 million people within a defined catchment area. They provide specialised care which are not available at lower level facilities and also serve as referral centres for district hospitals. Health professionals at regional hospitals include general surgeons, medical physicians, paediatricians, midwives and generalised and specialised nurses. Clinical services such as surgery and anaesthesia, obstetrics and gynaecology, dental, eye, ear and nose care, dermatology as well as accidents and emergency services are available. Regional health administrators provide training for nurses and medical students while supervising the operations of district hospitals.

The highest and sophisticated form of healthcare provisioning in Ghana is found at the teaching hospitals. The country has about 3 teaching hospitals located in Accra, Kumasi and Tamale. These health facilities are major referral points for all healthcare providers in the country. Complex diagnostic technologies and medicines as well as tertiary curative care are available at teaching hospitals. Some of the services provided by teaching

hospitals include research, teaching and training of physicians and nurses, and providing quality healthcare to complex illnesses (Ghana Statistical Service (GSS), Ghana Health Service (GHS), 2015).

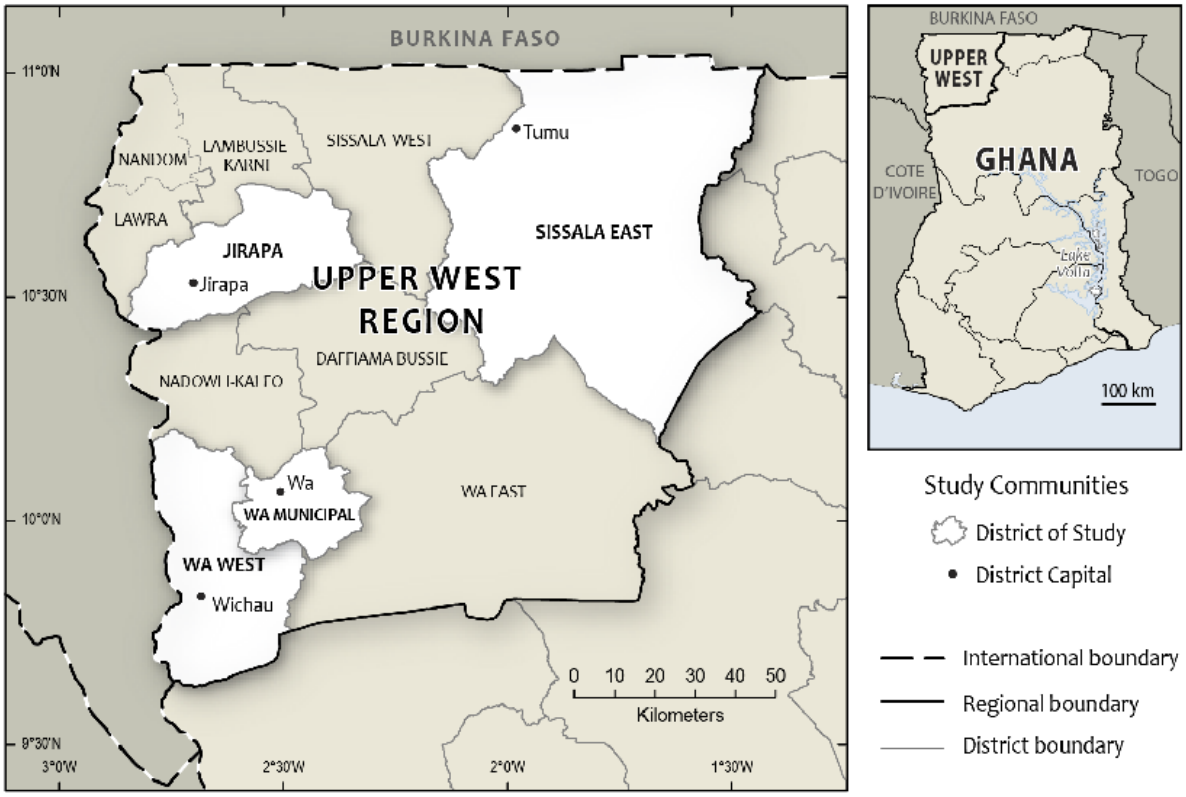
Accordingly, curative services are provided by district and regional hospitals, while primary healthcare facilities are tasked with healthcare prevention activities such as health education and vaccination. Nonetheless, public health services are also provided by the district health management team (DHMT) and the department of Public Health Division at regional hospitals. Regional health administration supervises and manages districts and sub-districts within the region, while the DHMT is in charge of sub-district facilities. At the sub-district level, both curative and preventive services are provided by the HCs as well as outreach services. Minor ailments and basic preventive services are addressed by the CHPS (Saleh, 2012).

### *2.7.5 Study Area*

The UWR is located in the north-western part of Ghana and covers a total land area of approximately 18,476 $km^2$. The region borders the Upper East Region and Northern regions to the east and south respectively while sharing international borders with Burkina Faso to the north and Cote d'Ivoire to the west [see Figure 2.1] (GSS, 2013). The vegetation is within the guinea savannah with two seasons; rainy and dry. The rainy season is short and spans from May to October while the dry season is from November to April characterised by harmattan (Luginaah et al., 2009). Generally, the region is warm with temperature ranging from 21 and 32 degree Celsius (Ghana Statistical Service, 2013). Farming is the predominant occupation in the UWR given that more than 80% of residents are engaged in subsistence agriculture. The common cultivated staples are

millet, yam, rice, groundnut and a few cash crops like cotton and cowpea (Molini & Paci, 2015). The 2010 population and housing census reported the total population for the region to be 702,110 representing 2.8% of Ghana's total population. Demographically, there are more females (360,928) are than males (341,182). Christianity is the dominant religion (44.5%) while Islam and African traditional religion represent 35.6% and 13.9% respectively (Ghana Statistical Service, 2012). Worsening climatic conditions have adversely impacted the region as unpredictable rainfall pattern has led to dwindling agricultural production which further impoverishes the people. According to the Ghana Statistical Service, the UWR has the highest level of poverty in the country as most people live below US$203.87 per adult annually (Ghana Statistical Service, 2012). Most residents tend to cope with the worsening climatic conditions and poverty through out-migration to the southern part of the country in search of livelihood opportunities (Kuuire, Mkandawire, Arku, & Luginaah, 2013). Geo-politically, the region has eleven administrative districts with Wa being the regional capital. Access to healthcare in the region is quite challenging and has been reported to be worse for the country.

**Figure 2.2: Map of the study area**




Source: Cartographic Section, Department of Geography, Western University

Currently, there are only 265 health facilities comprising CHPS, clinics, health centres, hospitals and maternity homes (see Table 6). In 2014, the doctor-population ratio (1:36,048) was lower than the national figures (1: 9,043). Due to the increasing number of primary health facilities such as CHPS, the nurse to population ratio (1: 813) for 2014 was above the national figure of (1: 959). Maternal mortality ratio reduced from 192.9 per 100,000 in 2013 to 161.1 per 100, 000 in 2014 (Ghana Health Service, 2017).

Like the rest of the country, the UWR is burdened with infectious diseases such as malaria, meningitis, TB, HIV/AIDS and viral hepatitis being the most prominent. For instance, in 2016 the region recorded 560 per 1000 cases of malaria, approximately 41 per 100,000 TB cases and about 90% success rate for TB treatment (Ghana Health

Service, 2017). Even though the region recorded no case for guinea worm and a 1.3 % HIV prevalence among pregnant women, it was one of the few regions with meningitis outbreak between 2015 and 2016 (Ministry of Health, 2016). The region is also noted to have 18.5% prevalence for HBV which is higher than the national estimate of 10%. In 2016 the region reported 7,601 (1400 lab confirmed cases) new cases of acute viral hepatitis while chronic hepatitis B and C cases were 61 and 57 respectively.

### 2.8 Theoretical framework

This thesis is guided by the Political Ecology of Health (PEH) framework. PEH theory is imbedded in political economy and cultural ecological perspectives (Bryant, 1998). Political Ecology (PE) is an important perspective for understanding power dynamics among actors in human-environment interactions especially in the access of basic resources including healthcare. Central to this perspective therefore, is how control over assets and other resources including health infrastructure by local populations are influenced by forces that are beyond the scope and control of local populations. For instance, in the quest to understand underdevelopment in economically-deprived countries in the Global South, scholars have used PE to contextualize the contributory role of various actors and stakeholders at both the local and international scales. While earlier works on political ecology in the developing world focused on understanding the impacts of colonialism, agricultural land deals and other environmental changes resulting from urbanisation and globalisation on development (Bryant & Bailey, 1997), the underdevelopment of SSA is not limited to economic growth, since health and wellbeing are critical determinants. Therefore, pioneers such as May (1954), from a medical geography perspective incorporated disease ecology into PE to advance the

understanding of the geographical spread of diseases in especially third world countries. Through this, he established the environment and health nexus through which diseases such as lyme, dengue fever and ebola were highlighted as a direct outcome of environmental activities including deforestation (Mayer, 1996). Missing in May's (1954) duology however is the sociocultural context of the spread of disease. Given, that some diseases such as HIV/AIDS, TB, HBV, multi-drug resistant TB, and urban respiratory diseases are not direct outcomes of environmental changes, Mayer (1996) extended the work of May to include disease, health and wellbeing into a single theoretical framework: political ecology of disease/health. The theory demonstrates how large scale social, economic and political issues intersect to influence and shape the disease dynamics of a society (Mayer, 2000). PEH strives to understand disease ecology from its socioeconomic and political context as expressed in how contextual beliefs, perceptions and knowledge may shape people's health seeking behaviours. Therefore, the role of individuals and structural forces are essential in the study of PEH.

According to the PEH theory, perception and knowledge about disease transmission needs to be understood and discussed in a broader socioeconomic context and from a variety of scales ranging from local to the global scale (Butterworth, Kolivras, Grossman, & Redican, 2010). PEH also highlights the need for historical evaluation of place in understanding local dynamics of health and wellbeing (Bassett, 1988). Therefore, the role of colonialism, state policies and, socioeconomic activities on development of local places and how these have affected and continue to affect disease transmission and prevention within the local context is emphasised. According to Mayer (1996) this has "the potential for geography to unite the physical and social worlds" (page 411). PEH has

been used extensively to study disease patterns, health and wellbeing across different disciplines and varied spatial-temporal contexts (Butterworth et al., 2010; Mkandawire et al., 2013; Richmond, Elliott, Matthews, & Elliott, 2005).

Drawing from PEH therefore, this study unravels the structural, historical as well as individual dynamics to the perceptions of HBV transmission in the UWR of Ghana. I argue that negative health perceptions resulting in high prevalence of HB in the UWR is multifaceted. Historically, the region is noted to have been 'deliberately' abandoned by the colonial administration in the areas of education, health and infrastructure. Actions and inactions of the colonial administration translated into neglect of the development of the area by successive governments. In view of the fact that the region currently has no major natural resource such as gold or cocoa to exchange for its own share of development, it is left to rely on subsistence farming as the main source of livelihood for residents. This has culminated in high rates of poverty where the average person lives on less than US$ 1.25 a day. In addition, government policies on the location and distribution of educational and healthcare facilities have been uneven leading to high illiteracy levels in the region. Existing studies (e.g. Atuoye et al., 2013; Mkandawire et al., 2013; Lobnibe, 2010) show that high illiteracy and low exposure to healthcare facilities and financial constraints limits access healthcare including seeking health information hence the likelihood of harbouring incorrect knowledge about the etiology and transmission of diseases and illnesses. Furthermore, individual sociocultural beliefs and practices influenced by religion such as the belief in spiritual causes or transmission of disease spread leads to negative health perceptions. The belief that disease is spread by witchcraft or that a higher force punishes evil doers with certain ailments which require

spiritual cleansing could partly be blamed on the widespread transmission of many infectious diseases in Ghana including the UWR. Individual limited resources are therefore channelled into spiritual healing of such diseases which may consequently increase the spread of diseases and the associated morbidity and mortality. For instance, HIV/AIDS was said to be a spiritual illness and that it is only by sleeping with a virgin that you can be protected/cured from the disease (Bogart et al., 2011; Ross, Essien, & Torres, 2006). Analysing both structural issues and individual factors situated under PEH is crucial to understanding health perceptions of HBV transmission in the UWR of Ghana.

### 2.9 Health Geography

Where we live inherently affects our health. The social, built and natural environments impact our overall health and wellbeing. Therefore, geographic context such as the siting of a health facility, and the implementation of specific health intervention programs for given locations and disease surveillance play a crucial role in shaping health perceptions and other environmental risks (Dummer, 2008). Understanding these environmental and sociocultural dimensions of health and how these factors are interrelated has remained the preoccupation of health geography. Unlike medical geography however that focuses on biomedical assessment or evaluation of diseases, health geography examines health and wellbeing holistically encompassing the sociocultural and political determinants of health (Mayer, 2000).

Research in health geography includes but not limited to 1) patterns, causes and spread of diseases, and 2) planning and provisioning of health services (Dummer, 2008). The contribution of health geography to public health reforms and interventions cannot be

overemphasised. For instance, public health policies are informed by the core themes of health geography including health inequalities, healthcare access, spatial-temporal analysis of diseases and wellbeing, and the management of healthcare at global, national and local scales (Smith & Easterlow, 2005; Thomas, Dorling, & Smith, 2010). The emphasis on the role of 'place' over 'space' in exploring health and wellbeing distinguishes health geography from medical geography. In this context, the subjective and contextual meaning ascribe to disease, illness and health including health perceptions is important to health geographers as they tend to influence concept of health and wellbeing as well as the spread of diseases in varying geographical and sociocultural contexts (Veenstra et al., 2005). Luginaah (2009) emphasises that *"*.....health geographers have re-conceptualized the notion of "place" as a complex cultural symbolic phenomenon constructed through relationships between people and their settings, rather than mere sites where observations are located*"* (pg 92). Therefore, the interplay of space, sociocultural patterns and power relations are instrumental in defining diseases, illness and health within a localized context (Luginaah, 2009). Indeed, social concepts in health geography including the political ecology of health framework used in contextualizing health outside biomedical markers are important to the holistic understanding of disease spread in the UWR, particularly the health perceptions of HBV transmission. This will help in tailoring public health interventions that are specific to the population under study.

**3.0 Summary**

The chapter reviewed literature on the burden and distribution of infectious diseases in SSA with emphasis on Ghana. Insufficient disease surveillance, poverty and weak healthcare infrastructure could partly explain why SSA is over burdened with varying

infectious diseases including the endemicity of HBV. This broad nature of the disease burden is reflected in Ghana's healthcare system and more specifically in the UWR where poverty and quality healthcare is a challenge. Health geography and PEH therefore provide a guide to understanding the structural as well as individual factors to the study of disease, illness and wellbeing.

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# Chapter Three

## Research Methodology

This chapter explains the conceptualization of this study, its design, data sources, collection, and analysis. It further elaborates how the philosophical and epistemological underpinnings of this study informed the design, methods and analytical tools used. It further expands on the data collection tools, measures, and analysis to ensure rigor. Other details regarding the methods in each manuscript that were not captured due to journal preferences and limitations are discussed in this chapter.

### 3.1 Post-Positivist epistemology

Research is the process of inquiry and discovery (Kitchin & Tate, 2013). All research is therefore formulated and guided by a philosophical/epistemological belief which inform assumptions about what can be researched, and thus the selection of research topics and the methods to be used (Graham, 2013). According to Kitchen and Tate (2013), the process of academic inquiry is still saddled with the fundamental question and debate about "what can be known and how things are known" which continues to evolve in the quest for knowledge. This debate has birthed two broad schools of thoughts on knowledge derivation, namely 'objectivism' and 'subjectivism' standpoints (Johnson & Onwuegbuzie, 1973). Accordingly, 'objectivism' versus 'subjectivism' debate has spanned in academia for over two centuries (Weber, 2004). The 'objectivism' school of thought argues that knowledge can be derived through the application of scientific methods such as observation and manipulation of subjects in a laboratory (Weber, 2004). Mainly made up of positivists, they further argue that knowledge exists outside of the human control and senses, and it can therefore be determined if researchers follow a

defined scientific process in their inquiry (Lincoln, Lynham, & Guba, 2011; Sandberg, 2005). Thus, according to the positivist epistemology, cause and effect of 'reality' can be known only if a scientific process which eliminates the personal influences and biases of the researcher is applied to the phenomenon under study (Crook & Garratt, 2005; Kaboub, 2008).

Critiques of positivism have been intense, with the main argument indicating the focus that positivist science is never value free, but tend to be influenced by various contexts. In contrast therefore, 'subjectivism' mostly made up of the constructivist and interpretivist argue that people's experiences and interaction in the social world define what can be known and therefore knowledge is contextual (Tuli, 2011). Accordingly, the path to 'knowing' is through people's lived experiences and their perceptions of human realities which makes knowledge or reality contextual and outside the realm of laboratories (Schwandt, 1994; Tuli, 2011). Interpretivists advocate for methods that provide an in-depth understanding of a social phenomenon.

However, for this thesis, I adopt a post-positivist epistemology in examining perceptions of hepatitis transmission in the Upper West Region of Ghana. Although positivists believe in the existence of 'absolute knowledge', post-positivist aknowledges that reality is influenced by people's social environment which then makes reality a highly subjective concept. According to the post-positivist epistemology, scientific inquiry is therefore embedded in human values and that scientific observations are not independent of the personal biases or influence of the researcher (Castree, 2005) - a sharp departure from positivism. Post-positivists, therefore, posit that research is guided by theory and since theoretical frameworks are mostly value-laden, it is difficult to objectively study a

phenomenon without the influence of the researcher biases. Given that all scientific measurements are fallible, post-positivists advocate the use of multiple measurement methods and observations including triangulation to better understand social reality (Ryan, 2006).

The study design, methodology and analytical framework was informed by a post-positivist epistemology with the assumption that, knowledge about hepatis B is contextual, as it is informed by the lived experiences of residents in the study area. Thus, post-positivist epistemology accounts for the influence of contextual factors that inform the construction of perceptions and knowledge about HBV transmission, although there is an objective mode of HBV transmission. For instance, while a scientific-objective criteria such as epidemiology has been useful in understanding disease spread and those that may be at most risk of a viral agent, contextual factors including health believes and perceptions, as posited by post-positivists have been found to be an important link in explaining the spread and those at increased risk even with the same context.

With a post-positivist epistemology and in line with previous studies (*see* Anson, Paran, Neumann, & Chernichovsky, 1993; Menec, Chipperfield, & Perry, 1999; Rishworth, Bisung, & Luginaah, 2016), the study used an extensive approach, which is a quantitative method to examine the health perceptions of HBV transmission in the UWR of Ghana. The choice of an extensive approach was informed by three reasons: 1) to generalize my findings to similar context in Ghana and elsewhere. This influenced the choice of a larger sample size in the study context to capture different demographics and other socioeconomic indicators which has the potential to influence perceptions of HBV transmission in the region; 2) to provide a baseline quantitative data for future research of

HB in Ghana and the UWR in particular. Previous extensive studies on HB prevalence were mostly clinical and targeted at high risk populations such as pregnant women and prisoners in southern Ghana (*see* Candotti, Danso, & Allain, 2007; Merrill & Hunter, 2011; Rufai, Mutocheluh, Kwarteng, & Dogbe, 2014; Sarkodie et al., 2001). So far, the only study on perception of HB in the UWR used an intensive/qualitative approach which leaves a knowledge gap on the extent of HB knowledge and misconceptions in the region (*see* Mkandawire, Richmond, Dixon, Luginaah, & Tobias, 2013). In line with the call by Mkandawire et al. (2013) for an extensive study to gauge the extent of misconceptions in the region, this will be the first extensive study to measure the level of HB knowledge in the study area and 3) lastly, given time constraints and a limited budget, as a master's student, quantitative method is the most cost-effective and, engenders optimization of time.

## 3.2 Study Methods

### *3.2.1 Research design and sampling*

In an attempt to answer the research questions, the study design used a cross-sectional survey. Cross-sectional research design allows research to be conducted as a snapshot of time taking into consideration the differences in demographics and other socioeconomic factors (Busk, 2005). Unlike longitudinal designs where interventions are introduced and measured at an estimated time to produce an outcome, cross-sectional design focuses on finding relationships between and among variables by drawing inferences from the differences that exist between or among study participants using a one point in time (Busk, 2005; Feldman & McKinlay, 1994; Levin, 2006). Given that my interest is to understand the level and extent of HB perceptions, misconceptions and knowledge that

may have contributed to the high prevalence (i.e. 18.5%) in the UWR and how this knowledge may differ among different social groups defined by gender, wealth status, educational attainment among others, cross-sectional design is well suited to capture these differences.

The data collection period lasted for 3 months, from June to August of 2017 in four districts (Wa municipal, Wa West, Sissala East and Jirapa) of the Upper West Region. Thirteen experienced Research Assistants (RAs) and two field monitoring supervisors from the University for Development Studies (UDS) Wa campus were recruited to assist with the data collection. These RAs were chosen from UDS because of the long-standing relationship between them and the Department of Geography, Western University. The experience gathered over the years by these RAs in data collection in the study area made them suitable for this research. While the RAs were tasked with collecting the data from study participants, the two supervisors assisted in monitoring and supervising the RAs while on the field. Together with the two supervisors we scanned for data entry errors and made follow-ups to participants when an error was detected which was to ensure data quality.

Before proceeding to the field and notwithstanding the experiences of the RAs, a five-day training workshop was organized to get the RAs acquainted with the survey tool. The first three days were used to discuss and assess the RAs understanding of the intent and purpose of each question on the survey through a role play. This was to ensure RAs understood in-depth the purpose of the study and to provide me the opportunity to explain to discuss invalid responses during data collection on the field while training for the last two days centered on ethical issues. To help disseminate factual knowledge about HB

transmission and prevention in the research communities, RAs were also tasked to spend some time after administering surveys to explain and respond to questions from research participants on all HBV related issues such as transmission and concerns. Further, I emphasized research participants' confidentiality and rights to leave the research at any point in the interview. RAs and the two field monitoring supervisors were also made to sign a bond of confidentiality before they were allowed to proceed with the field work.

Data collection used a multistage sampling technique that followed the Ghana Statistical Service sampling method (Ghana Statistical Service, 2012). Under this technique, sampling is done at different stages/clusters and in smaller units until the desired sample size is achieved (Kothari, 2004). This method is most appropriate for this study since it is less expensive compared to other sampling methods. It also combines different random sampling techniques (e.g. simple random sampling and stratified sampling) to ensure the data is representative of the population under study (Kothari, 2004; Redman, 1973). Following the different stages involved with this sampling technique, I randomly selected four out of eleven districts in the first stage. In the second stage, I selected at random four electoral areas in each district and came up with 112 communities each representing a geographical zone in the district (e.g. northwest, southeast etc.). In each of the 112 communities the first household at the entrance of the community was interviewed, after which interviews were conducted in every fifth house until the number of households surveyed was proportional to the population size of the community.

The population of males and females above 18 years for the four districts at the time of the research was 333,492 (Table 5). Using a 95% confidence interval and a 3% margin of error in Slovin's formula for sample size determination: [n=N/ (1+ (N*e^2)] resulted in a

minimum required sample size of 1107. To ensure enough statistical power from the sample for analysis, an additional 266 surveys were added to the 1107 surveys. This gave a total survey of 1374, with a 95% response rate. A big sample size is beneficial to any quantitative study for the following reasons: 1) it ensures the reliability, validity, and robustness of research findings; 2) it also enhances the power of the study by reducing type I & II errors. Therefore, the sample (n=1374) was used for all statistical analysis in this thesis.

**Table 3.1: Sample Size for study districts**

| District | Population | Sample size |
|---|---|---|
| Wa Municipal | 107,214 | 480 |
| Wa West | 81,348 | 300 |
| Sissala East | 56,528 | 200 |
| Jirapa | 88,402 | 394 |
| **Total** | **333,492** | **1374** |

**Source:** Adapted from Ghana Statistical Service 2010 Population and Housing Census report, 2012

*3.2.2 Data collection tools*

Standardized data collection instruments on Knowledge of HBV transmission, testing and service availability were adapted from the Ghana Demographic and Health Survey (GSS, GHS, and ICF, 2015) and the Ghana Living Standards Survey round 6 (Ghana Statistical Service, 2014).The adopted questions from GDHS and GLSS6 were modified to suit the purpose of this study. Specifically, knowledge, awareness, and perceptions (KAP) questions about the HBV were modified from the GDHS to suite the specific context of this study while the household and community survey instrument that examines individual health behaviors, access to healthcare services and food security was adapted from the GLSS6. Since 1987, the Ghana Living Standards Survey (GLSS) and the Ghana

Demographic and Health Survey (GDHS) under the auspices of the Ghana Statistical Service (GSS) and Ghana Health Service (GHS) and in collaboration with ICF international have conducted several research into the general living conditions of Ghanaians (Ghana Statitiscal Service, 2014). The survey tool used by both GDHS and GLSS collects broad data from selected households on a wide range of areas including but not limited to demographic characteristics, health, and wellbeing, business and source of livelihood as well as tourism and migration.

In line with theory and other empirical studies, I selected and modified relevant questions from the two instruments to suit my study objectives. The modified questionnaire used for the study had a total of 93 questions that covered HB perceptions and knowledge; general health behavior; health status questions adapted from the Duke Health survey; food security, and questions relating to the socio-demographic characteristics of study participants (see Appendix B). The questions/variables included in my measurement tool had been used by previous studies to examine the associations between health perceptions, disease transmission and access to healthcare in varying contexts *(see* Alidu & Grunfeld, 2017; Glenton et al., 2013; Ma et al., 2007; Perz, Armstrong, Farrington, Hutin, & Bell, 2006; Sano et al., 2016; UNICEF, 2008*).*

*3.2.3 Data analysis*

Using statistical package for social science research (SPSS) version 25, the field data was captured and later cleaned to remove potential errors associated with the inputted responses. This was also to enhance data quality and ensure the reliability of study findings. The processed data was subsequently uploaded and analyzed using STATA 15. In the first manuscript, I used multilevel hierarchical linear model to examine the

association between socio-demographic factors (i.e. individual-level characteristics) and facility-based variables (community level factors) on HBV knowledge. For my second manuscript I used multinomial logit regression models to examine the factors associated with testing for HBV with a focus on source of healthcare. The detailed analytical strategy can be found in the two manuscripts presented in Chapters 4 and 5.

The study got ethical clearance from Western University Non-Medical Ethics Board (NMEB before the commencement of the study. The NMEB ensures that participants' confidentiality and privacy are maintained throughout the entire study period. This included seeking participant's consent prior to interviews, informing them of their rights and willingness to stay/discontinue the research process at their convenience, and censoring sensitive questions to ensure participants comfort. Following the ethics board guidelines also ensures that the safety of both the researcher and participants were safeguarded throughout the period of the study.

### *3.2.4 Rigor*

The entire research was guided by several procedures to ensure robustness, rigor and make findings generalizable. First, the measurement tool (survey instrument) went through several revisions by my thesis supervisor and the ethics board to ensure that questions were well suited for the study context. Secondly, during the field data collection stage, experienced RAs were recruited and trained on the tool to ensure consistency and the import of each question on the survey instrument. A pilot study was done in two communities (not included in study communities) to test the questions for cultural suitability and also to address any discrepancies relating to the understanding of survey questions by the participants. To ensure that the data was of the highest quality, a

weekly debriefing was organized during fieldwork. RAs were paired to work in one community at a time under the close supervision from my two field monitoring supervisors and lastly, the sampling method (multistage) used ensured that the sample was representative of the study population.

### 3.3 Conclusion

This chapter discussed the philosophical and epistemological grounding of this thesis and its influence on the conceptualization of this study. It further delved into the research design and methods used in the data collection and the analytical strategy used in each of the two respective manuscripts. The chapter ended with a description of the various procedures put in place to ensure robustness and validity thought out the study including the research design, sampling and analytic techniques. This ensured that findings from this study are valid and also generalizable to similar context elsewhere.

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# Chapter Four

## Factors influencing Knowledge of Hepatitis B Virus Transmission in the Upper West Region of Ghana: A Multilevel Analysis


### Abstract

Improving knowledge of HBV transmission is highlighted as a crucial strategy for reducing the spread and promoting healthy behaviors among endemic populations in developing countries. Yet, our understanding of the perception of HBV transmission and how multi-scalar factors influence its spread in resource-poor contexts is limited. In this study, I examined the influence of individual and facility/community-level factors on HBV transmission knowledge among residents in the Upper West Region (UWR) of Ghana. Using a social-ecological theoretical framework, we fitted multilevel hierarchical regression models to cross-sectional data collected on individual community members (n=1,104) and health facilities (n=41). Findings reveal that a quarter (25%) of respondents possessed correct knowledge of HBV transmission. We further found that individual-level factors such as respondents' socio-economic status: education (OR=2.357, $p \leq 0.001$) and occupation (OR=2.795, $p \leq 0.01$) and demographic characteristics: age (OR=2.263, $p \leq 0.1$) and district of residence (OR=1.757, $p \leq 0.05$) were significantly associated with good knowledge of HBV transmission. Religion and place of residence were however associated with lower odds of HBV knowledge. At the community-level, the type of health facility and HBV services partly accounted for disparities in HBV transmission knowledge among residents. Random effects analysis showed that approximately 79% of the variance in the knowledge of HBV transmission in the analysis is explained by presence and type of HB services provided in health

facilities in the UWR of Ghana. These findings provide important insights on the need to address both individual and health facility-based factors in HBV policy in Ghana and similar contexts.

**Keywords**: Social Ecological Model; hepatitis B (HB); hepatitis B virus (HBV); UWR; Ghana

## 4.1 Introduction

Since its discovery in the late 1960s, hepatitis B (HB) has increasingly contributed to high rates of morbidity and mortality which led the World Health Organization to consider it as a global public health threat (Ott et al., 2012; World Health Organization, 2017). The WHO reports that close to a million people die annually from HB related complications (World Health Organization, 2016). The incidence of HBV infection and its associated deaths are predominant in sub-Saharan Africa (SSA) and Asia where country-level average of HB prevalence rate is estimated at 8% compared to countries like Canada, United States and Australia with less than 2% prevalence (World Health Organization, 2017). Consequently, over 80% of liver cirrhosis and cancer cases of the two endemic world regions are attributed to HBV (Lok & Mcmahon, 2001; Taylor et al., 2005). According to the WHO, this situation represents a significant burden on the already deplorable health care systems in these regions (World Health Organization, 2013).

In contrast to low HB endemic countries where sex and injection drug use are the leading causes of infection (François et al., 2008; Maddrey, 2000), lack of disease awareness, mother-to-child transmission and child-to-child transmission resulting from childhood play, and other interactions with infected children have been identified as the main routes of transmission in high endemic regions (Choe et al., 2006). A specific global response to the disease burden posed by HBV infection in high endemic regions is the Sustainable Development Goal (SDG) 3.3 instituted by the United Nations to eradicate all hepatitis related infections including HBV by 2030 (World Health Organization, 2016). At the core of the strategies to achieve SDG 3.3 are creating awareness, testing, and vaccination

programs. The successful implementation of these strategies is estimated to reduce the incidence of the disease by 65% in moderate to high prevalence countries (WHO, 2016).

In the context of developing countries, several scholars have posited that the spread of infectious diseases including HIV and HBV is due to the persistence of risky socio-cultural practices and an inefficient and under-resourced healthcare system (Martinson et al., 1998; Mkandawire, Richmond, Dixon, Luginaah, & Tobias, 2013). Others also contend that the lack of disease awareness, which is defined as low knowledge or incorrect information about the mode of transmission is the leading cause of the spread of infectious diseases including HB (Sano et al., 2016; Martinson et al., 1998). For instance, it is reported that some people in Ghana still hold the view that HIV is contracted through witchcraft and other supernatural means, — opinions informed by religious and traditional beliefs (Gyimah et al 2010). Consequently, Rufai and colleagues (2014) attribute HB related complications in many resource-poor countries including Ghana to misconception and lack of accurate knowledge about HBV transmission.

Furthermore, given the similarity in symptoms (*i.e.* fever, headaches, and jaundice), HB infection is mostly self-diagnosed as malaria, and may only be reported at health facilities in advanced chronic stages (Lok & Mcmahon, 2001). In line with this, it has been argued that creating awareness and knowledge about HBV transmission is a crucial tool for the prevention, early detection, and reduction in the spread of the disease. While HB awareness at the individual level is important for achieving SDG 3.3, other studies have also emphasized the important role of community-level factors in shaping health beliefs and practices. For instance, Sano et al. (2016) have reported that the persistence of HIV misconception is more pronounced among certain ethnic groups in Malawi given the

ethnocultural beliefs about the etiology of the disease and limited access to health information. Furthermore, access to health facilities, especially in the context of developing countries where they may be mandated to offer health information and community outreach programs has also been shown to be an important determinant of HB voluntary testing (Anfaara, Atuoye, Mkandawire, & Luginaah, n.d.)

Despite this evidence, previous studies on HB knowledge in Ghana has been limited to individual factors (Mkandawire et al., 2013; ) and the impact of socio-cultural factors (François et al., 2008; Mitchell, Colvin, & Beasley, 2010). Since health facilities in Ghana are also mandated to provide information on HB transmission through outreach programme, we hypothesize that health facilities in the UWR have an influence on individuals' HB awareness in the region. Furthermore, in line with previous studies that posit that individual health beliefs and practices are influenced by community factors such as improved access to health facilities and information, I adapted the socio-ecological model (SEM) to explore the influence of both individual and community-level factors on HB knowledge in the UWR of Ghana.

### *4.1.1 Social Ecological Model and HB Knowledge Transmission*

The SEM underscores the relationship between the individual and their environment by emphasizing how individual actions and beliefs including the etiology of diseases are influenced or modified by their social context (Lubega et al., 2015). Individual behavior is therefore not only a function of one's knowledge, attitudes, and perceptions, but also the environment in which they live (Lubega et al., 2015). Thus, positive health behavior such as voluntary testing for HB can be influenced and maximized when the environment (e.g. presence of health facility in the community) and other health policies support and

facilitate individual choices, while motivating them to take positive actions about their health (McLeroy, Bibeau, Steckler, & Glanz, 1988). The model has five overlapping levels that influence behaviors and health interventions: individual, interpersonal, community, organizational and policy guidelines (Centers for Disease Control and Prevention, 2009; McLeroy et al., 1988). The model has been used to examine contextual influences on health prevention and disease control (*e.g* Bull & Shlay, 2005) and also to assess public health interventions in different contexts (Kerrigan et al., 2006).

Individual socio-economic and demographic factors including educational attainment, employment and wealth status, occupation, age, gender, ethnicity, and religion have been shown to influence knowledge of infectious diseases including HB (Bates et al., 2004; Maddrey, 2000). For instance, given the role of formal education in making individuals more assertive about preventative health care, studies show that persons with no formal education tend to have lower knowledge about infectious diseases and are more likely to endorse traditional and religious beliefs on the etiology of diseases such as HB compared to their educated counterparts (Sano et al., 2016; Wu, Lin, So, & Chang, 2007). Similarly, type of occupation and household wealth has been reported to influence knowledge creation and dissemination in the context of SSA. Compared to those within formal work settings, informal workers such as farmers and traders may have limited access to health information given the organization of their workspace (Ma et al., 2007; Kansanga et al., 2018). Furthermore, the cost associated with health care access such as HB voluntary testing and vaccination prevent the poor from accessing the necessary resources to form factual knowledge about disease transmission (Sano et al., 2016). Similarly, while religious beliefs in the context of SSA may be associated with false information and

perception about the etiology and spread of infectious diseases (Gyimah, Tenkorang, Takyi, Adjei, & Fosu, 2010), scholars such as Luginaah et al. (2005b) have highlighted the role of religious practices in disease knowledge by actively participating in disease prevention and health promotion (Luginaah, Yiridoe, & Taabazuing, 2005).

According to the model, community-level factors such as access to health care, availability of health workers, and health services in the community interact with individual-level factors to shape health beliefs and behaviors. In most countries in SSA, health facilities in addition to their core mandate of attending to clinical cases, have an extended responsibility of educating patients and community members on preventive health care including testing for infectious diseases. These initiatives have been successful in changing community beliefs and perceptions about diseases and their etiology ( Stephenson, Baschieri, Clements, Hennink, & Madise, 2006). For instance, in the UWR of Ghana, the establishment of the CHPS and health posts have been found to be helpful in disseminating information about HIV that has resulted in increased voluntary testing (Baiden et al., 2005; Tenkorang & Owusu, 2010).

To date, most studies that have examined knowledge and access to health care only reported on individual economic and socio-demographic characteristics as determinants of correct knowledge about disease transmission. To extend the literature on factors influencing HB transmission, this study seeks to answer the following research questions, a) what is the level of knowledge on HB transmission in the UWR of Ghana? b) how are individual and facility/community-level factors associated with knowledge of HBV transmission in the UWR of Ghana?

*4.1.2 HB knowledge in Ghana*

In Ghana, estimates of the prevalence of HBV are less certain given the existing poor disease surveillance system (Mkandawire et al., 2013; Ofori-Asenso & Agyeman, 2016). In the absence of national-level studies, systematic analyses of micro-level studies that focused on specific segments of the population, provide potential estimates of HBV prevalence in Ghana. In a more recent meta-analysis of 30 studies conducted between 1995 and 2015 across six of the ten regions in the country (excluding Upper West, Upper East, Volta and Western Regions), Ofori-Asenso and Agyeman (2016) estimate a prevalence rate of 12.3% with wide disparities reported across rural-urban areas, regions, age groups and persons with chronic health conditions. For instance, while Nsiah (2012), reports a prevalence rate of 3.6% among sickle cell patients in the Ashanti Region, Adjei et al. (2006) estimate a 22.1% infection rate among prison inmates and officers in nine regional capitals. Despite the varying figures, what is certain is that HBV is a hidden epidemic in Ghana that needs urgent attention (Mkandawire et al., 2013).

Consequently, HB knowledge in the country remains very low especially in the rural regions such as the UWR. According to the Hepatitis Society of Ghana, the poor knowledge about HB is attributable to four possible reasons, namely; a) low awareness/knowledge about the disease, b) cost of testing and vaccination, c) distance to accessing HB services especially in rural communities, and d) unavailability of HB services in most health facilities serving rural communities. In line with the position of the WHO, Martinson *et al*. (1996), reiterates that low awareness of the disease is a major setback to reducing the HB menace in Ghana because HB knowledge is strongly associated with misperceptions and religious beliefs. This study will provide an

understanding of the factors influencing HBV knowledge or lack thereof. Various NGOs such as the Okyeame Kwame HB Foundation and the HB Foundation of Ghana have partnered with the Ghana Health Service to offer free HB information sessions via audiovisual platforms to sensitize the public on HB. They also offer intermittent HBV screening and vaccination at subsidized fees which are mostly in endemic communities. However, this is not enough to cover the most vulnerable rural populations that have limited access to HB information and services.

*4.1.3 Study Context*

The UWR of Ghana is predominantly rural with a population of 702,110 representing 2.8% of the national population. Males and females constitute 48.5% and 51.4% of the population respectively with an average household size of 6.2 people. The major ethnic groups in the region are the Dagaaba and Waala. Other minority ethnic groups include the Brifo, Sissala, and Lobi. The non-literacy rate for people 11 years and over is 51%, almost double that of the national average of 23% (Ghana Statistical Service, 2012). Poverty rates are also very high—about 71% of people in the region live on less than USD 1.25 a day which is below the national average of 24.2% (Ghana Statiscal Service, 2015). Accordingly, residents have coped with high poverty rates through out-migration (Kuuire, Mkandawire, Arku, & Luginaah, 2013; Luginaah, 2008).

In addition to the high poverty rates, poor social infrastructural development in the region has affected health care delivery. For instance, the doctor-patient ratio in 2015 was 1:30601 in sharp contrast with the national average of 1:8953, and 1:3186 in the Greater Accra region (Ghana Health Service, 2015). The entire region in 2014 had only 6 hospitals, 15 clinics, and 176 CHPS compounds (Ghana Health Service, 2015).

Geographical access to health care has been challenging, as about 80% of residents in the region walk more than 8km before accessing health care facilities (GHS, 2015). This may also be affecting access to health information in the region as these health facilities are also mandated to sensitize patients and residents on infectious diseases especially HBV. The UWR has the highest rates of mortality relating to infectious diseases in Ghana including HB (Mkandawire et al., 2013). According to Mkandawire et al. (2013), this situation is partly attributable to low health care access and awareness as well as risky cultural practices and health behaviors in the region.

## 4.2 Methods

### *4.2.1 Study sample and data collection*

Cross-sectional data were collected from adults 18 years and older (n=1,374), and from staff at health facilities (n=41) that provide HB information and services to the general population in the Jirapa, Wa West, Wa Municipal, and Sissala East districts of the UWR. Data were collected from June to August 2017. For individual-level surveys, the study followed the Ghana Statistical Service multi-staged sampling method to randomly draw the study sample from four of the eleven districts in the region. Within each district, communities were randomly selected and within each community, households were selected for the study. This procedure ensured proportionality of the population size in the sample. In every household, the person whose birthday was closest to the date of the data collection, regardless of the person's sex was selected. As part of the interview, participants identified health facilities they go for health service. In each of the identified health facilities, the health worker responsible for HB service was interviewed in the second phase of the data collection. With this design, responses from household level

(first level) were nested in health facilities (second level). Standardized data collection instruments on knowledge of HBV transmission, testing, and service availability were adapted from the Ghana Demographic and Health Survey (GSS, GHS, and ICF, 2015), and the Ghana Living Standards Survey round 6 (GSS, 2014).

### *4.2.2 Outcome Variable*

In this study, the outcome variable, 'Knowledge of Hepatitis B transmission' was derived from two techniques: additive scale and Principal Component Analysis (PCA) involving fourteen binary (yes, no) response questions adopted from Ghana Demographic Health and Survey (GSS, GHS, and ICF, 2015). With a Cronbach alpha of 0.76, which is above the commonly accepted lower threshold of 0.70 (Cronbach, 1951), the questions together measured a single construct, Knowledge of Hepatitis B transmission. The additive scale presented spatial and gender-based disparities in HBV knowledge, which directly addressed the first research question. The PCA scores supported the building of regression models to address the second research question. For both scales, lower values represented 'poor knowledge' while higher values represented 'good knowledge' of HBV transmission. Despite being continuous, the index from PCA was not normally distributed, which violated a major assumption for linear parameter estimates with Ordinary Least Squares regression technique. Thus, I categorized this index into two, the top 20% coded '1', and the other segment coded '0'. Distribution of the outcome variable is shown in Table 1. In this study, the top 20%, referred to as 'good knowledge of HBV transmission' is the category of interest.

### *4.2.3 Explanatory variables*

#### *4.2.3.1 Individual level*

Informed by the Social Ecological Model (SEM) (Lubega et al., 2015), and empirical studies on knowledge of infectious disease transmission (e.g. Mkandawire et al., 2013; Sano et al., 2016) the first two and the last three factors of the SEM were collapsed into two main levels; individual and community-level factors respectively. Any discussion of the SEM in this paper, therefore, refers to the two main factors; individual and community-level factors. Subsequently, relevant independent variables were selected and grouped into individual and health facility-based variables, representing the first two and the last three factors of the SEM, respectively. Individual-level variables included socio-economic, socio-demographic and locational characteristics. Household wealth (coded as 1=Richest; 2=Rich; 3=Middle; 4=Poor; and 5=Poorest), level of education (coded as 1=Secondary education and higher; 2=Primary education; and 3=No formal education), and occupation (coded as 1=Civil service; 2=Trade; and 3=Farming) were included to account for disparities in socio-economic characteristics of respondents. Socio-demographic factors considered in the analysis included gender (coded as 1=Male; and 2=Female), age (coded as 1=18-24; 2=25-34; 3=35-49; and 4=50 years and above), marital status (coded as 1=Formally married; 2=Currently married; and 3= Never married), religious affiliation (coded as 1= Christian; 2=Muslim; and 3= Traditionalist and others), and ethnic affiliation (coded as 1=Dagaaba; 2=Sissala; 3=Waala; 4=Brifo; and 5=Others). The impact of respondents' location was accounted for with the inclusion of district of residence (coded as 1=Wa; 2=Jirapa; 3=Sisaala East; and 4=Wa West), and place of residence (coded as 1=Urban, and 2=Rural).

*4.2.3.2 Health facility-level*

As individuals' knowledge of transmission of infectious disease is influenced by the source of health information and health care service, the analysis included 'type of health facility' respondents visited for health care service, and the HB services provided by these health facilities — HB service index. In Ghana, health care service provision is structured from Community-based Health Planning and Services (CHPS) compounds at the lowest level, to sub-district clinics, district clinics and hospitals, regional hospitals, and tertiary health facilities at the highest level (GHS, 2015). This ordering reflects the referral structure in the Ghana health Services. As indicated by Kuuire et al. (2015), people in the region were likely to visit places perceived to provide quality health care services and were financially and physically accessible. Consequently, the type of health facility from which people access health care service is incongruent to the Ghana Health Services structure, thus observations were not hierarchical. With this, I categorized the health facilities people go for care into three (coded as 1=CHPS; 2=Sub-district clinic; and 3=Hospital). Further, I derived HB service index from the binary response questions on the kind of HB services provided by the health facilities (coded as 1=Education only; 2=Education and referral only; and 3=Education, testing, and vaccination). The analytical sample represented respondents who answered questions on modes of HBV transmission. Thus, respondents who reported they never heard of HB (n=270) were dropped and having recorded no missing data, the final sample used in the analysis was 1,104.

## 4.3 Analytical technique

In line with the research questions, histograms were used to present the distribution of knowledge of HBV transmission (Figures 4.1, 4.2 & 4.3). I also examined the

independent effect of individual-level variables and variance attributable to health facility variables by employing multilevel mixed-effects generalized linear model of the binomial family with the complementary log-log link function. Preference of this method over techniques such as multivariate logistics regression is because the outcome variable is dichotomous with a highly skewed distribution towards the category of interest (see Table 4.1), and responses were clustered around health facility level factors. The models built a fixed effects component that examined the association between individual-level factors and knowledge of HBV transmission, and a random effects component, which accounted for the variance from clustering at health facility level. In the random effects component, "type of health facility" was assigned to level one and HB services index to level two, as services are nested within health facilities. The analysis adjusted for sample weights to improve the robustness of the parameter estimates. Regression coefficients were exponentiated into adjusted odds ratios for easy interpretation. Odds ratio (OR) less than 1 is interpreted as lower odds of reporting good knowledge of HBV transmission while OR greater than 1 is interpreted as higher odds of reporting good knowledge of HBV transmission. Variance Partitioning Coefficient (VPC) in the random effects component of the analysis was calculated using the D method recommended by Goldstein et al. (2002). This method suggests that under the assumption of a threshold imposed on a continuous variable such as knowledge of HVB transmission, the variance at level l (type of health facility in this study) is fixed at 3.29 ($\pi^2/3$). I then included the variance at level 2 (HB service index) and calculated the percentage of variance explained by the model. Four models were built: Model 1 estimated unadjusted associations between the independent variables and the outcome variable; Model 2 adjusted for the composite

effect of health facility-based factors; Model 3 added all individual-level factors (socio-economic, socio-demographic, and locational); and Model 4 employed multilevel regressions to estimate fixed and random effects. All statistical analyses were conducted using STATA SE 15.

## 4.4 Results

### *4.4.1 Sample Characteristics*

Descriptive statistics and distribution of HBV knowledge across districts are presented in Table 4.1 and in Figures 4.1, 4.2 & 4.3. The study found that approximately 25% of respondents reported accurate knowledge on 7 out of the 14-item HBV transmission index (Figure 4.1). Further, there was gender and district-based variation in this knowledge (Figure 4.2).

**Figure 3.1: Knowledge of HBV transmission in the UWR of Ghana**

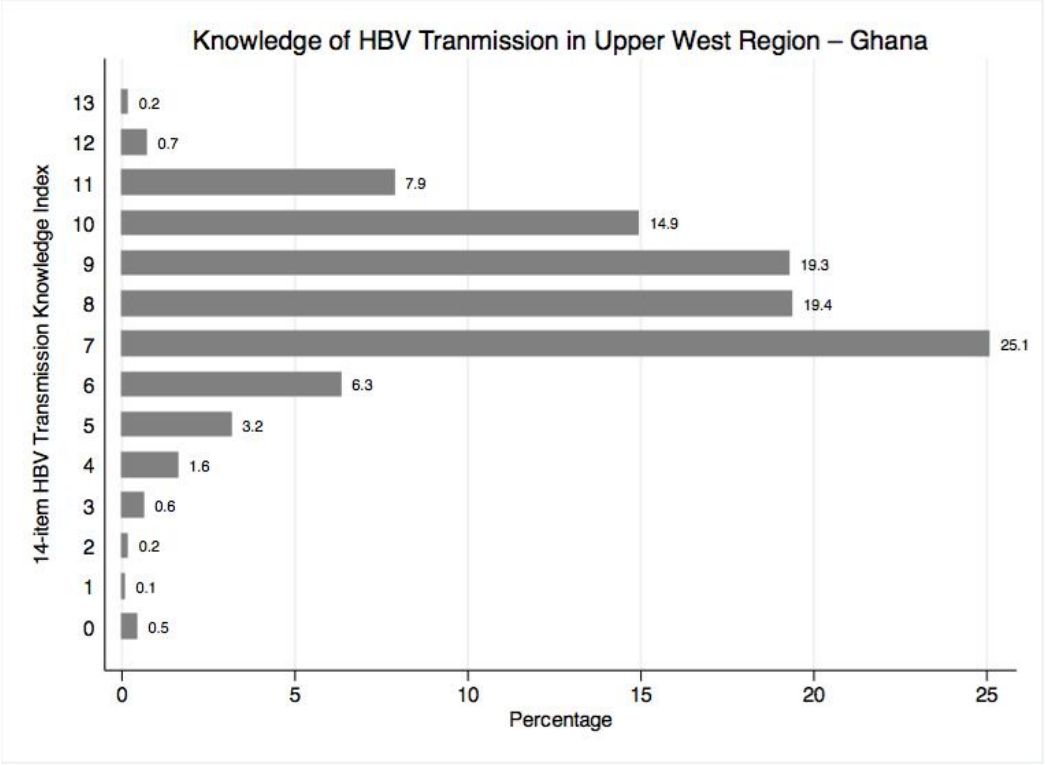


**Figure 4.2: Knowledge of HBV transmission among females and males in the UWR of Ghana**

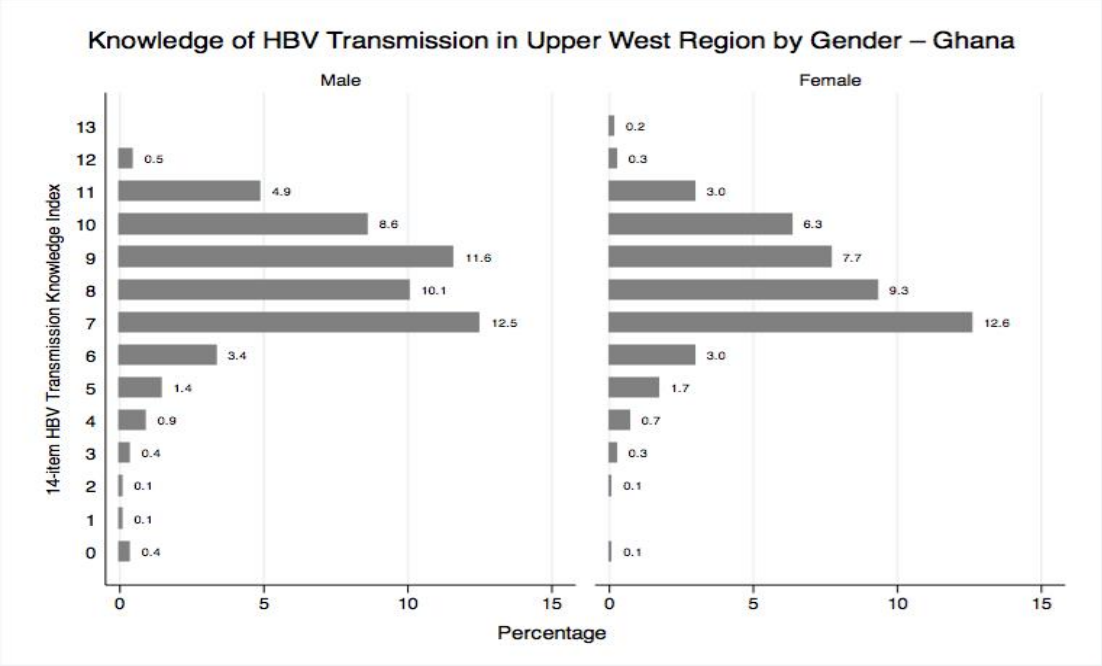
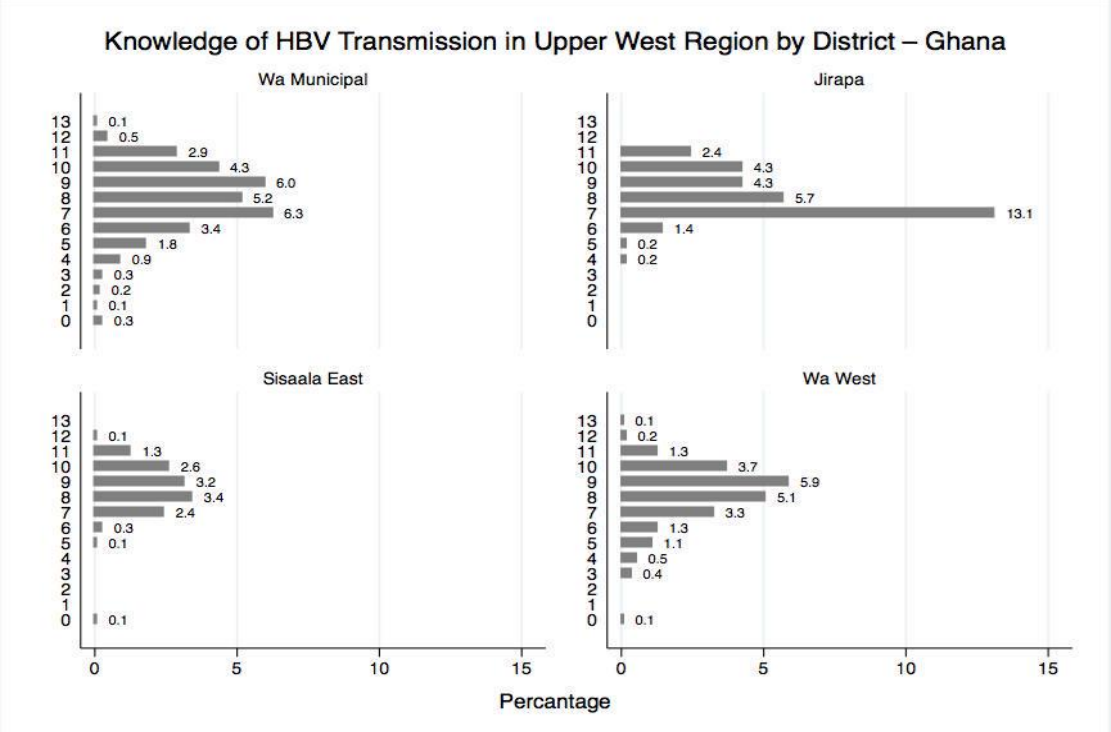



**Figure 4.3: Knowledge of HBV transmission by districts in the UWR of Ghana**



Respondents in the sample were equally distributed on household wealth quintiles. Also, while the majority (54%) had attained secondary education and higher, most respondents engaged in farming (52%) as their main occupation. Similarly, the majority of the respondents were males (55%), aged between 35 and 49 (39%), and married at the time of the study (68%). The analyses also found that majority of the respondents were Christians (51%) and affiliated with the Dagaaba ethnicity (47%) which reflects the socio-cultural population dynamics in the region (Ghana Statistical Service, 2013).

**Table 4.1: Sample characteristics for individual level variables**

| Variable | **Freq. (%) (N=1104)** |
|---|---|
| **Knowledge of HBV transmission** | |
| Upper quintile (Top 20%) | 224(20.3) |
| Others | 880(79.7) |
| **Wealth quintile** | |
| Richest | 221(20.0) |
| Rich | 220(19.9) |
| Middle | 221(20.0) |
| Poor | 221(20.0) |
| Poorest | 221(20.0) |
| **Education** | |
| Secondary + | 595(53.9) |
| Primary | 168(15.2) |
| No education | 341(30.9) |
| **Occupation** | |
| Civil service | 193(17.5) |
| Trading | 332(30.1) |
| Farming | 579(52.5) |
| **Gender** | |
| Male | 604(54.7) |
| Female | 500(45.3) |
| **Age** | |
| 18-24 | 130(11.8) |
| 25-34 | 362(32.8) |
| 35-49 | 433(39.2) |
| 50+ | 179(16.2) |
| **Marital status** | |
| Formerly married | 118(10.7) |
| Currently married | 748(67.8) |
| Never married | 238(21.6) |
| **Religion** | |
| Christian | 559(50.6) |
| Muslim | 154(35.4) |
| Traditionalist/others | 154(13.9) |
| **Ethnicity** | |
| Dagaaba | 522(47.3) |
| Sissala | 134(12.1) |
| Waala | 227(20.6) |
| Brifo | 88(7.9) |
| Others | 133(12.1) |
| **District of Residence** | |
| Wa Municipal | 354(32.1) |
| Jirapa | 349(31.6) |
| Sisaala East | 149(13.5) |
| Wa West | 252(22.8) |
| **Place of residence** | |
| Rural | 535(48.5) |
| Urban | 569(51.5) |

The analysis further indicated that a slight majority of respondents who had heard of HB prior to the study were resident in urban areas (52%), and in the Wa Municipal (32.1%),

the most populous and administrative capital of the UWR of Ghana (Ghana Statistical Service, 2013). For health facility dynamics as presented in Table 4.2, sub-district clinic was the most preferred source of health care (48%).

**Table 4.2: Sample characteristics for Health Facility level variables**

| Variable | **Per cent (%) (n= 41)** |
|---|---|
| **Health Facility Type** | |
| CHPS | 388(35.1) |
| Sub-District Clinics | 526(47.6) |
| Hospital | 190(17.2) |
| **HBV Services Index** | |
| Education/sensitisation only | 474(42.9) |
| Education/referral only | 469(42.5) |
| Testing/vaccination | 161(14.6) |

Furthermore, the study found that only 15% of health facilities provided both testing and vaccination for HBV, while approximately 43% were engaged in only education/sensitization activities.

*4.4.2 Bivariate Results*

Estimates of unadjusted odds of the association between independent variables and knowledge of HBV transmission are presented in Model 1 of Table 8. For health facility-level factors, it was found that while respondents who accessed health care from sub-district clinics were more likely to report good knowledge of HBV transmission, those who went to hospitals for care were less likely to report good knowledge of HBV transmission when compared with their counterparts who access care from CHPS (OR=1.275, $p \leq 0.1$; and OR=0.601, $p \leq 0.05$, respectively). Similarly, respondents who patronized health facilities that provided education, testing and vaccination for HB were less likely to report good knowledge of HBV transmission compared to those that provide education/sensitization only.

**Table 4.3: Bivariate and multilevel complementary log-log regressions predicting knowledge of HBV transmission in the UWR of Ghana**

| | Model 1 Unadjusted OR (R. Std. Err) | Model 2 Adjusted OR (R. Std. Err) | Model 3 Adjusted OR (R. Std. Err) | Model 4 Adjusted OR (R. Std. Err) |
|---|---|---|---|---|
| ***Health facility level variables*** | | | | |
| **Health Facility Type (ref:** CHPS) | | | | |
| Sub-district clinic | 1.275(0.186)† | 1.265(0.182) | 1.900(0.459)** | |
| Hospital | 0.601(0.143)* | 2.230(0.729)* | 1.940(0.610)* | |
| **HBV Services Index (ref:** Education only) | | | | |
| Education/referral only | 1.057(0.146) | 1.027(0.140) | 0.588(0.137)* | |
| Education/testing/vaccination | 0.313(0.095)*** | 0.163(0.069)*** | 0.670(0.315) | |
| ***Individual level variables*** | | | | |
| **Wealth quintile** (ref: Richest) | | | | |
| Rich | 2.626(0.898)** | | 1.592(0.570) | 1.599(0.573) |
| Middle | 2.802(0.949)** | | 1.080(0.379) | 1.081(0.407) |
| Poor | 5.018(1.603)*** | | 1.233(0.434) | 1.197(0.457) |
| Poorest | 10.207(3.132)*** | | 1.764(0.627) | 1.746(0.668) |
| **Education** (ref: Secondary+) | | | | |
| Primary | 2.299(0.509)*** | | 1.243(0.328) | 1.271(0.327) |
| No education | 5.400(0.871)*** | | 2.256(0.494)*** | 2.357(0.525)*** |
| **Occupation** (ref: Civil service ) | | | | |
| Trading | 2.349(0.833)* | | 1.731(0.666) | 1.676(0.650) |
| Farming | 6.764(2.201)*** | | 2.823(1.075)** | 2.795(1.059)** |
| **Gender** (ref= Male) | | | | |
| Female | 1.032(0.139) | | 0.937(0.144) | 0.932(0.147) |
| **Age** (ref= 18-24) | | | | |
| 25-34 | 2.900(1.030)** | | 2.281(1.021)† | 2.263(1.900)† |
| 35-49 | 3.999(1.389)*** | | 1.702(0.818) | 1.664(0.708) |
| 50+ | 3.425(1.268)*** | | 1.662(0.834) | 1.657(0.746) |
| **Marital status** (ref: Formerly married) | | | | |
| Currently married | 0.977(0.200) | | 1.041(0.227) | 1.062(0.251) |
| Never married | 0.358(0.102)*** | | 0.708(0.278) | 0.720(0.276) |
| **Religion** (ref: Christian) | | | | |
| Muslim | 0.348(0.068)*** | | 0.587(0.159)* | 0.568(0.151)* |
| Traditionalist | 2.211(0.340)*** | | 1.119(0.191) | 1.107(0.198) |
| **Ethnicity** (ref: Dagaaba) | | | | |
| Sissala | 0.552(0.119)** | | 0.713(0.280) | 0.709(0.365) |
| Waala | 0.195(0.051)*** | | 0.552(0.201) | 0.561(0.203) |
| Brifo | 0.392(0.117)** | | 0.700(0.333) | 0.680(0.293) |
| Others | 0.166(0.060)*** | | 0.498(0.221) | 0.505(0.210) |
| **District of Residence (ref:** Wa Municipal) | | | | |
| Jirapa | 4.834(0.918)*** | | 1.850(0.545)* | 1.757(0.637)* |
| Sisaala East | 1.999(0.508)** | | 2.051(0.794)† | 2.088(1.062)† |
| Wa West | 0.919(0.247) | | 0.616(0.244) | 0.562(0.231) |
| **Place of residence (ref=**Rural) | | | | |
| Urban | 0.676(0.091)** | | 0.537(0.107)** | 0.565(0.119)** |
| Constant | | 0.213(0.028)*** | 0.036(0.029)*** | 0.044(0.031)** |
| Log Pseudo-likelihood | | -542.01844 | -416.29332 | -429.10188 |
| ***Random Effects*** | | | | |
| Health facilities | Groups = 3 | Observations per group: min=190; Avg=368.0; max=526 | | |
| Health facility variance (SD) | 0.164 (0.659) | Health facility VPC (%) | | 21.3 |
| HBV services index | Groups = 7 | Observations per group: min=4; Avg=157.7; max=337 | | |
| HBV services index variance (SD) | 0.607(0.109) | HBV services index VPC (%) | | 78.7 |

Note: R. Std. Err. =Robust standard errors; VPC = variance partition coefficient; *** p≤0.001, ** p≤0.01, * p≤0.05, †p≤0.1

Further, individual-level socio-economic factors were significant predictors of HB knowledge at the bivariate analysis. Respondents from rich, middle, poor and poorest households were more likely to report good knowledge of HBV transmission relative to those from the richest households (OR=2.626, p≤0.01; OR=2.802, p≤0.01; OR=5.018, p≤0.001; and OR=10.204, p≤0.001, respectively). Similar findings were reported for education and occupation. Compared to respondents with secondary or higher education, those with primary and no formal education reported higher odds of having good knowledge of HBV transmission (OR=2.299, p≤0.001; and OR=5.400, p≤0.001, respectively). Also, traders and farmers relative to civil servants were more likely to report good knowledge of HBV transmission (OR=2.349, p≤0.05; and OR=6.764, p≤0.001, respectively). For socio-demographic variables, the bivariate analysis found statistically significant associations with knowledge of HBV transmission. Older respondents were more likely to have good knowledge of HBV transmission, while those who were never married at the time of the study relative to formerly married respondents were less likely to report good knowledge of HBV transmission. Furthermore, compared to Christians, Muslims were less likely, while those of Traditional and other religious affiliations more likely to report good knowledge of HBV transmission (OR=0.348, p≤0.001; and OR=2.211, p≤0.001, respectively). In addition, respondents of Sisaala, Waala, Brifo and other ethnic affiliations were less likely to have good knowledge of HBV transmission relative to those of Dagaaba ethnicity. Residing in urban areas was associated with lower odds or reporting good knowledge of HBV transmission when compared with their rural counterparts, and those in Jirapa and Sisaala Districts relative to Wa Municipal had higher odds of reporting good knowledge of HBV transmission.

*4.4.3 Multivariate Results*

Multivariate results are presented in Models 2 – 4 in Table 8. After accounting for the effect of health facility-level factors in Model 2, disparities in type of health facilities respondents visited for health care and their reported knowledge of HBV transmission attenuated, while that for type of HBV services and HBV transmission remained robust. For instance, the unadjusted significant disparity between CHPS and sub-district clinics on knowledge of HBV transmission disappeared. However, hospitals compared with CHPS became associated with higher odds of reporting good knowledge of HBV transmission (OR=2.230, $p \leq 0.05$).This suggests type of HBV services provided in health facilities may be mediating the relationship between type of health facility and knowledge of HBV transmission. However, compared to people who visited facilities that provide HB education only, their counterparts who visited health facilities that provide education/testing/vaccination for HBV were less likely to report good knowledge of HBV transmission (OR=0.163, $p \leq 0.001$).

After adding individual-level factors in Model 3, the impact of health facilities on knowledge of HBV transmission improved. It was found that health care access in hospitals, and sub-district clinics were associated with higher odds of reporting good knowledge of HBV transmission relative to health access in CHPS (OR=1.900, $p \leq 0.01$; and OR=1.940, $p \leq 0.05$, respectively). Similarly, people who visited facilities that provide education and referral for HB services were less likely to report good knowledge of HBV transmission compared with those who visited health facilities that provide only education on HB (OR=0.588, $p \leq 0.05$).

Further, multivariate analysis found socio-economic, socio-demographic and location factors as statistically significant correlates of knowledge of HBV transmission in the UWR of Ghana. People with no formal education relative to those with secondary and higher education were more likely to report good knowledge of HBV transmission (OR=2.256, p≤0.001). Similarly, farmers compared with civil servants were more likely to report good knowledge of HBV transmission (OR=2.823, p≤0.01).

For socio-demographic factors, the analysis show that people in the age category of 25-34 compared with their counterparts in the age category of 18-24 were more likely to report good knowledge of HBV transmission (OR=2.281, p≤0.1). In contrast with Christians, Muslims were 41% less likely to report good knowledge of HBV transmission. Furthermore, residents of Jirapa and Sisaala East Districts compared to Wa Municipal had higher odds of reporting good knowledge of HBV transmission (OR=1.850, p≤0.05; and OR=2.051, p≤0.1, respectively), while urban relative to rural residents had lower odds of reporting good knowledge of HBV transmission. The fixed effects parameter estimates of individual-level factors in Model 4 were slightly different in magnitude relative to the results in Model 3. Meanwhile, it was revealed in the random effects analysis that approximately 79% of the variance in the final model was attributable to disparities in HB services provided in health facilities.

### 4.5 Discussion

Hepatitis B is considered a global health threat by the World Health Organization (WHO) given the associated morbidity and mortality. In resource-poor contexts like Ghana, it accounts for over 70% of all recorded cases of cirrhosis and cancer (Blankson, Wiredu, Gyasi, Adjei, & Tettey, 2005). Although awareness and testing are recommended to

reduce new infections, the role of individual and community-level factors is crucial in reducing the spread of infectious diseases. Guided by the Socio-ecological Model (SEM) and using a multilevel analysis, the findings underscore the importance of both individual and community-level factors in creating HB knowledge in the context of the UWR of Ghana. Overall, the results show that aside individual-level socio-economic and demographic factors, other community characteristics including type of health facility and the nature of HB related service are associated with awareness and knowledge of HBV transmission. This finding is consistent with previous studies (Glenton et al., 2013; Saleh, 2012) that highlight the importance of both individual-level factors and other contextual characteristics such as the presence of health facilities in creating awareness about infectious diseases.

The importance of the type of community facility is emphasized by the finding that residents who access health care from sub-district clinics and hospitals reported good HB knowledge. In Ghana, although CHPS is mandated and noted for influencing positive health behavior such as voluntary testing among rural residents through health promotion and education (Nyonator et al., 2005), there has been a challenge for the roll-out and maintenance of this mandate. For instance, due to under-resourcing with personnel and other health supplies and equipment, the role of CHPS in spite of its position as the first point of call for health care for rural residents has been limited to basic and rudimentary health care services as most cases are referred to sub-district clinics and hospitals. This has over time compromised the operations of CHPS as a community-based facility. In contrast, sub-district clinics and hospitals serving as centers for curative and as referrals for CHPS are better resourced in reaching many vulnerable populations in the region

through platforms such as radio and health information vans. Furthermore, as part of their structure, sub-district clinics and hospitals unlike CHPS, have departments of public health that strategize and executes community outreach programs and information sessions on preventive health care aimed at minimizing misconceptions about HB transmission. Besides that, higher-level health facilities (sub-district clinics and hospitals) through in-service training, workshops, and interaction with medical specialists visiting these facilities may be keeping staff constantly updated and informed about HBV transmission compared to health workers in CHPS compounds trained in basic health care delivery. Thus, individuals accessing health care in these higher health facilities in the region are better placed to access factual and accurate knowledge about HB transmission compared to those visiting CHPS.

The finding that socio-economic status including education and occupation have a significant influence on HB awareness is consistent with previous studies (Akwara, Madise, & Hinde, 2003). Given that formal education makes individuals more assertive about preventive health care (Letamo, 2007; Sano et al., 2016;), the finding that those with no formal education reported more knowledge of HBV may seem counter-intuitive. This is because health interventions in this highly non-literate context like the UWR are directed at those who do not have formal education hence HB information are mostly translated into the various local languages and disseminated through community outreach programs. Additionally, the increasing focus of health facilities and non-governmental organizations in the study context on this group might have led to improved HB transmission knowledge compared to those with secondary and higher education who are not the primary targets of these interventions. These findings are consistent with previous

findings such as Leeves and Soyiri (2015) and Smith et al. (1999) who report that people of higher educational attainment may be complacent in seeking information on preventive health care which may explain poor HBV transmission knowledge among the educated in the UWR.

The increasing focus on 'hard to reach populations' as part of intervention programs to reduce the prevalence of HBV and other infectious diseases may be yielding some dividends as farmers report higher HBV transmission knowledge. Representing an estimated 80% of the main economic activity in the region, the off-farming period spanning September to June have become periods of intensified HBV outreach programs and other public health sensitization programs for farmers since reaching them in the farming season is difficulty. Over time, this approach may have been successful in improving the knowledge of farmers who are also classified as a vulnerable group by intervention programs (Atuoye et al., 2015). However, the perception that civil servants are already exposed to varied sources of health information which may translate to improved HBV awareness and better access to health care may have resulted in a dwindling focus of many health interventions in the region on this population which explains their poor HBV transmission knowledge. Overall, it may be important to target all categories of people regardless of socio-economic status as the findings indicate certain population may be left behind in terms of HBV intervention programs in the region.

In the current study context, it can be argued that younger adults (18-24) still transitioning from adolescence into adulthood, may not be as conscious and independent for their health needs. The 25-34 age groups on the other hand are more likely to be

independent with young families and thus may have a heightened sense of responsibility for their health and that of other dependents. This may have influenced their health information seeking behavior ( Bonnie, Stroud, Breiner, & Council, 2015; Wiium, Breivik, & Wold, 2015). Earlier studies (Clark, Lynch, Donovan, & Block, 2001) have reported similar findings where young adults in the 25-34 age cohort who are more assertive about their health sought more information on health related issues.

Furthermore, the dominance of Christianity in the UWR leading to the infiltration of Christian based non-governmental organizations and other religious-based health facilities have exposed Christians to more health information. This has been possibly through Christian congregations who tend to promote health and well-being for members by regularly inviting personnel from these health institutions for health sensitization and awareness (Yaro, 2013) thereby increasing their awareness of diseases including HB. In view of the fact that Christian religion tend to influence HBV knowledge in the UWR, the finding that residents of Jirapa district had higher knowledge of HBV could be explained by the dominance of Christianity in the district. The Jirapa district was the first place to receive Christian missionaries in north-western Ghana (Songsore, Denkabe, Jebuni, & Ayidiya, 2001). The presence of these missionaries resulted in increased investment in education and other health infrastructure including the Jirapa hospital and Nurses Training College. The presence of these institutions therefore, may have improved access to HB health information and education in the district. For instance, as part of the curricular of health institutions, students are required to engage in community outreach programs during which they sensitize residents especially those in rural areas on

infectious diseases including HBV. The activities of these health institutions may partly explain the increase in HB knowledge in this district.

Furthermore, the concentration of CHPS and intervention programs in rural areas in the region may have resulted in an urban disadvantage, where urban dwellers are left out of health campaigns and information sessions on the assumption that they have better access to health information and care (Adongo et al., 2014). Residents in rural areas reporting good HB transmission knowledge could also be explained by the fact that health facilities in urban areas may be preoccupied with providing clinical and acute medical services which limits their focus on health promotion and education. Previous studies such as Montgomery (2009) have underscored the plight of the particularly the urban poor in accessing health care and health information. Based on their increasing vulnerability, health policy should target deprived urban residents to improve their access to health care and information.

Although these findings are important for policy, there are some note-worthy limitations. First, the data for this study is self-reported and therefore responses may be subject to recall and social desirability bias. Second, since the study is cross-sectional the findings may be limited to statistical associations. To address these limitations, it is recommended that future studies adopt a longitudinal approach with in-depth qualitative studies to examine the influence of both individual and community-level factors on HB awareness in the UWR of Ghana. It has also been acknowledged that disease knowledge is associated with the level of provider (e.g. health workers) knowledge and how accurate health information is being disseminated (Leventhal, Nerenz, & Purse, 1984). However, due to cost and time constraints, I could not collect data on health providers' HB

knowledge. Nevertheless, these findings are important in highlighting the various individual and community-level factors shaping HBV knowledge in the UWR of Ghana and similar contexts.

### 4.6 Conclusion and recommendations

The findings of this study emphasize the importance of both individual and community-level factors in informing HB awareness in a developing context. As indicated by the SEM, economic and other socio-demographic factors at the individual level, as well as facility-based factors influence HB knowledge in the UWR of Ghana. Based on these findings, I recommend the institutionalization and implementation of a national HB policy that will focus on high risks groups and populations. This policy will also need to target intervention initiatives in high HB prevalence areas like the UWR. Furthermore, covering the cost of HB related services such as testing and vaccination under Ghana's NHIS will make HB services and information more easily accessible to the poor and other vulnerable populations. Finally, there is the urgent need for improved community health infrastructure in the study area and indeed in most rural communities in Ghana, given that most rural residents rely on health personnel at these facilities for health information. The inclusion of HB related services at basic health units such as CHPS will be a crucial step in creating awareness and reducing substantially new HB infections in Ghana.

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# Chapter Five

## Factors Associated with Voluntary Testing for HBV in the Upper West Region of Ghana


### Abstract

This study examined the role of health facilities on testing for Hepatitis B virus in a policy context where screening is only available at a cost. We fitted multivariate multinomial logistic regression models to cross-sectional data (n=1,374) collected from Upper West Region of Ghana. The analysis showed that approximately 28% of respondents reported ever testing for HBV. Although the source of healthcare influenced HBV testing, traders (RRR=0.29, $p \leq 0.001$) and farmers (RRR=0.34, $p \leq 0.01$) were significantly less likely to test voluntarily. Wealth generally predicted voluntary testing, although less so for mandatory testing. The findings highlight the need for free HBV services targeting the very poor, especially those who use community-level health facilities as the primary source of care.



**Keywords:** hepatitis B virus, voluntary testing, primary health care, Upper West Region, Ghana

## 5.1 Introduction

Hepatitis is a global health threat, accounting for 1.4 million global annual deaths, and hepatitis B virus (HBV) alone accounts for 47% of all hepatitis-related deaths (World Health Organization, 2016). The current lack of global response to hepatitis will likely result in a cumulative death of about 20 million in the next 15 years alone, and worsen hepatitis-related poor health outcomes in the next 40-50 years (World Health Organization, 2016). In addition, about 240 million people live with hepatitis B-related chronic liver cirrhosis and liver cancer. The majority of HBV-related deaths occur in low and middle-income countries where there is low awareness of the disease, lack of access to critical health care services, and high levels of poverty and food insecurity (Candotti, Danso, & Allain, 2007; FAO, 2016; World Health Organization, 2016). Consequently, these same factors also influence disparities in response to the HBV epidemic, which in low-income countries has largely relied on Non-Governmental Organizations (World Health Organization, 2016). As a strategy, the WHO promotes increased awareness, building attitudes, and scaling up screening to reduce the spread of the disease (World Health Organization, 2016).

HBV transmission modes vary with the level of endemicity. In high endemic zones, where more than 8% prevalence in the adult population, mother-to-child transmission is the predominant mode. However, transmission in low endemic areas is characterized by 'horizontal transmission' through unprotected sex and injection drug use (Hyun, Lee, Ventura, & McMenamin, 2017). Other ways include unscreened blood transfusion, unsterilized use of needles, and syringes during medical procedures, blood contaminated sharps such as razors and needles used for tattooing, body piercing or scarification

(World Health Organization, 2016). Yet because of poor disease surveillance systems, the precise national prevalence of HBV in the general population in Ghana is unknown, (Ofori-Asenso & Agyeman, 2016). As such, available estimates are based on specific sub-groups. But even then the picture is troubling. For instance, the prevalence among blood donors is between 6.7% and 10% (Owiredu, Osei-Yeboah, Amidu, & Laing, 2012; Sarkodie et al., 2001). In addition, 6.4% of pregnant women (Candotti et al., 2007; Cho et al., 2012) and 25% of inmates in Nsawam and Accra prisons have HBV (Adjei et al., 2006). Currently, Ghana is considered one of the worst-affected countries globally, with some researchers claiming that 10-15% of Ghana's population is already infected (Ofori-Asenso & Agyeman, 2016) . In fact, estimates show that the overall contribution of HBV related deaths to national mortality rate in Ghana has increased by 17.2% in the last two decades largely due to limited uptake of voluntary testing for early detection and treatment (Ofori-Asenso & Agyeman, 2016).

HBV has therefore been emerging as a major public health concern, with more than 95% of people infected with chronic HBV in developing countries do not know their status (Painter, 2001; UNICEF, 2008). Reasons for low uptake of testing for HBV relate to lack of health facilities and poor access to health information, preventive services, and curative care. Furthermore, other factors include poor knowledge of modes of transmission of the disease and risky socio-cultural practices (Mkandawire, Richmond, Dixon, Luginaah, & Tobias, 2013). In lieu of the increasing impact of HBV, the WHO (2016) called for early detection, diagnosis, and treatment of HBV necessary to control the spread of the disease (World Health Organization, 2016). Unfortunately, in Ghana, the National Health Insurance Scheme does not cover HBV screening and vaccination.

This is largely because of competing health needs such as malaria and HIV/AIDS especially when set against limited state finances. In addition, although HBV screening costs GH₵5 (USD 1.10) and the required three doses of HBV vaccination is each priced at GH₵25 (USD 5.52), this otherwise modest cost of HBV screening is beyond the financial reach of most Ghanaians in a context where the majority of the people live on less than US$1.25/day. Invariably, the available literature on testing from SSA largely reflects determinants of screening in a context where screening services are available free of charge to the end user. Consequently, this study aims to contribute to our understanding of the relative importance of health service programs (i.e. primary health care) and other factors associated with the uptake of HBV testing in a context where HBV testing and vaccination are not covered by the national health insurance. We hypothesize that source of health care and household wealth are important factors influencing HBV testing behaviours in the Upper West Region of Ghana.

### *5.1.1 Uptake of HBV Testing - Voluntary and mandatory*

Over the years, counseling and testing has proven to significantly reduce the spread of epidemics such as HIV/AIDS and cancer (McPhail & Campbell 2001; Hutchinson & Mahlalela 2017; UNICEF 2008). Testing for HBV involves the individual receiving information about the disease, including ways of prevention and available treatment options. If positive, the individual undergoes further assessment, treatment and counseling on risk and prevention. If negative, the individual still receives counseling but they also get vaccination. Thus, testing promotes positive behavior change that can reduce the further spread of HBV (De Cock, Mbori-Ngacha, & Marum, 2002). However, despite the benefits, barriers such as poor knowledge about HBV, cultural and health

beliefs, and lack of testing facilities prevent people from testing (Adjei et al., 2006; Hu, Kane, & Heymann, 1991; Mkandawire et al., 2013). Unlike voluntary testing, mandatory testing is driven by reasons such as the need to donate blood; during antenatal; or as requirements for marriage/employment or entry into a professional institution. Therefore, to influence positive health behavior, emphasis should be placed on voluntary testing.

Despite being different, both voluntary and mandatory testing behaviours however relate to financial and physical cost. Educated and/or financially secure people, for instance, or those in formal employments are more likely to test (Obermeyer et al., 2013; Parkhurst, 2010). Similarly, demographic factors such as religion, marital status and ethnicity can influence testing. For instance, most Christian groups in SSA including Ghana expect 'would-be' couples to screen for HIV/AIDS and other sexually infectious diseases including HBV prior to marriage (Luginaah, Yiridoe, & Taabazuing, 2005). While not exhaustive these examples demonstrate socioeconomic and sociocultural factors associated with testing.

### 5.1.2 Study Context

#### *5.1.2.1 Primary Health Care in Ghana*

Ghana adopted the Primary Health Care (PHC) approach following the 1978 Alma-Ata Declaration. The Declaration has three key principles: 1) that health is a fundamental human right, 2) that health care delivery should be participatory, and 3) that health care services must be practical, socially acceptable, scientifically sound (World Health Organization, 1978). Thirty years after becoming a signatory to the Declaration, Ghana can boast of a measure of success in primary health care service delivery, including the integration of health promotion into Ghana's PHC service (Nyonator, Awoonor-

Williams, Phillips, Jones, & Miller, 2005). Maternal and child mortality rates have also reduced significantly over the years (Boateng et al., 2014). The number of health facilities in rural areas has increased compared to the late 80s and 90s, although most of them provide basic health care services and do not offer HVB testing (Mkandawire et al., 2013).

Currently, health care delivery in Ghana is organized into five levels of administration. The Health Post, centered on the concept of a Community based Health Planning and Services (CHPS), is the first point of contact for primary care. Health Centers and clinics are the second level that supervise and accept referrals from the CHPS. This is followed by the district hospitals, regional and tertiary/teaching hospitals which provide curative services and serve as major referral centers for the lower level facilities.

*5.1.2.2 The Upper West Region*

The Upper West Region (UWR) of Ghana, where this study was conducted, occupies 18,476 km², representing 12.7% of Ghana's total land mass. The region is predominantly rural with a population of 702,110 (2.8% of national population). The major ethnic groups are the Dagaaba, Waala, and Sissala. Illiteracy is high, at 51%, more than double that of the national average of 23% (Ghana Statistical Service, 2012). The UWR is also the poorest of the 10 regions in the country, and 71% of people live on less than USD 1.25 a day (Ghana Statistical Service, 2015). Out-migration is a major pathway through which people in the Region cope with high poverty, making the region a major source of labour reserve for other areas in Ghana (Kuuire, Mkandawire, Arku, & Luginaah, 2013).

The high levels of poverty in the UWR can be traced to colonial policies, which left parts of northern Ghana, especially UWR highly deprived and this neglect has been continued to some degree by successive post-colonial governments (Songsore & Denkabe, 1995). Because of extreme poverty, the northern territories were used as a constant supply of labour for farms, factories and mines located in the southern part of the country (Abdul-korah, 2008). At a certain level one would argue that this chronic policy neglect represents a way of entrenching UWR's disadvantageous position as supplier of manual labour within Ghana's political economic landscape. As noted by Bening (1990), the first public school in northern Ghana was established after over hundred years of quality education in southern Ghana and successive post-colonial governments have done little if any to correct this colonial legacy (Songsore & Denkabe, 1995).

It is therefore not surprising that health care infrastructure in UWR is weak and fragmented compared to other regions in the country, and the doctor-patient ratio has been one of the worse in the country. For instance, while a doctor in the region serves over 30,000 residents (1:30,601) in UWR, the doctor to population ratio in Accra, the national capital, is 1:3186, and the national ratio is 1:8,953 (Ghana Health Service, 2015). The UWR in 2014 had only 6 hospitals, 15 clinics, and 176 CHPS compounds (Ghana Health Service, 2015). Access to health care is limited, as about 80% of residents in the region walk more than 8km to access health care services (GHS, 2015). This makes UWR particularly vulnerable to epidemic outbreaks (Mkandawire et al. 2013; CHS, 2017).

## 5.2 Methodology

### *5.2.1 Data collection*

The analysis used data from a cross-sectional survey of males and females 18 years and older (n=1,374) in the UWR of Ghana conducted from June to August 2017. Adopting the multi-stage sampling technique followed by the Ghana Statistical Service, we drew our districts at random from the eleven districts in the Region in the first stage of sampling and then randomly sampled electoral areas from which we selected 112 communities. The study interviewed the household member whose birthday was closest to the date of the data collection, regardless of the person's sex. The study received ethical clearance from the first author's academic institution.

Standardized data collection instruments on knowledge of HBV transmission, testing and service availability were adapted from the Ghana Demographic and Health Survey (2014) and the Ghana Living Standards Survey round 6 (Ghana Statistical Service, 2014). We recruited experienced research assistants from the University for Development Studies, trained them on the survey and ethical issues, and assigned them to each of the districts for data collection. Having access to experienced undergraduate students as research assistants greatly helped to improve data quality and entry, explaining why less than 1% of the sample cases had missing data. The data was processed in IBM SPSS version 24 and exported into STATA for subsequent inferential analysis.

### *5.2.2 Measures*

The outcome variable in the study, Hepatitis B Testing was derived from two related questions: "have you ever been tested for Hepatitis B virus?" and "If you ever been tested

for Hepatitis B virus, what was the main reason?" The second variable was categorized into "voluntary" and "mandatory". For instance, responses such as "I tested because it was my college admission requirement; because I wanted to go into restaurant business; or because I went to donate blood" were coded as 'mandatory'. We recoded reasons such as "I went to test because I wanted to know my status; or because there was free testing and I wanted to take advantage of it to know my status" as 'voluntary'. By cross-referencing the two variables, we constructed "Hepatitis B Testing" (HB testing) with three categories: no testing, voluntary testing, and mandatory testing.

The focal independent variable, 'source of health care', came from the question, "where did you go for formal health care?" Responses followed the Ghana Health Service categorization of health facilities in Ghana. Health Posts/CHPS represents the lowest structure of health service provision in the country and is accessible to rural and underserved communities (GHS, 2015). Selection of other relevant variables in the analysis was informed by previous empirical research on attitude towards testing (De Paoli et al., 2004; Luginaah, Yiridoe, & Taabazuing, 2005). These include socio-economic factors (educatioal attainment, occupation, and wealth), demographic factors (gender, age, marital status, and ethnic affiliation), and place base factors (place and district of residence). The variable capturing household wealth is a composite index based on household's ownership of a number of assets including ownership of house roofed with iron sheets, consumer items (e.g., motorbike, bicycle); own livestock (e.g., cows and goats). We used Principal component analysis (PCA) to construct an overall index of household wealth (Filmer and Pritchett, 1999). Each asset was normalized by its mean and standard deviation. The Cronbach's alpha was 0.796, which showed strong

internal consistency of the scale. Explanation of variable measurement is provided in Table 1. Wealth categories were then dummied into richest = 1; rich = 2; middle = 3; poor = 4 and poorest = 5. This was done because we felt individual and household incomes would be unreliable measures of wealth as most rural Ghanaians do not have fixed or regular income and tend to hold their wealth in forms other than money.

*5.2.3 Analytical Technique*

The study used multinomial logit regression models to examine the factors associated with testing for HBV with a focus on source of healthcare. Despite the fact that our outcome (HBV testing) appears to reflect a natural ordering of testing behaviour ranging from no testing (lowest) to voluntary testing, likelihood-ratio test of proportionality of odds across the response categories using *omodel* in stata was significant ($chi^2$=0.0013). Thus, our data failed to support the assumption that HBV testing was ordered, hence multinomial logistic regression (Long and Freese, 2014).

To satisfy the assumption of independence of observations, we imposed a unique identification number onto our models to adjust for the potential impact of clustering. We also adjusted the analysis for sample weights to improve the robustness of the parameter estimates. We estimated the predictors of voluntary and mandatory HBV testing with 'no HBV testing' as the reference category. Regression coefficients were exponentiated into Relative Risk Ratios (RRRs) for easy interpretation. In the results, an RRR less than 1 is interpreted as less likely to go for voluntary or mandatory HBV testing when compared to no HBV testing, while RRR greater than 1 is interpreted as more likely to go for voluntary or mandatory HBV testing. Three multivariate models were built to account for the influence of conceptual blocks of independent variables on the relationship between

our covariates and HBV testing: model 1 adjusts for the impact of source of healthcare and socio-economic factors. In model 2, we introduced bio-socio-cultural factors, and in model 3, we accounted for the impact of locational factors. We present all the three models to show how the relationship between the dependent variable and the independent variable as well as the relationship between co-variates themselves change as successive sets of relevant variables enter the analysis. Statistical analyses were conducted at 5% level of significance ($\alpha$=0.05) using StataSE 15.

## 5.4 Results

### *5.4.1 Sample Characteristics*

Table 5.1 presents descriptive statistics. The study found that almost three in every four respondents (72%) in the study never tested for HBV, while 5% and 22% had voluntary and mandatory testing, respectively. Of those who tested, 82% of them reported they took the test because it was a requirement to gain college admission, acquire certificate for a restaurant business, during blood donation, or during pregnancy or child delivery.

**Table 5.1:** Measurement and distributions of selected variables

| Variable | Frequency (%) | Measures/coding |
|---|---|---|
| ***Outcome variable*** | | |
| **HBV testing** | | Cross-reference of testing status (no testing, and testing), and main reason for testing (voluntary and mandatory). Coded 1=no testing, 2=voluntary testing, and 3=mandatory testing |
| No | 994(72.34) | |
| Voluntary | 74(5.39) | |
| Mandatory | 306(22.27) | |
| ***Key Independent Variable*** | | |
| **Source of health care** | | Derived from 'source of formal health care' coded 1=hospital; 2=clinic; and 3=Community based Health Planning and Service (CHPS) |
| Hospital | 715(52.04) | |
| Clinic | 212(15.43) | |
| CHPS | 447(32.53) | |
| ***Other Independent Variables*** | | |
| **Education** | | Highest educational attainment of respondents at time of survey coded 1=secondary or higher, 2=primary, and 3=no formal education |
| Secondary + | 713(51.89) | |
| Primary | 212(15.43) | |
| No education | 449(32.68) | |
| **Occupation** | | Main occupation of respondent at time of survey coded 1=civil service, 2=trading (including other business), and 3=farming |
| Civil Service | 213(15.50) | |
| Trading | 421(30.64) | |
| Farming | 740(53.86) | |

| | | |
|---|---|---|
| **Wealth Quintile** | | A composite variable of household assets derived using Principal Components Analysis, categorized into quintiles and coded as 1=Richest; 2=Rich; 3=Middle; 4=Poor; and 5=Poorest |
| Richest | 274(19.94) | |
| Rich | 275(20.01) | |
| Middle | 275(20.01) | |
| Poor | 276(20.09) | |
| Poorest | 274(20.09) | |
| **Gender** | | The identified sex of respondent coded 1=male and 2=female |
| Male | 772(56.19) | |
| Female | 56.19(43.81) | |
| **Age*** | 38.08 (12.13) Min=18; Max=90 | Age of respondent at time of survey |
| **Marital status** | | Marital status of respondent at time of survey coded 1=currently married, 2=never married (single), and 3=formerly married (widowed and divorced) |
| Currently married | 923(67.18) | |
| Never married | 287(20.89) | |
| Formerly married | 164(11.94) | |
| **Religion** | | Religious affiliation of respondent at time survey coded 1= Christian, 2=Muslim, and 3=traditionalists and 3=other religious or non-religious affiliation |
| Christian | 657(47.82) | |
| Muslim | 520(37.85) | |
| Traditionalist/others | 197(14.34) | |
| **Ethnicity** | | Ethnic affiliation of respondent was coded 1=Dagaaba; 2=Sissala; 3=Waala; 4=Brifo; and 5=others |
| Dagaaba | 610(44.40) | |
| Sissala | 184(13.39) | |
| Waala | 325(23.65) | |
| Brifo | 100(7.28) | |
| Others | 155(11.28) | |
| **District of residence** | | District of residence of respondent coded 1=Jirapa, 2=Sissala East, 3=Wa West, and 4=Wa Municipal |
| Jirapa | 399(29.04) | |
| Sissala East | 201(14.63) | |
| Wa West | 296(21.54) | |
| Wa Municipal | 478(34.79) | |
| **Place of residence** | | Feature of place of residence coded 1=urban and 2=rural |
| Urban | 561(40.83) | |
| Rural | 813(59.17) | |
| Observations | 1,374 | |

Note: *Mean and standard deviation in parenthesis

The majority (52%) of respondents indicated that they access health care from hospitals located at district and regional capitals, while majority (59%) reside in rural areas. Similarly, the majority of the respondents (35%) resided in Wa Municipal. The analysis also shows that while a slight majority (20.1%) were in the poor and poorest wealth categories, most of them (52%) had secondary education and higher, and engaged in farming (54%) as their main occupation. There were disparities in the bio-socio-cultural dynamics of the study participants. The average age in the sample was 38years, and the

majority was married (67%). Majority (48%) of respondents were Christians, and affiliated with the Dagaaba ethnic group (48%).

*5.4.2 Bivariate Results*

Table 5.2 shows the unadjusted association between the independent variables and HB testing. Overall, there is a statistically significant association between source of care and voluntary testing but not with mandatory testing.

**Table 5.2:** Bivariate multinomial logistic regression estimating HBV testing in the Upper West Region of Ghana

| | **Voluntary Testing** | | **Mandatory Testing** | |
|---|---|---|---|---|
| **Variables** | **RRR(SE)** | ***95% CI*** | **RRR(SE)** | ***95% CI*** |
| **Source of health care** (ref: Hospital) | | | | |
| Clinic | 2.52(.76)** | *1.39,4.54* | 0.86(.17) | *0.59,1.27* |
| CHPS | 1.33(.38) | *0.76,2.33* | 0.98(.14) | *0.74,1.30* |
| **Education (ref:** Secondary +) | | | | |
| Primary | 0.35(.14)* | *0.16,0.78* | 0.79(.14) | *0.55,1.13* |
| No education | 0.14(.056)*** | *0.06,0.31* | 0.35(.06)*** | *0.25,0.49* |
| **Occupation (ref:** Civil Service) | | | | |
| Trading | 0.19(.19)*** | *0.10,0.35* | 0.68(.68)* | *0.47,0.99* |
| Farming | 0.17(.17)*** | *0.10,0.29* | 0.42(.42)*** | *0.29,0.59* |
| **Wealth Quintile** (ref: Richest) | | | | |
| Rich | 0.49(.16)* | *0.26,0.94* | 0.73(.14) | *0.50,1.06* |
| Middle | 0.34(.12)** | *0.17,0.69* | 0.57(.113)** | *0.39,0.85* |
| Poor | 0.31(.114)** | *0.15,0.64* | 0.56(.110)** | *0.38,0.82* |
| Poorest | 0.16(.071)*** | *0.07,0.39* | 0.18(.046)*** | *0.11,0.30* |
| **Gender** (ref: Male) | | | | |
| Female | 0.96(.23) | *0.60,1.55* | 1.20(.16) | *0.93,1.55* |
| **Age** | 0.98(.010)* | *0.96,1.00* | 0.97(.006)*** | *0.96,0.98* |
| **Marital status (ref:** Currently married) | | | | |
| Never married | 1.47(.40) | *0.86,2.52* | 1.20(.19) | *0.88,1.65* |
| Formerly married | 0.43(.23) | *0.15,1.21* | 0.83(.17) | *0.54,1.26* |
| **Religion (ref:** Christian) | | | | |
| Muslim | 0.46(.13)** | *0.27,0.79* | 1.26(.17) | *0.96,1.65* |
| Traditionalist/others | 0.11(.08)** | *0.03,0.45* | 0.72(.15) | *0.47,1.09* |
| **Ethnicity (ref:** Dagaaba) | | | | |
| Sissala | 0.22(.16)* | *0.05,0.92* | 1.94(.38)*** | *1.32,2.84* |
| Waala | 1.00(.31) | *0.55,1.82* | 1.38(.24)† | *0.98,1.93* |
| Brifo | 3.94(1.29)*** | *2.08,7.49* | 1.76(.47)* | *1.04,2.98* |
| Others | 0.58(.31) | *0.20,1.67* | 2.63(.53)*** | *1.77,3.90* |
| **District of residence** (ref: Jirapa) | | | | |
| Sissala East | 0.15(.15)† | *0.02,1.13* | 2.07(.45)*** | *1.36,3.15* |
| Wa West | 4.36(1.44)*** | *2.29,8.32* | 4.07(.77)*** | *2.80,5.91* |
| Wa Municipal | 1.61(.53) | *0.84,3.09* | 1.35(.25) | *0.94,1.95* |

| | | | | |
|---|---|---|---|---|
| **Place of residence** (ref: Urban) | | | | |
| Rural | 0.92(.22) | *0.57,1.48* | 1.10(.14) | *0.85,1.43* |
| **Observations** | **1,374** | | | **1,374** |

Note: **Reference=No Testing**; RRR=Relative Risk Ratios; 95% CI=Confidence Intervals at 0.05 significance level;
$^{***}p \leq 0.001$
$^{**}p \leq 0.01$
$^{*}p \leq 0.05$
$^{\dagger}p \leq 0.10$

Respondents who utilize local clinics relative to hospitals were more likely to report they have ever tested for HB voluntarily (RRR=2.52, $p \leq 0.01$). However, when compared to hospitals, there was no significant association between utilization of CHPS and HBV testing. The analysis also indicates that socio-economic factors (education, occupation, and wealth), bio-socio-cultural (age and ethnicity), and district of residence were significantly associated (positively or negatively) with both voluntary and mandatory testing. At the bivariate level, religious affiliation was significantly associated with voluntary but not mandatory testing.

*5.4.3 Multivariate Results*

Table 5.3 shows results from multivariate models. Model 1 examines the effects of source of healthcare and socio-economic factors (i.e. educational attainment, occupation and wealth) on testing for HBV. Compared to hospitals, respondents seeking HBV test from health clinics (RRR=2.62, $p \leq 0.01$) and from CHPS (RRR=2.23, $p \leq 0.05$) were more likely to test voluntarily for HBV. With regards to the influence of education, individuals with no formal education were less likely to go for either voluntary (RRR=0.24, $p \leq 0.01$) or mandatory testing (RRR=0.54, $p \leq 0.01$). In contrast with civil servants, farmers (RRR=0.36, $p \leq 0.01$) and traders (RRR=0.28, $p \leq 0.001$) were less likely to test voluntarily for HBV.

Five bio-socio-cultural factors (gender, age, marital, religion and ethnicity) were introduced in Model 2, and the results showed significant effects on the association between source of care and HBV testing. When compared to hospitals, voluntary testing for HBV was more likely to take place at clinics (RRR=2.31, $p \leq 0.05$) and CHPS (RRR=2.26, $p \leq 0.05$). As expected, it seemed inconsequential where one would go when the test was mandatory. Furthermore, in contrast with respondents with secondary education or higher, the relationship between no formal education and voluntary testing attenuated, while remaining significant for mandatory testing (RRR=0.55, $p \leq 0.01$). The association between occupation and voluntary testing remained significant while wealth, which was not significant for voluntary testing in Model 1 gained significance, and also remained significant for mandatory testing in Model 2. Bio-socio-cultural factors showed varied associations with voluntary and mandatory HB testing. Gender, age and marital status were significantly associated with mandatory testing but not with voluntary testing. On the other hand, religious affiliation was significantly associated with voluntary testing but not with mandatory testing. Model 2 also showed significant disparities in relative risk of reporting both voluntary and mandatory testing among people of different ethnicities.

The introduction of location variables in Model 3 accentuated the relationship between source of health care and voluntary testing, but not mandatory testing. Only those who accessed clinics for healthcare were more likely to report going for voluntary testing (RRR=2.12, $p \leq 0.05$). Compared with respondents with secondary education or higher more, respondents without formal education were less likely to report mandatory HB testing (RRR=0.63, $p \leq 0.05$).

**Table 5.3:** Multivariate multinomial logistic regression estimating HBV voluntary and mandatory testing in the Upper West Region of Ghana

| Independent Variables | Voluntary Testing | | | | | | Mandatory Testing | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Model 1 | | Model 2 | | Model 3 | | Model 1 | | Model 2 | | Model 3 | |
| | RRR(SE) | *95% CI* | RRR(SE) | *95% CI* | RRR(SE) | *95% CI* | RRR(SE) | *95% CI* | RRR(SE) | *95% CI* | RRR(SE) | *95% CI* |
| **Source of health care** (ref: Hospital) | | | | | | | | | | | | |
| Clinic | 2.62(.85)** | *1.39,4.93* | 2.31(.77)* | *1.21,4.43* | 2.12(.76)* | *1.05,4.29* | 0.88(.18) | *0.59,1.30* | 0.82(.17) | *0.54,1.24* | 0.73(.17) | *0.47,1.15* |
| CHPS | 2.23(.71)* | *1.19,4.16* | 2.26(.78)* | *1.15,4.45* | 1.81(.68) | *0.86,3.77* | 1.35(.21)† | *0.99,1.84* | 1.27(.21) | *0.92,1.75* | 0.93(.17) | *0.65,1.32* |
| **Education (ref:** Secondary+) | | | | | | | | | | | | |
| Primary | 0.61(.28) | *0.25,1.50* | 0.84(.39) | *0.34,2.11* | 0.93(.46) | *0.37,2.33* | 1.03(.21) | *0.70,1.53* | 0.97(.21) | *0.63,1.48* | 1.09(.24) | *0.71,1.66* |
| No education | 0.24(.12)** | *0.09,0.62* | 0.39(.20)† | *0.14,1.08* | 0.42(.25) | *0.15,1.20* | 0.54(.11)** | *0.36,0.80* | 0.55(.12)** | *0.36,0.86* | 0.63(.14)* | *0.41,0.99* |
| **Occupation (ref:** Civil Service) | | | | | | | | | | | | |
| Trading | 0.28(.10)*** | *0.14,0.55* | 0.32(.11)*** | *0.16,0.62* | 0.29(.10)*** | *0.14,0.58* | 0.87(.18) | *0.59,1.30* | 0.81(.17) | *0.53,1.23* | 0.68(.15)† | *0.44,1.05* |
| Farming | 0.36(.13)** | *0.18,0.73* | 0.40(.15)* | *0.19,0.82* | 0.34(.12)** | *0.16,0.71* | 0.74(.16) | *0.49,1.12* | 0.71(.16) | *0.46,1.10* | 0.56(.13)** | *0.36,0.87* |
| **Wealth Quintile** (ref: Richest) | | | | | | | | | | | | |
| Rich | 0.66(.24) | *0.32,1.36* | 0.57(.211) | *0.28,1.18* | 0.65(.24) | *0.31,1.34* | 0.77(.15) | *0.52,1.14* | 0.72(.15) | *0.48,1.09* | 0.83(.18) | *0.55,1.27* |
| Middle | 0.59(.23) | *0.27,1.28* | 0.32(.14)* | *0.14,0.77* | 0.33(.15)* | *0.13,0.82* | 0.66(.14)* | *0.44,1.00* | 0.62(.14)* | *0.41,0.95* | 0.64(.15)† | *0.41,1.01* |
| Poor | 0.72(.31) | *0.30,1.69* | 0.35(.15)* | *0.15,0.83* | 0.36(.17)* | *0.15,0.88* | 0.71(.16) | *0.45,1.12* | 0.70(.17) | *0.43,1.14* | 0.72(.19) | *0.43,1.19* |
| Poorest | 0.46(.27) | *0.15,1.46* | 0.21(.12)** | *0.07,0.67* | 0.20(.12)** | *0.06,0.65* | 0.26(.08)*** | *0.15,0.48* | 0.26(.09)*** | *0.13,0.49* | 0.26(.09)*** | *0.13,0.53* |
| **Gender** (ref: Male) | | | | | | | | | | | | |
| Female | | | 1.45(.38) | *0.86,2.43* | 1.45(.39) | *0.85,2.45* | | | 1.28(.19)† | *0.96,1.70* | 1.28(.19)† | *0.96,1.71* |
| **Age** | | | 0.008(.01) | *0.97,1.03* | 0.009(.01) | *0.97,1.03* | | | 0.98(.01)** | *0.96,0.99* | 0.98(.01)** | *0.96,0.99* |
| **Marital status (ref:** Currently married) | | | | | | | | | | | | |
| Never married | | | 1.26(.45) | *0.62,2.54* | 1.38(.51) | *0.67,2.86* | | | 0.68(.14)† | *0.46,1.01* | 0.69(.14)† | *0.46,1.04* |
| Formerly married | | | 0.50(.26) | *0.17,1.40* | 0.45(.25) | *0.15,1.32* | | | 1.19(.29) | *0.74,1.91* | 1.06(.26) | *0.65,1.72* |
| **Religion (ref:** Christian) | | | | | | | | | | | | |
| Muslim | | | 0.44(.14)* | *0.23,0.84* | 0.41(.14)** | *0.21,0.80* | | | 1.01(.18) | *0.72,1.42* | 0.99(.18) | *0.70,1.42* |
| Trad/others | | | 0.23(.19)† | *0.04,1.16* | 0.20(.16)* | *0.04,0.99* | | | 1.29(.31) | *0.80,2.06* | 1.07(.27) | *0.65,1.75* |
| **Ethnicity (ref:** Dagaaba) | | | | | | | | | | | | |
| Sissala | | | 0.28(.21)† | *0.06,1.22* | 1.62(1.61) | *0.23,11.3* | | | 1.51(.34)† | *0.97,2.35* | 2.15(.86)† | *0.98,4.72* |
| Waala | | | 1.14(.44) | *0.53,2.45* | 1.06(.44) | *0.47,2.40* | | | 1.04(.22) | *0.68,1.58* | 0.91(.22) | *0.57,1.47* |
| Brifo | | | 5.21(1.79)*** | *2.65,10.2* | 2.72(1.22)* | *1.12,6.57* | | | 1.97(.54)* | *1.14,3.38* | 0.89(.30) | *0.46,1.72* |
| Others | | | 0.37(.27) | *0.11,1.23* | 0.39(.24) | *0.12,1.30* | | | 1.85(.41)** | *1.19,2.86* | 1.66(.41)* | *1.02,2.69* |
| **District of residence** (ref: Jirapa) | | | | | | | | | | | | |
| Sissala East | | | | | 0.08(.09)* | *0.01,0.83* | | | | | 0.66(.29) | *0.28,1.55* |
| Wa West | | | | | 2.31(1.05)† | *0.95,5.62* | | | | | 2.83(.79)*** | *1.64,4.88* |
| Wa Municipal | | | | | 0.89(.36) | *0.40,1.98* | | | | | 0.86(.23) | *0.51,1.46* |
| **Place of residence** (ref: Urban) | | | | | | | | | | | | |
| Rural | | | | | 1.24(.41) | *0.64,2.39* | | | | | 1.34(.28) | *0.89,2.02* |
| Log pseudo likelihood | –927.73377 | | | –887.15821 | | –857.16881 | | –927.73377 | | –887.15821 | | –857.16881 |
| Pseudo $R^2$ | | 0.07 | | 0.11 | | 0.14 | | 0.07 | | 0.11 | | 0.14 |
| Observations | | 1,374 | | 1,374 | | 1,374 | | 1,374 | | 1,374 | | 1,374 |

Note: **Reference=No Testing**; RRR=Relative Risk Ratios; 95% CI=Confidence Intervals at 0.05 significance level; $^{\dagger}p \leq 0.10$, $^{*}p \leq 0.05$, $^{**}p \leq 0.01$, $^{***}p \leq 0.001$

Interestingly, occupation, which was not significant for mandatory HB testing in Model 1 and Model 2 attained significance in Model 3. Respondents in trading and farming occupations were significantly less likely to go for voluntary testing (RRR=0.29, $p \leq 0.001$; and RRR=0.34, $p \leq 0.01$, respectively) or mandatory testing (RRR=0.68, $p \leq 0.1$; and RRR=0.56, $p \leq 0.01$, respectively). In the context of the other covariates, wealth generally predicted voluntary testing, although less so for mandatory testing, whereby the poorest category of people were significantly less likely to go for testing even when it deemed to be mandatory (RRR=0.26, $p \leq 0.001$). Model 3 further shows that compared with Jirapa, for voluntary testing, those in Sisaala East (RRR=0.08, $p \leq 0.05$) were less likely to go for HBV testing, while those from Wa West district were more likely to test mandatorily (RRR=2.38, $p \leq 0.001$).

### 5.5 Discussion and Conclusion

In this study, we examined the factors associated with HBV testing in the Upper West Region of Ghana where HBV screening and vaccination is only available for a fee. Given increasing prevalence of HBV and associated mortality, the Sustainable Development Goals (in Goal 3.3) has indicated the need to reduce the spread of hepatitis using voluntary testing as one of the major public health strategies (World Health Organization, 2016). In Ghana, vaccination and testing have largely been provided at a cost in hospitals and other higher-level health facilities, but the majority of the population, especially the poor, utilize health services in lower cadres of the country's health system such as in clinics and in Community based health Planning and Services (CHPS). Despite the current policy focus on hospitals, our study found that lower-level health facilities may in fact play a greater role in scaling up hepatitis screening in Ghana.

Besides reducing inequitable access to health services, providing hepatitis testing and vaccination services if made widely available in local clinics and CHPS can increase service uptake and slow down the spread of hepatitis in rural communities. This, however, should be done within a policy framework that decentralizes hepatitis services to communities and addresses key barriers to equitable utilization such as socio-economic, bio-socio-cultural and locational factors (Akwara, Madise, & Hinde, 2003).

That voluntary uptake of HBV is more common in lower-level health facilities may, after all, not be very surprising given the study context. Clinics in Ghana primarily serve rural settings and provide both clinical and preventive health services within their catchment area. The active involvement of clinic staff in educating and sensitizing people about infectious diseases including HBV may have fostered positive community attitudes towards HBV voluntary testing over time. Furthermore, clinics and CHPS tend to operate much more informally compared to larger hospitals, thereby allowing local community members to interact with their staff on much more personal basis, hence creating rapport required for influencing behavioural change. Given that most mandatory/required testing are involuntary, and required only for reasons such as pregnancy, blood donation, admission requirement, individual health beliefs, the primary motivation is not self-perceived risk. This means that, unlike voluntary testing, mandatory HBV testing has minimal effect on behavioural change. This finding is consistent with other studies, which have found associations with type of health facilities and testing types (De Allegri et al., 2015; Obermeyer et al., 2013).

Furthermore, socioeconomic status including education, occupation and wealth have been shown to significantly influence health-related outcomes (Kuuire et al. 2017). As with

other studies, lower level of education was associated with lower likelihood of testing for HBV (Obermeyer et al., 2013). The fact that those with no formal education were less likely to go for HBV testing is possibly due to their inability to access and understand the varied and sometimes confusing HBV information sources (Mkandawire et al., 2013). This also relates to the fact that both traders and farmers generally reported very low levels of HBV testing.

Occupational disparities can influence uptake of health services since unemployed individuals or the working poor often face financial barrier to access health services (Atuoye, Vercillo, Antabe, Galaa, & Luginaah, 2016; Dixon, Luginaah, & Mkandawire, 2014). On the other hand, because civil servants work in formal settings, they are more likely to be required to undertake mandatory testing or may have more opportunities for HBV testing as part of workplace health and safety policy. Additionally, compared to other occupations such as farming and informal trading, civil servants can more readily afford the cost of screening and treatment of HBV. In the Upper West Region, where 71% of the population lives on US $1.25, financial cost remains a major barrier to hepatitis services, as evident by this study's finding that poorer individuals were missing out on voluntary testing, and even in mandatory/required testing. Addressing these financial barriers through the national health insurance, for instance, would be key to improving access of poor people to HBV services in deprived areas like the Upper West Region.

The impact of gender on the HB voluntary testing at primary care facilities cannot be over-emphasized (Luginaah et al., 2005; Norman, 2006). In the context of Ghana, women have more contact with the health system at the local level. Community level programs

such as mother-to-mother in CHPS support women, pregnancy related services including antennal, and emphasis on preventing mother to child transmission of HBV help form good health knowledge and attitudes among women. As a result women are more likely to accept referral for hepatitis services (Sambisa et al., 2010). Religion and ethnicity have also previously been identified to shape social behavior and health beliefs (Glanz & Rimer, 1997). In the study context, long-standing practices have exposed Christians to formal education, and health education in churches and religious meetings. With over 70% of residents in the UWR being Christians and a number of Christian-based NGOs (e.g. ACDEP) targeting congregants, churches have intensified their role in preventive health behaviors by organizing free health screening services for their membership. Interestingly, our findings show that Brifo ethnic group is more likely to go for voluntary testing compared to the dominant Dagaaba ethnic group. This advantage might be because the first area to benefit from CHPS initiative in UWR was Wa West district, the home of the Brifo.

In conclusion, this study has a few limitations, including not being able to make definitive casual claims between source of testing and testing behaviour due to the cross-sectional design of the study. The other limitation is the lack of qualitative data to provide contextual understanding of why people test or do not test for HBV. Nonetheless, the findings provide insights into potential determinants of testing for HBV in a context where HBV services are provided at a fee. The findings of the study also suggest a key role for local clinics and community-based health programs in scaling up HBV services in Ghana. This points to the need for a decentralized public health response to the HBV

in Ghana, given the capacity of local clinics and CHPS to scale up screening coverage in rural areas where HBV is most prevalent.

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# Chapter Six

## Summary and Conclusions

This chapter provides a summary of the major findings of this thesis. It highlights the contributions of the research to infectious diseases literature particularly HBV, in the context of a developing country – Ghana. It further outlines important policy imperatives in addressing the continuous spread of HBV and reducing its associated health risk in Ghana and in similar context. It concludes with relevant suggestions for future research.

### 6.1 Repositioning the study

The main purpose of this research was to examine the influence of health perceptions on HBV transmission in the UWR of Ghana. Specifically, the study assessed factors that influenced knowledge of HBV in Ghana. It also examined individual level as well as facility-based factors that affect people's choice in seeking HB services including HBV voluntary testing. Ghana has experienced varying incidence of infectious diseases including malaria, tuberculosis, cholera, yellow fever, typhoid, HIV/AIDS, and hepatitis in the last two decades (Ghana Health Service, 2017). The strategies put in place to reduce the morbidity and mortality associated with these diseases has been contributing to improve health outcomes in general. For instance, the malaria control programme and the HIV/AIDS comprehensive care program drastically reduced the incidence of malaria and HIV by nearly 80% respectively, between 2000 and 2010 (Ghana Health Service, 2017). However, the level of attention on HB remains low/non-existent probably because of our limited understanding of its health risks in Ghana. Consequently, deprivation among vulnerable populations, socio-cultural factors and locational disparities have combined with persistent unequal access to healthcare services including HB

information, screening, and vaccination to reinforce low knowledge of HBV mode of transmission and negative health perceptions about the disease, particularly in the UWR. The misconceptions held by the people are very similar to those held about the spread of HIV/AIDS, SARS and Ebola by various population in the sub-Saharan region (Murray, 2015; Sano et al., 2016; Smith, 2006).

Amidst the shift in focus of healthcare service provision from treatment and clinical care to preventive care in Ghana (Ghana Health Service, 2017); it is important to investigate the role of health facilities in promoting preventive health behaviors. By focusing on health perceptions and contextualizing individual health perception as a product of experiences and interaction with others, and that availability of health services vary by location (rural/urban), the study sought to examine how health perceptions have influenced the spread of the HBV in the UWR. In particular, the study was guided by the following specific research questions;

1. What is the level of knowledge of HB transmission in the UWR of Ghana?
2. What factors (individual/community) influence HB knowledge in the UWR of Ghana?
3. Does source of healthcare influence the utilization of HB services in the UWR of Ghana?

The findings in this study therefore highlight individual and community level barriers affecting access to HB services in Ghana and the UWR in particular. The individual factors include household wealth disparities, educational attainment, occupation, ethnic and religious affiliation, marital status. Further, location of healthcare facilities and availability of HB services impact on access to critical HB services, which affect the

level of HB knowledge in the study area. Several other studies conducted in rural contexts confirm that both individual and institutional barriers to health services pose negative consequences for health perceptions/beliefs and ultimately influence utilization of healthcare services (Bates et al., 2004; Harris et al., 2011; Stephenson et al., 2006).

### 6.2 How the findings from the two manuscripts are integrated

The two manuscripts together examined one overarching research question: what factors influence perceptions of hepatitis B (knowledge of modes of transmissions) and utilization of hepatitis B services in the UWR of Ghana. The first manuscript (chapter 4) examined the level of HBV knowledge, and also investigates the determinants of correct knowledge of HBV transmission by accounting for the influence of individual, locational, socio-economic and socio-demographic factors, as well as facility-based characteristics (type of health facility, and HBV service index). The second manuscript (chapter 5) examined the influence of source of healthcare on HBV voluntary testing. Both manuscripts revealed that individual and contextual factors play a role in forming health perceptions as well as enabling the utilization of health services within the context of the study area. The two manuscripts made important insight into factors that influence the high prevalence of HB transmission in a deprived context in a low-income country such as Ghana. The next sections summarize the research findings in the two manuscripts, and their place in the literature, theory and methods, and implications for policy.

### 6.3 Summary of findings

#### 6.3.1 Research questions 1 and 2:

*What is the level of knowledge for HBV transmission in the UWR? To what extent do individual and community level factors influence HB knowledge in the UWR of Ghana?*

Guided by the social-ecological framework, the study used multilevel hierarchical linear models to find the association between locational, socio-economic, socio-demographic and facility-based factors on HB knowledge (chapter 4). Consistent with other studies in a similar context (Glenton et al., 2013; Tenkorang, 2013a), the findings show that 25% of respondents had answered at least 7 of the 14-item knowledge questions correctly. This shows that respondents in the UWR have low level of knowledge about how HBV is transmitted which probably explains why there is a high HBV prevalence in the region. Overall, individual, locational, socio-economic and demographic characteristics and health facility level differences were associated with awareness and knowledge of HBV transmission. Individual-level factors including education, occupation, marital status, religion and household wealth quintile had statistically significant associations with HB knowledge transmission.

*6.3.2 Research question 3:*

*Do source of health care influence utilization of HB services in the UWR of Ghana?*

Using multinomial logit regression analysis, the study found that source of healthcare is a significant predictor of HBV voluntary testing (chapter 5). In contrast to hospitals, people who seek health care from clinics were more likely to voluntarily test for HBV. The possible explanation could be because of the easier accessibility of lower level like health facilities like clinics that are located in the communities. The study also found that district of residence, occupation, religious affiliation, and ethnicity were statistically associated with HBV voluntary testing, while people with no formal education, and men were less likely to do mandatory HBV testing. This finding is similar to the work of Baiden et al. (2007) who reported that community health workers and lay counselors

were able to influence community-based HIV counseling and testing in the upper east region of Ghana.

### 6.4 Contributions of the study

The findings of the study make important contributions to the literature on infectious diseases in general and in particular, hepatitis B in Ghana. Over the years the focus of infectious diseases in Ghana has been limited to malaria, tuberculosis and HIV/AIDS (see Ghana Health Service, 2017). This study brings to light the potentially hidden impacts of HBV and advocates for an immediate intervention to reduce its spread and associated mortality. Furthermore, the study is the first of its kind to be conducted in the northwestern part of Ghana, thereby revealing the importance of place-based factors in informing factual knowledge about disease transmission. The study also draws attention to the lack of healthcare services in deprived context. Given the mandate of health facilities in information dissemination towards meeting SDG 3.3 which among other things aims to eradicate HBV, the lack of health facilities and services in this deprived context, highlight their important role in influencing health perceptions and hepatitis B service utilization. To the best of my knowledge this is the first study on infectious diseases to examine the combined effect of individual and health facility-based factors in knowledge and service utilization.

Theoretically, this study provides a different dimension to the study of infectious diseases particularly HBV. Previous studies on viral hepatitis, particularly HBV, have relied on medical and laboratory experiments to understand the prevalence of infectious diseases through blood test. However, as admonished by Luginaah (2009), it becomes difficult to explain incidence and prevalence of infectious diseases without taking into account the

local, social and other place based characteristics. Thus, through the use of political ecology of health framework, which embraces multiple actors and multi-layered contextual factors in explaining disease diffusion (Kalipeni and Oppong, 1998), this study, brings to light the sociocultural dimensions of disease spread with a particular emphasis on the role of lay health perceptions. I argue that health perceptions in the UWR is produced from the interplay of multi-layed social, economic and political dynamics which together influence HBV transmission.

### 6.5 Policy recommendation

The thesis provides policy imperatives on a number of interrelated fronts. It is evident from the study findings that there is a mismatch in availability of hepatitis services and willingness of local population to utilize them. For instance, while testing and vaccination for hepatitis B are rendered at hospitals, many people who visit CHPS and local clinic for health care services are only able to test for the virus, but are not able to get the vaccination. In addressing the endemicity of hepatitis B in the UWR, it is important to provide screening and vaccination services for people who are already sensitized to utilize these services, while promoting knowledge among urban dwellers through public health programs. Another related barrier to hepatitis B services utilization is the financial burden of accessing these services, especially for poor people in deprived context. Given these challenges, Ghana's national hepatitis policy should be modeled along the lines of the current HIV/AIDS program which has been showed to effectively reduce the spread of the disease in the country. In the context of the findings, I suggest a tri-fold approach with a strategic design and implementation coordination unit, service provision through

Ghana Health Services, and increase in targeted public health education and sensitization for under-served populations.

At the center of the hepatitis program design and implementation should be a commission (Ghana Commission for Hepatitis) mandated to facilitate development of strategic plans, coordination and monitoring of implementation at local level, and harmonization of the resources needed for effective hepatitis program implementation. The Commission in my view should be working closely with the ministry of health and other decentralized local government institutions such as Metropolitan, Municipal and District Assemblies, as well as non-state actors to implement strategies to reduce the spread of hepatitis in the country. The second dimension of the proposed national policy relates to activities of the Ministry of Health and Ghana Health Services, which are responsible for health policy and health services delivery in Ghana, respectively. The Ministry of Health should restructure the health delivery regime to decentralize screening and vaccination services to CHPS and local clinics, and also bring the cost of these services under the NHIS to increase coverage, similar to the implementation of HIV testing services in the country. The third component of the policy should focus on increasing awareness and knowledge about the mode of transmission of HBV, and the services available to local populations. National and local level campaigns as well as targeted public sensitization services should be implemented through non-state actors, and the public health department of the Ghana Health Services. The implementation of such a national policy would awaken the general population to the health risk associated with hepatitis, and as a result reduce the spread of hepatitis and its consequential mortality as anticipated in the Sustainability Development Goals.

### 6.6 Limitations

Despite the important contribution of this study to both literature and policy, there are some limitations worth mentioning. First, the data for this study is self-reported and therefore responses may be subject to recall and social desirability bias. For instance, asking respondents to recall events spanning the 6 months prior to the study may be quite challenging. Also, given the 'rurality' of the study context and the fact that it has attracted a lot of research work, respondents may suffer research fatigue, which could have impacted their responses in the current study. Further, the region has experienced activities of NGOs, and to that extent participants could have misconstrued the study for an NGO intervention study with the potential of receiving future benefits. Thus, their responses could have been biased by these considerations.

Second, since the study is cross-sectional findings may be limited to statistical associations, not causation. For instance, the relationship between source of healthcare and HBV voluntary testing is an association and does not in anyway suggest that where people go for healthcare causes them to seek voluntary testing. Further, it is well known that knowledge of infectious disease is associated with the level of provider (e.g. health workers) knowledge and how accurate health information is being disseminated (Leventhal et al., 1984). However, cost and time constraints did not allow for collecting data on health providers' HB knowledge.

Notwithstanding these limitations, the study findings are consistent with the literature on infectious diseases (Mkandawire et al., 2013; Ofori-Asenso & Agyeman, 2016; Spearman et al., 2017) and important in providing an understanding of the social dynamics of health

and HBV transmission in the UWR of Ghana. Particularly the role of health perceptions in shaping knowledge of HBV transmission is highlighted.

### 6.7 Directions for future research

To address the limitations inherent in the current study, I suggest that future studies adopt a longitudinal approach with in-depth qualitative studies to examine the influence of both individual and community level factors on HB awareness in Ghana and similar context. A mixed methods study will be useful in providing explanation to the complex social dynamics that influence people's choice of hepatitis B services. Qualitative questions would help address why respondents went to certain health facilities for testing and not others. Thus, providing a holistic understanding of why people seek hepatitis B services.

Furthermore, as indicated by the World Health Organization, HIV-HBV co-infection is devastating among HIV positive patients. Mortality associated with HBV is more than twice in HIV patients than HBV mono-infection (World Health Organisation, 2017). In a context where HIV patients are stigmatized coupled with the inadequate care they receive, a study to examine the impacts of HIV-HBV co-infections in an HBV endemic context like the UWR will shed more light on the need for global interventions for these vulnerable people.

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# Appendix A: Research Ethics Approval

Western Research

Research Ethics

Western University Non-Medical Research Ethics Board
**NMREB Delegated Initial Approval Notice**

**Principal Investigator:** Dr. Isaac Luginaah
**Department & Institution:** Social Science/Geography, Western University

**NMREB File Number:** 109277
**Study Title:** Perceptions on Hepatitis B Transmission in the Upper West Region of Ghana

**NMREB Initial Approval Date:** June 05, 2017
**NMREB Expiry Date:** June 05, 2018

**Documents Approved and/or Received for Information:**

| Document Name | Comments | Version Date |
|---|---|---|
| Letter of Information & Consent | LOI_ Consent Health Facility Survey | 2017/04/24 |
| Other | RA Confidentiality Agreement | 2017/04/24 |
| Instruments | Survey for Health Facility Staff | 2017/04/24 |
| Western University Protocol | | 2017/05/26 |
| Letter of Information & Consent | Survey | 2017/05/26 |
| Instruments | Community Survey_hepatitis B | 2017/05/26 |

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed and approved the above named study, as of the NMREB Initial Approval Date noted above.

NMREB approval for this study remains valid until the NMREB Expiry Date noted above, conditional to timely submission and acceptance of NMREB Continuing Ethics Review.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario.

Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB.

The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

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## Appendix B: Survey Instruments

### Individual-level Questionnaire

**Survey ID: ____/____/____ District#_____ Community #_____ Interview Date:___/____/2016**

**Interviewer#_____ Respondent's Gender: Male____ Female_____**

| # | QUESTION (and Enumerator Instruction) | RESPONSE OPTIONS | CODE |
|---|---|---|---|
| **1** | What is the locality type? | Rural | 1 |
| | | Urban | 2 |
| **Section A: Hepatitis B Knowledge (Administer to general populations)** | | | |
| **2** | Now I would like to talk about something else.<br>Have you ever heard of viral **Hepatitis**? | Yes | 1 |
| | | No | 2 |
| | | Don't Know | 98 |
| | | Preferred not to answer | 99 |
| **3** | Have you ever heard of an illness called **Hepatitis B**? | Yes | 1 |
| | | No **(SKIP to Q7)** | 2 |
| | | Don't Know | 98 |
| | | Preferred not to answer | 99 |
| **4** | Where did you first hear about **hepatitis B?** | Television | 1 |
| | | Radio | 2 |
| | | Newspaper? | 3 |
| | | Poster? | 4 |
| | | Leaflet/Brochure | 5 |
| | | Health worker | 6 |
| | | Volunteer | 7 |
| | | Other (please specify)<br>…… | 97 |

| | | | | |
|---|---|---|---|---|
| **5** | In the past 6 months, have you seen or heard any messages about **Hepatitis B?** | | Yes | 1 |
| | | | No **(SKIP to Q7)** | 2 |
| **6** | Where did you see or hear about **Hepatitis B** in the past 6 months? | | Television | 1 |
| | | | Radio | 2 |
| | | | Newspaper? | 3 |
| | | | Poster? | 4 |
| | | | Leaflet/Brochure | 5 |
| | | | Health worker | 6 |
| | | | Volunteer | 7 |
| | | | Other (please specify)<br>…… | 97 |
| **7** | Compared with AIDS virus, do you think **Hepatitis B** virus spread from person to person more easily? | | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **8** | Is it possible for a healthy-looking person to have **Hepatitis B**? | | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **9** | If someone is infected with the hepatitis B virus but they look and feel healthy, do you think that person can spread **Hepatitis B**? | | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **10** | Do you know how a person can get infected with **Hepatitis B**? | | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **10a** | Do you think you can be infected | By eating food prepared by an infected | Yes | 1 |

| | | | | |
|---|---|---|---|---|
| | with **Hepatitis B** virus: | person? | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **10b** | | By sharing food and drink with a person who has **Hepatitis B**? | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **10c** | | By sharing earrings with an infected person | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **10d** | | By being coughed on by an infected person | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **10e** | | By sharing a toothbrush with an infected person? | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **10f** | | By sharing razor with an infected person | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **10g** | | By having sexual intercourse with an infected person | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **10h** | | By holding hands with an infected person | Yes | 1 |
| | | | No | 2 |

| | | | | |
|---|---|---|---|---|
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **10i** | | Through mosquito bites? | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **10j** | | Because of witchcraft or other supernatural means? | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **11a** | Can the virus that causes **Hepatitis B** be transmitted from a mother to her baby: | During pregnancy? | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **11b** | | During delivery? | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **11c** | | By breastfeeding? | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **12** | Can someone die from being infected with the **Hepatitis B** virus? | | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **13a** | Do you think **Hepatitis B** can cause: | Liver Cancer? | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |

| | | | | |
|---|---|---|---|---|
| | | | Preferred not to answer | 99 |
| **13b** | | A Stomach ulcer? | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **13c** | | High blood pressure? | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **14** | Do you think people with **Hepatitis B** can be infected for life? | | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **15** | Can people reduce their chances of getting **Hepatitis B** by having just one uninfected sex partner who has no other sex partners? | | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **16** | Can people reduce their chance of getting the **Hepatitis B** by using a condom every time they have sex? | | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **17** | I don't want to know the results, but have you ever been tested for **Hepatitis B**? | | Yes | 1 |
| | | | No | 2 |
| **17a** | Why did you first test for hepatitis B? Was it because: | You donated blood? | | 1 |
| | | You had other blood tests done for a routine physical that showed you might have liver disease? | | 2 |
| | | You were sick with symptoms like fatigue, nausea, stomach pain, yellowing of the eyes or skin (known as jaundice)? | | 3 |
| | | You were exposed to blood while on the job? | | 4 |
| | | You or a doctor thought you were at risk of having hepatitis B? | | 5 |

| | | | | |
|---|---|---|---|---|
| | | You wanted to marry? | | 6 |
| | | You had another reason (please specify)<br>……. | | 97 |
| | | Don't Know | | 98 |
| | | Preferred not to answer | | 99 |
| **18** | I don't want to know the results, but have your partner been tested for **Hepatitis B** virus? | | Yes<br>No | 1<br>2 |
| **18a** | Why did she/he first test for hepatitis B? Was it because: | You donated blood? | | 1 |
| | | She/he had other blood tests done for a routine physical that showed She/he might have liver disease? | | 2 |
| | | She/he was sick with symptoms like fatigue, nausea, stomach pain, yellowing of the eyes or skin (known as jaundice)? | | 3 |
| | | She/he was exposed to blood while on the job? | | 4 |
| | | She/he or a doctor thought She/he was at risk of having hepatitis B? | | 5 |
| | | You wanted to marry? | | 6 |
| | | She/he had another reason (please specify)<br>……. | | 97 |
| | | Don't Know | | 98 |
| | | Preferred not to answer | | 99 |
| **19** | Do you know **Hepatitis B** can be prevented through vaccination? | | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **20** | Have you taken the **Hepatitis B** vaccine? | | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |
| **21** | Do you think **Hepatitis B** virus can be cured? | | Yes | 1 |
| | | | No | 2 |
| | | | Don't Know | 98 |
| | | | Preferred not to answer | 99 |

| | | | |
|---|---|---|---|
| **22** | Would you buy fresh vegetables from a shopkeeper or vendor if you knew that this person had the **Hepatitis B** virus? | Yes | 1 |
| | | No | 2 |
| | | Don't Know | 98 |
| | | Preferred not to answer | 99 |
| **23** | If a member of your family got infected with the **Hepatitis B**, would you want it to remain a secret or not? | Yes | 1 |
| | | No | 2 |
| | | Don't Know | 98 |
| | | Preferred not to answer | 99 |
| **24** | If a member of your family became sick with **Hepatitis B**, would you be willing to care for her or him in your own household? | Yes | 1 |
| | | No | 2 |
| | | Don't Know | 98 |
| | | Preferred not to answer | 99 |
| **Section B: AUDIT and General Health Behaviours** | | | |
| **25** | Have you ever drunk any alcoholic beverage except *pito*? | Yes | 1 |
| | | No | 2 |
| | | Preferred not to answer | 99 |
| **26** | What type of alcoholic beverage do you normally drink? | Don't Drink Alcohol | 1 |
| | | Akpeteshie | 2 |
| | | Bitters (E.G Alomo) | 3 |
| | | Beer | 4 |
| | | Wine | 5 |
| | | Other (Please Specify)<br><br>…… | 97 |
| **27** | How often do you have a drink containing alcohol? | Never **(SKIP to Q41)** | 0 |
| | | Monthly or less | 1 |
| | | 2 to 4 times a month | 2 |
| | | 2 to 3 times a week | 3 |
| | | 4 or more times a week | 4 |

| | | | |
|---|---|---|---|
| **28** | How many drinks containing alcohol do you have on a typical day when you are drinking? | 1 or 2 | 0 |
| | | 3 or 4 | 1 |
| | | 5 or 6 | 2 |
| | | 7, 8, or 9 | 3 |
| | | 10 or more | 4 |
| **29** | How often do you have six or more drinks on one occasion? | Never | 0 |
| | | Less than monthly | 1 |
| | | Monthly | 2 |
| | | Weekly | 3 |
| | | Daily or almost daily | 4 |
| **30** | How often during the last year have you found that you were not able to stop drinking once you had started? | Never | 0 |
| | | Less than monthly | 1 |
| | | Monthly | 2 |
| | | Weekly | 3 |
| | | Daily or almost daily | 4 |
| **31** | How often during the last year have you failed to do what was normally expected from you because of drinking? | Never | 0 |
| | | Less than monthly | 1 |
| | | Monthly | 2 |
| | | Weekly | 3 |
| | | Daily or almost daily | 4 |
| **32** | How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session? | Never | 0 |
| | | Less than monthly | 1 |
| | | Monthly | 2 |
| | | Weekly | 3 |
| | | Daily or almost daily | 4 |
| **33** | How often during the last year have you had a feeling of guilt or remorse after drinking? | Never | 0 |
| | | Less than monthly | 1 |
| | | Monthly | 2 |
| | | Weekly | 3 |

| | | | |
|---|---|---|---|
| | | Daily or almost daily | 4 |
| **34** | How often during the last year have you been unable to remember what happened the night before because you had been drinking? | Never | 0 |
| | | Less than monthly | 1 |
| | | Monthly | 2 |
| | | Weekly | 3 |
| | | Daily or almost daily | 4 |
| **35** | Have you or someone else been injured as a result of your drinking? | No | 0 |
| | | Yes, but not in the last year | 1 |
| | | Yes, during the last year | 2 |
| **36** | Has a relative or friend or a doctor or another health worker been concerned about your drinking or suggested you cut down? | No | 0 |
| | | Yes, but not in the last year | 1 |
| | | Yes, During The Last Year | 2 |
| **37** | During the past 4 weeks have you had a drink of *akpetetshie*? | Yes | 1 |
| | | No | 2 |
| | | Don't Know | 98 |
| | | Preferred not to answer | 99 |
| **38** | How often do you consume any of these beverages? *Akpetetshie, Alomo bitters, Agya Appiah, Herb Afrik, Mandingo,Gin, Atemuda, K20, etc.* | Not At All | 0 |
| | | Daily | 1 |
| | | Occasionally | 2 |
| | | Don't Know | 98 |
| | | Preferred not to answer | 99 |
| **39** | How often do you consume *pito*? | Not At All | 0 |
| | | Daily | 1 |
| | | Occasionally | 2 |
| | | Don't Know | 98 |
| | | Preferred not to answer | 99 |
| **40** | Has the amount of alcohol you consume changed since the introduction of the alcohol tax in 2010? | Never consumed alcohol | 0 |
| | | Drink Less | 1 |
| | | No Change | 2 |

| | | | |
|---|---|---|---|
| | | Drink More | 3 |
| | | Don't Know | 98 |
| | | Preferred not to answer | 99 |
| **41** | Do you smoke cigarettes or tobacco? | Yes | 1 |
| | | No **(SKIP to Q43)** | 2 |
| | | Preferred not to answer | 99 |
| **42** | How often do you smoke cigarettes or tobacco? | Daily | 1 |
| | | Occasionally | 2 |
| | | Don't Know | 98 |
| | | Preferred not to answer | 99 |
| **43** | **IF NO TO 45 ASK**<br><br>Does anyone in your household smoke? | Yes | 1 |
| | | No | 2 |
| | | Don't Know | 98 |
| | | Preferred not to answer | 99 |
| **44** | How often does [NAME] smoke? | Daily | 1 |
| | | Occasionally | 2 |
| | | Don't Know | 98 |
| | | Preferred not to answer | 99 |
| **Section C: General Health Status** | | | |
| **45** | I would like to ask you about your health.<br><br>In general, how does your health compare with that of other people of your age group? Would you say your health is Excellent, Very Good, Good, Fair or Poor? | Excellent | 1 |
| | | Very good | 2 |
| | | Good | 3 |
| | | Fair | 4 |
| | | Poor | 5 |
| | | Don't Know | 98 |
| **46** | *****Adapted from the Duke Health Survey***** <br><br>Here are a number of questions about your health and feelings. I will read you a statement. Please answer which of the three options is most closely suited to you. | Yes, describes me exactly | 1 |
| | | Somewhat describes me | 2 |
| | | No, doesn't describe me | 3 |

| | | | |
|---|---|---|---|
| | I like who I am | | |
| **47** | I am not an easy person to get along with | Yes, describes me exactly | 1 |
| | | Somewhat describes me | 2 |
| | | No, doesn't describe me | 3 |
| **48** | I am basically a healthy person | Yes, describes me exactly | 1 |
| | | Somewhat describes me | 2 |
| | | No, doesn't describe me | 3 |
| **49** | I give up too easily | Yes, describes me exactly | 1 |
| | | Somewhat describes me | 2 |
| | | No, doesn't describe me | 3 |
| **50** | I have difficulty concentrating | Yes, describes me exactly | 1 |
| | | Somewhat describes me | 2 |
| | | No, doesn't describe me | 3 |
| **51** | I am happy with my family relationships | Yes, describes me exactly | 1 |
| | | Somewhat describes me | 2 |
| | | No, doesn't describe me | 3 |
| **52** | I am comfortable being around people | Yes, describes me exactly | 1 |
| | | Somewhat describes me | 2 |
| | | No, doesn't describe me | 3 |
| **53** | Today, would you have physical trouble or difficulty walking? | None | 0 |
| | | Some | 1 |
| | | A lot | 2 |
| **54** | Today, would you have physical trouble or difficulty doing physical work? | None | 0 |
| | | Some | 1 |
| | | A lot | 2 |
| **55** | During the PAST 4 WEEKS how much trouble have you had with:<br><br>Sleeping? | None | 0 |
| | | Some | 1 |
| | | A lot | 2 |
| **56** | Hurting or aching in any part of your body? | None | 0 |

| | | | |
|---|---|---|---|
| | | Some | 1 |
| | | A lot | 2 |
| **57** | Getting tired easily? | None | 0 |
| | | Some | 1 |
| | | A lot | 2 |
| **58** | Feeling depressed or sad? | None | 0 |
| | | Some | 1 |
| | | A lot | 2 |
| **59** | Nervousness? | None | 0 |
| | | Some | 1 |
| | | A lot | 2 |
| **60** | During the PAST 8 WEEKS how often did you:<br><br>Socialize with other people (talk with or visit relatives) | None | 0 |
| | | Some | 1 |
| | | A lot | 2 |
| **61** | Take part in social, religious, or recreation activities (community, church, political party meetings) | None | 0 |
| | | Some | 1 |
| | | A lot | 2 |
| **62** | Stay in your home or hospital because of sickness, injury, or other health problem | None | 0 |
| | | Some | 1 |
| | | A lot | 2 |
| **Section D: Household Food Insecurity Access Scale (HFIAS) Measurement Tool** | | | |
| **63** | In the past four weeks, did you worry that your household would not have enough food? | Yes | 1 |
| | | No **(SKIP to 64)** | 2 |
| **63a** | How often did this happen? | Rarely (once or twice in the past four weeks) | 1 |
| | | Sometimes (three to ten times in the past four weeks) | 2 |
| | | Often (more than ten times in the past four weeks) | 3 |
| **64** | In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources? | Yes | 1 |
| | | No **(SKIP to Q65)** | 2 |
| **64a** | How often did this happen? | Rarely (once or twice in the past four weeks | 1 |

| | | | |
|---|---|---|---|
| | | Sometimes (three to ten times in the past four weeks) | 2 |
| | | Often (more than ten times in the past four weeks) | 3 |
| **65** | In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources? | Yes | 1 |
| | | No **(SKIP to 66)** | 2 |
| **65a** | How often did this happen? | Rarely (once or twice in the past four weeks) | 1 |
| | | Sometimes (three to ten times in the past four weeks) | 2 |
| | | Often (more than ten times in the past four weeks) | 3 |
| **66** | In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food? | Yes | 1 |
| | | No **(SKIP to Q67)** | 2 |
| **66a** | How often did this happen? | Rarely (once or twice in the past four weeks) | 1 |
| | | Sometimes (three to ten times in the past four weeks) | 2 |
| | | Often (more than ten times in the past four weeks) | 3 |
| **67** | In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food? | Yes | 1 |
| | | No **(SKIP to Q68)** | 2 |
| **67a** | How often did this happen? | Rarely (once or twice in the past four weeks) | 1 |
| | | Sometimes (three to ten times in the past four weeks) | 2 |
| | | Often (more than ten times in the past four weeks) | 3 |
| **68** | In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food? | Yes | 1 |
| | | No **(SKIP to Q69)** | 2 |
| **68a** | How often did this happen? | Rarely (once or twice in the past four weeks) | 1 |
| | | Sometimes (three to ten times in the past four weeks) | 2 |
| | | Often (more than ten times in the past four weeks) | 3 |
| **69** | In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food? | Yes | 1 |
| | | No **(SKIP to Q70)** | 2 |
| **69a** | How often did this happen? | Rarely (once or twice in the past four weeks) | 1 |
| | | Sometimes (three to ten times in the past four weeks) | 2 |
| | | Often (more than ten times in the past four weeks) | 3 |
| **70** | In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food? | Yes | 1 |
| | | No **(SKIP to Q71)** | 2 |

| | | | | |
|---|---|---|---|---|
| **70a** | How often did this happen? | Rarely (once or twice in the past four weeks) | | 1 |
| | | Sometimes (three to ten times in the past four weeks) | | 2 |
| | | Often (more than ten times in the past four weeks) | | 3 |
| **71** | In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food? | | Yes | 1 |
| | | | No **(SKIP to Q72)** | 2 |
| **71a** | How often did this happen? | Rarely (once or twice in the past four weeks) | | 1 |
| | | Sometimes (three to ten times in the past four weeks) | | 2 |
| | | Often (more than ten times in the past four weeks) | | 3 |
| **Section E: Socio-Demographic Information** | | | | |
| **72** | Gender | | Male | 1 |
| | | | Female | 2 |
| **73** | How old are you? | | _____ | |
| **74** | What is your current marital status? | | Single | 1 |
| | | | Married | 2 |
| | | | Separated | 3 |
| | | | Divorced | 4 |
| | | | Widowed | 5 |
| | | | Preferred not to answer | 99 |
| **75** | Which of the following best describes the household structure? | Female Centered (No husband/ male partner in household, may include relatives, children, friends) | | 1 |
| | | Male Centered (No wife/ female partner in household, may include relatives, children, friends) | | 2 |
| | | Nuclear (Husband/ male partner and wife/ female partner with or without children) | | 3 |
| | | Extended (Husband/ male partner and wife/ female partner and children and relatives) | | 4 |
| | | Polygamous (husband with more than one wife) | | 5 |
| | | Other (Please Specify) | | 99 |

| | | | |
|---|---|---|---|
| | | …….. | |
| **76** | What is your position in your household? | Non-head | 1 |
| | | Head **(SKIP to Q78)** | 2 |
| | | Preferred not to answer | 99 |
| **77** | **IF NON-HEAD**<br>What is your relation to the household head? | Wife | 1 |
| | | Parent | 2 |
| | | Child | 3 |
| | | Other (Please Specify)<br>…….. | 97 |
| | | Preferred not to answer | 99 |
| **78** | How many people in total live in your household? | Record as mentioned:<br>_____ | |
| **79** | How many of the people in your household are children? | Record as mentioned:<br>_____ | |
| **80** | What is your religion? | Christianity | 1 |
| | | Muslim | 2 |
| | | Traditionalists | 3 |
| | | No religion | 4 |
| | | Preferred not to answer | 99 |
| **81** | What is your ethnicity? | Record as mentioned:<br>_____ | |
| **82** | What is your highest level of education? | No formal education | 1 |
| | | Primary | 2 |
| | | Secondary | 3 |
| | | Tertiary | 4 |

| | | | |
|---|---|---|---|
| | | Middle school | 5 |
| | | Preferred not to answer | 99 |
| **83** | What is your occupation? | Agriculture/farming | 1 |
| | | Trading/business | 2 |
| | | Civil service | 3 |
| | | Unemployed | 4 |
| | | Preferred not to answer | 99 |
| **84** | What is the main occupation of your household? | Agriculture/farming | 1 |
| | | Trading/business | 2 |
| | | Civil service | 3 |
| | | Unemployed | 4 |
| | | Preferred not to answer | 99 |
| **85** | Would you mind if I ask you about your household's average income per month (GH¢) | Record as mentioned:<br>_____ | |
| **86** | Which one of the following housing type best describes the type of dwelling this household occupies? | House | 1 |
| | | Homestead | 2 |
| | | Compound house | 3 |
| | | Room in a house | 4 |
| | | Hut/shack | 5 |
| | | Other (Please Specify)<br>…….. | 97 |
| *Please answer yes or no to following questions 87 and 88 (Yes = 1, No = 2)* | | | |
| **87** | Does your household have: | Electricity? | |
| | | Running water? | |
| | | A wall clock? | |
| | | A radio? | |
| | | A black/white television? | |

| | | | |
|---|---|---|---|
| | | A colour television? | |
| | | A mobile phone? | |
| | | A land-line telephone? | |
| | | A refrigerator? | |
| | | A freezer? | |
| | | Electricity generator/Invertor(s)? | |
| | | Washing machine? | |
| | | Computer/Tabulate computer? | |
| | | Photo camera? (Not on phone) | |
| | | Video deck/DVD/VCD? | |
| | | Sewing machine? | |
| | | Bed? | |
| | | Table? | |
| | | Cabinet/cupboard? | |
| | | Access to the Internet in any device? | |
| **88** | What type of fuel does your household mainly use for cooking? | Electricity | |
| | | LPG | |
| | | Natural Gas | |
| | | Biogas | |
| | | Kerosene | |
| | | Coal, Lignite | |
| | | Charcoal | |
| | | Wood | |
| | | Straw/Shrubs/Grass | |
| | | Agricultural Crop | |
| | | Animal Dung | |
| | | No food cooked in household | |
| | | Other (Please Specify) | 97 |

| | | | |
|---|---|---|---|
| | | …….. | |
| **89** | Is the cooking usually done in the household, in a separate building, or outdoors? | In the house | 1 |
| | | In a separate building | 2 |
| | | Outdoors | 3 |
| | | Other (Please Specify)<br><br>…….. | 97 |
| **90** | Do you have a separate room which is used as a kitchen? | Yes | 1 |
| | | No | 2 |
| **91** | **Type of building materials** | | |
| **91a** | Main material of the floor. *(Please observe and record)* | Natural floor (earth/sand/dung) | 1 |
| | | Rudimentary floor (wood planks) | 2 |
| | | Finished floor | |
| | | et/polished wood | 31 |
| | | Vinyl/asphalt strips | 32 |
| | | Ceramic/marble/tiles/terrazzo | 33 |
| | | Cement | 34 |
| | | Woolen carpet/synthetic carpet | 35 |
| | | Linoleum/rubber carpet | 36 |
| | | Other (Please Specify)<br><br>…….. | 97 |
| **91b** | Main material of the roof. *(Please observe and record)* | Natural roofing (earth/thatch/palm) | 1 |
| | | Rudimentary roofing | |
| | | Rustic mat | 21 |
| | | Pal/bamboo | 22 |
| | | Wood planks | 23 |
| | | Cardboard | 24 |
| | | Finished roofing | |

| | | | |
|---|---|---|---|
| | | Metal | 31 |
| | | Wood | 32 |
| | | Calamine/cement fibef | 33 |
| | | Ceramic/brick tiles | 34 |
| | | Cement | 35 |
| | | Roofing shingles | 36 |
| | | Roofing sheets | 37 |
| | | Other (Please Specify)<br><br>…….. | 97 |
| **91c** | Main material of the exterior walls. *(Please observe and record)* | Natural Walls | |
| | | No walls | 11 |
| | | Cane/palm/trunks | 12 |
| | | Dirt/landcrete | 13 |
| | | Rudimentary walls | |
| | | Bamboo with mud | 21 |
| | | Stone with mud | 22 |
| | | Uncovered adobe | 23 |
| | | Plywood | 24 |
| | | Cardboard | 25 |
| | | Reused walls | 26 |
| | | Finished walls | |
| | | Cement | 31 |
| | | Stone with lime/cement | 32 |
| | | Bricks | 33 |
| | | Cement blocks | 34 |
| | | Covered adobe | 35 |
| | | Wood planks/shingles | 36 |
| | | Other (Please Specify) | 97 |

| | | | |
|---|---|---|---|
| | | …….. | |
| **92** | Does any member of this household own the following:<br>*Please answer yes or no (Yes=1, No=2)* | A wrist watch? | |
| | | A bicycle? | |
| | | A motorcycle or motor scooter? | |
| | | An animal-drawn cart? | |
| | | A car or truck? | |
| | | A boat with a motor? | |
| | | A boat without a motor? | |
| **93** | Does your household own any livestock? | Yes | 1 |
| | | No | 2 |
| | | Don't know | 98 |
| | | Preferred not to answer | 99 |
| **94** | How many of the following types of animals does your household have? (please indicate the number | Goat | |
| | | Pigs | |
| | | Cattle | |
| | | Donkey | |
| | | Sheep | |
| | | Chicken | |
| *95 | Where do you access health service<br><br>(Pease record name of community and facility eg. Nambeg CHPS zone) | | |

## Facility-based Questionnaire

**Survey ID: ____/____/____ District#_____ Community #_____ Interview Date:___/____/2016**

**Interviewer#_____ Name of Health Facility: _____**

**Respondent's Gender: Male____ Female_____**

| # | QUESTION (and Enumerator Instruction) | RESPONSE OPTIONS | CODE |
|---|---|---|---|
| **Hepatitis B service provision (Administer to health care providers eg. CHPS)** | | | |
| **1** | What would you say your health facility is? | CHPS | 1 |
| | | Sub-District Health Facility | 2 |
| | | Clinic | 3 |
| | | Hospital | 4 |
| | | Other (Please Specify)<br>…… | 97 |
| **2** | Beside this community, do you serve other communities? | Yes | 1 |
| | | No | 2 |
| **3** | Are you involved in delivering an intervention, activity or strategy that aims to improve uptake of **Hepatitis B** services? | Yes | 1 |
| | | No | 2 |
| | | Don't Know | 98 |
| | | Preferred not to answer | 99 |
| **4** | Does your service provide education/sensitization on **Hepatitis B**?<br>(If yes next question) | Yes | 1 |
| | | No | 2 |
| **5** | Are specific groups targeted for education/sensitization on **Hepatitis B**?<br>(Please select all that apply) | No specific groups are targeted | 1 |
| | | Women of child bearing age | 2 |
| | | Bar owners/tenders and other alcohol sellers | 3 |

| | | | |
|---|---|---|---|
| | | Household heads | 4 |
| | | Community leaders | 5 |
| | | Community health volunteers | 6 |
| | | Persons leaving with HIV (PLWHIV) | 7 |
| | | Sex workers | 8 |
| | | Recipients of unscreened blood/blood products | 9 |
| | | Other (please specify)<br><br>…… | 97 |
| **6** | Does your service promote and/or offer testing for **Hepatitis B?** | Yes **(SKIP to Q13)** | 1 |
| | | No | 2 |
| | | Preferred not to answer | 99 |
| **7** | What is the setting of your service?<br><br>**(Please select all that apply)** | Community (please specify) | 1 |
| | | Drugs service: other | 2 |
| | | Hospital | 3 |
| | | Outreach | 4 |
| | | Pharmacy | 5 |
| | | CHPS | 6 |
| | | Primary care | 7 |
| | | Sexual Health clinic / GUM clinic | |
| | | Other specialist clinic (please specify)<br><br>…… | 971 |
| | | Other (please specify)<br><br>…….. | 972 |
| **8** | Are specific groups targeted for testing or | No specific groups are targeted | 0 |

| | | | |
|---|---|---|---|
| | encouraged to seek testing by your service?<br><br>**(Please select all that apply)** | Infants | |
| | | Children under5 years | 1 |
| | | Pregnant women | 2 |
| | | Women of child bearing age | 3 |
| | | Teenagers | 4 |
| | | Barbers and hairdressers | 5 |
| | | Persons leaving with HIV (PLWHIV) | 6 |
| | | No specific groups are targeted | 7 |
| | | Bar owners/tenders and other alcohol sellers | 8 |
| | | Other (please specify)<br><br>…….. | 97 |
| **9** | Does your service provide testing on site or by referral? | On site **Hepatitis B** testing | 1 |
| | | Referral to another service for **Hepatitis B** testing | 2 |
| | | Other (please specify)<br><br>……. | 97 |
| **10** | Does your service follow a protocol, guideline or policy for **Hepatitis B**? | Yes | 1 |
| | | No | 2 |
| **11** | If yes, is a copy of the protocol, guideline or policy available for the research team to view? | Yes | 1 |
| | | No | 2 |
| **12** | Who collects the sample for testing within your facility? (Please select all that apply) | Drug worker | 1 |
| | | Community worker/ Lay health worker | 2 |
| | | Health professional: practice nurse | 3 |
| | | Health professional: specialist nurse | 4 |
| | | Health professional: general practitioner | 5 |
| | | Health professional: other (please specify) | 6 |

| | | | |
|---|---|---|---|
| | | Health promotion/education practitioner | 7 |
| | | Peer educator (please specify) | 8 |
| | | Other (please specify)<br><br>……. | 97 |
| **13** | Does your facility provide **Hepatitis B** vaccination? | Yes | 1 |
| | | No | 2 |
| **14** | Does your **Hepatitis B** vaccination target specific group of people?<br><br>**(Please select all that apply)** | No specific groups are targeted | 0 |
| | | Infants | |
| | | Children under5 years | 1 |
| | | Pregnant women | 2 |
| | | Women of child bearing age | 3 |
| | | Teenagers | 4 |
| | | Barbers and hairdressers | 5 |
| | | Persons leaving with HIV (PLWHIV) | 6 |
| | | No specific groups are targeted | 7 |
| | | Bar owners/tenders and other alcohol sellers | 8 |
| | | Other (please specify)<br><br>……. | 97 |

# Curriculum Vitae

## FLORENCE WULLO ANFAARA

## EDUCATION

| | |
|---|---|
| ***Sept. 2016 to date*** | **Masters Student, Department of Geography, University of Western Ontario**<br>**Thesis Title:** Health Perceptions of Hepatitis B Transmission in the Upper West Region of Ghana<br><br>**Academic Advisor:** Dr. Isaac Luginaah |
| ***May 2010*** | **Bachelor of Arts, Sociology and Study of Religions, University of Ghana, Legon**<br>**Thesis title:** The impact of alcoholism on the socio-economic development of the youth of Jirapa in the Upper West Region of Ghana<br><br>**Academic Advisor:** Mr. Albert Kpoor |

## TEACHING EXPERIENCE

***Sept 2016 to Apr 2018*** **Teaching Assistant, University of Western Ontario**

Course Title: Geography of Tourism

## RESEARCH INTEREST/EXPERIENCE

| | |
|---|---|
| ***May2013-Aug 2014*** | **Field Research Officer, Navrongo Health Research Institute 'Artesunate Extension Project'** |
| ***Jan-May 2010*** | **Undergraduate thesis: The impact of alcoholism on the Socioeconomic development of the youth of Jirapa in the Upper West Region of Ghana.** |
| ***July-Sept2005*** | **Field Research Assistant, Ghana Health Service - Bolgatanga** |

## PAPERS IN PROGRESS

**Anfaara, F.W.,** Atuoye, K.N., Mkandawire, P., & Luginaah, I. (under review) Factors Associated with HBV Voluntary testing in the Upper West region of Ghana *Health & Place*

**Anfaara, F.W.,** Atuoye, K.N., & Luginaah, I. (submitted) Factors influencing Knowledge of Hepatitis B Virus Transmission in the Upper West Region of Ghana: a multilevel analysis. *Health Policy and Planning*

Antabe, R., Sano, Y., **Anfaara, F. W.,** Kansanga, M., Chai, X., & Luginaah, I. (submitted) Antenatal care utilization among circumcised women in Kenya: Some evidence from the 2014 Kenya Demographic and Health Survey. *Journal of Midwifery*

**Anfaara, F.W.,** Atuoye, K.N., & Luginaah, I. (in draft) Health Information Sources and Perception of Hepatitis B Transmission in the Upper West Region of Ghana

**Anfaara, F.W.,** Kangmennaang, J., Songsore, E., Kuuire, V., Atuoye, K.N., & Luginaah, I. (in draft) Killing Them Softly: The Politics in Alcohol Policymaking in Ghana

**Anfaara, F.W.,** Sano, Y., & Antabe, R. (in draft) Correlates of Women Decision making Autonomy in the Democratic Republic of Congo

## CONFERENCE PRESENTATION

***April 2017*** **Association of American Geographers (AAG) Conference (Apr 10-14) New Orleans, Louisiana**

- **Anfaara, F.W.,** Atuoye, K.N., Mkandawire, P., Luginaah, I. *Voluntary testing for HBV in the Upper West Region of Ghana: Where do people go?* (paper presentation)

***Nov 2017*** **Africa-Western Collaboration Day (AWC) Conference (Nov. 15), Western University, London**

- **Anfaara, F.W.,** & Luginaah, I. *The Influence of Primary Healthcare on HBV Voluntary Testing in the UWR of Ghana* (Poster Presentation)

***May 2017*** **Canadian Association of Geographers (CAG) Conference (May 29-June 2), York University, Toronto**

- **Anfaara, F.W.,** Atuoye, K.N., Luginaah, I. *Health Information Sources and Perceptions of Hepatitis B Transmission in the Upper West Region of Ghana* (Paper Presentation)

***April 2017*** **Association of American Geographers (AAG) Conference (April 4-9) Boston, Massachusetts**

- **Anfaara, F.W.,** Sano, Y., Antabe, R., Luginaah, I. *Place of Residence and Women Autonomy in the Democratic Republic of Congo* (paper presentation)

***Oct 2017*** **Canadian Association of Geographers Ontario Division (CAGONT) Conference, University of Waterloo**

- **Anfaara, F.W.,** Sano, Y., Antabe, R., Luginaah, I. *Correlates of Women Decision making Autonomy in Democratic Republic of Congo* (paper presentation)

## PROFESSIONAL DEVELOPMENT –Western Teaching Support Centre

| | |
|---|---|
| ***June 2017*** | Academic and Professional communication Series |
| ***May 2017*** | Spring Perspectives on Teaching Conference-2017 |
| ***Feb/June 2017*** | Future Prof Workshops |
| ***Jan 2017*** | Winter Conference on Teaching 2017 |
| ***Jan 2017*** | Teaching Mentor Program-Winter 2017 |
| ***Jan 2017*** | Teaching in the Canadian Classroom (Certificate Awarded) |
| ***Jan 2017*** | Netiquette: Professional Communication Skills-Winter 2017 |
| ***Sept 2016*** | Teaching Assistant Training Program (TATP)-September 2016 (Certificate Awarded) |

## AWARDS

| | |
|---|---|
| ***2016-2018*** | **Queen Elizabeth II Diamond Jubilee Scholarship (QEII)** |
| | CAD$ 72,900 |
| ***March 2018*** | **Florence Margai Student Paper Contest** |
| | CAD$ 100 |
| ***April 2017*** | **Society of Graduate Students (SOGS) Travel Grant** |
| | CAD$ 500 |
| ***April 2017*** | **Department of Geography Travel Grant** |
| | CAD$ 100 |
| ***Aug 2017*** | **Society of Graduate Students (SOGS) Travel Grant** |
| | CAD$ 271 |
| **2002-2005** | **Ghana Commercial Bank Academic Excellence Awards** |
| | CAD$5000 |

## RELEVANT VOLUNTARY EXPERIENCE AND COMMUNITY INVOLVEMENT

| | |
|---|---|
| **Aug 2016 to date** | **Ghana Association of London and Middlesex (GALM)**<br>*Youth Coordinator* |
| **2017-2018** | **Geographers Graduate Society at Western (GEOGRAD)**<br>*Auxiliary Councillor to Society of Graduate Students (SOGS)* |

| | |
|---|---|
| **April 2017** | **Association of American Geographers, Boston, Boston, Massachusetts**<br>*Volunteer* |
| **July 2017** | **Western University Conference on Science Education**<br>*Volunteer* |