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HEPATITIS B VIRUS INFECTION AMONG PREGNANT WOMEN AT JAMESTOWN MATERNITY, ACCRA

BY

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DECLARATION

I, Michael Ofosu Atuah, hereby certify that all works utilized in this research have been properly cited and this is the outcome of my legitimate effort conducted under supervision.

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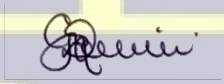
Date…28/02/22 Signature 

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DEDICATION

This research is devoted entirely to the Heavenly Father, through whose incredible love and power I was determined to finalize this monumental task, as well as to my family.

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Acronym	Meaning
ANC	Antenatal care
CHB	Chronic hepatitis B
G6PD	Glucose-6-phosphate dehydrogenase
DNA	Deoxyribonucleic acid
HBV	Hepatitis B virus
HCC	Hepatocellular carcinoma
HCV	Hepatitis C virus
LMICs	Low- and middle-income countries
N/A	Not Applicable
WHO	World Health Organization

ABSTRACT

Background: HBV infection is among the top 10 global causes of death, responsible for almost one million deaths each year. According to the WHO, approximately 240 million people worldwide have chronic HBV infection, most of whom live in poor or underdeveloped countries. ABO blood types have also been linked to HBV infection. In addition, an association between HBV infection and anaemia has been discovered by others. This connection, however, is still unknown. HBV infection and socio-demographic variables have been linked in several studies. The primary objective of the study was to establish the prevalence of HBV infection among pregnant women who visited the Jamestown Maternity.

Method: The design used in this study was an analytical cross-sectional design. The technique fulfilled the defined objectives of determining the prevalence of HBV infection, assessing the knowledge about HBV infection, and establishing the factors contributing to HBV infection among pregnant women attending the ANC clinic at Jamestown Maternity. The questionnaire used to survey respondents contained both closed and open-ended questions. The survey questions information and test outcomes were imported into Epi-info 7 and STATA 15.0, respectively, for interpretation. In addition, the researchers conducted univariate, bivariate, and multivariate analyses of the various determinants of HBV infection among pregnant women attending Jamestown Maternity.

Results: HBV infection was found in 11.5 percent of pregnant women, with nearly a third (31.0 %) having no or poor knowledge of the virus and almost a quarter (23.2 %) having excellent knowledge. HBV vaccine uptake rate is among these women was 5.6%. HBV infection was seven

times more common in mothers with secondary education (AOR=6.95, 95% CI: 1.15–42.08, p=0.034). Mole-Dagbani mothers were 12 times more likely than other mothers to be infected with HBV (AOR=12.0, 95% CI: 1.49 – 95.95**,** p=0.018). Having several sexual partners approximately quadrupled the chance of HBV infection (AOR=3.80, 95% CI: 1.37 – 10.52, p=0.011).

Conclusion: The prevalence of HBV infection among expectant mothers at Jamestown Maternity is high. The knowledge of HBV infection and vaccine uptake among these women is generally low. More education and awareness campaigns are needed to address these public health concerns.

1. CHAPTER ONE

1.1 INTRODUCTION

The hepatitis B virus causes HBV infection. It is a DNA virus with an envelope that primarily infects the liver, resulting in hepatocyte destruction and inflammation (WHO, 2015). HBV infection has a 3 to 4-month incubation period, comparable to other viral hepatitis (Kwon et al. 2011). It generates early symptoms such as weariness, high body temperature, and lack of appetite. Chronic HBV infection is characterized by a duration of six months or more. (Wilkings et al. 2010). When HBV infection lasts more than six months, the body cannot eliminate the virus. Acute HBV infection, unlike chronic HBV infection, is a short-term infection that exhibits symptoms within three months of contact and can last up to six months (Lin & Kirchner,2004).

According to research, the progression from acute to chronic HBV infection may be influenced by the age at which a person is infected. Infections in childhood have a greater chance of evolving into longstanding ones than infections that occur later in life. When exposed to the virus, 8-9 out of 10 neonates and 3-5 out of 10 children cannot recover because their immune systems are too young to fight and successfully eliminate it. As a result of an early neonatal HBV infection, a chronic HBV develops (Adjei et al., 2016). The WHO estimates that 240 million people worldwide have chronic HBV infection, with most people living in developing nations. The primary consequences of chronic HBV infection are liver cirrhosis and hepatocellular carcinoma (HCC). About 20% to 30% of patients with chronic HBV infection may develop such consequences and about 650,000 deaths annually from cirrhosis and liver carcinoma. According to Ombeni (2013), up to fifty percent of the globe's population reside in HBV endemic regions, including Africa and Asia. HBV infection is the tenth most prominent cause of mortality globally, with half a million

to 1.2 million fatalities yearly due to unresolved HBV infection, liver fibrosis, and primary liver malignancies (Alavian et al. 2007). There are over four million new HBV infections each year worldwide, with 1/4 of these new infections leading to liver disease (Franco et al.,2012). According to statistics, liver cancer is one of the most prevalent malignancies in China. Every year, almost 400,000 people die in China from liver cancer, accounting for about fifty percent of all liver cancer fatalities globally (Wang et al. 2014).

The WHO agreement on HBV (WHA67.6) was passed by the Global Health Congress in 2014, giving countries the authority to develop and implement comprehensive and essential policies and initiatives to combat all kinds of HBV. The WHO's treatment techniques for unresolved HBV infection illustrate the need to decide on a simple open-welfare technique to fight the "silent killer" (Assembly, 2014).

Ofori-Asenso's (2016) research in Ghana raises significant concerns about blood supply safety. According to the study, HBV infection has an 11.1 percent prevalence among blood donors, with a greater prevalence among replacement blood donors. According to Ofori-Asenso (2016), the ubiquity of HBV infections among pregnant women in Ghana is significant. This finding demonstrates the need for a national HBV screening program in pre-conception units for women of reproductive age. Moreover, 40% of Ghanaian liver fibrosis patients had persistent HBV (Blankson et al., 2005).

Parenteral, transplacental, and multiplicity of sexual partners continue to have a role in the transmission of infectious HBV (Alavian, Fallahian & Lankarani, 2007). Hepatitis B infection in pregnancy, according to Kilonzo (2010) and Ombeni (2013), has substantial consequences, including the potential for mother-to-child transmission. HBV is predominantly transferred

perinatally from mother to newborn) According to Ombeni (2013), high-prevalence locations imply a significant chronicity risk. Sex is the primary mode of transmission in areas where the incidence is low (Iloh, Chuku, Amadi & Obiegbu, 2013). Nearly 9 out of 10 children infected by vertical transmission have chronic HBV infection (Alavian et al.,2007). Adults, on the other hand, will clear initial HBV infection in 96% of cases. As a result, interrupting early transmission is critical to stopping the HBV infection cycle.

In Africa, the prevalence of HBV ranged from 5.3 percent to 25 percent among prenatal females (Elsheikh et al., 2007). Luuse et al. (2017) found a statistically significant connection between maternal age and HBV positivity in pregnancy (2=50.2, P<0.001) in Ghana's Volta region; the highest prevalence of 5.3 percent, was discovered among pregnant aged 15-20 years, whereas the age groups 21-25, 26-30, and 36-40 had 0.0%. 2.4% was the total proportion in the population.

The most effective way to combat viral hepatitis is prevention. According to Hakim (2007), the best strategy to avoid contracting HBV infection is to avoid behaviours that raise the disease risk. In addition, the HBV infection can be slowed by changing people's lifestyles and educating them about the virus. Screening blood donors and using sterile measures in clinical procedures are two critical measures to limit the incidence of HBV infection.

If all expectant mothers are diagnosed and treated adequately for HBV, the risk of mother-to-child transmission might be drastically decreased. Neonatal HBV prevention might be done by administering the HBV vaccination shortly after a child's birth. The vaccination protects newborns from developing HBV and reduces the risk of infection. In addition, in 2015, the WHO recommended that pregnant women with high HBV be put on prophylaxis antiviral medications from 28 weeks to prevent mother-to-child transmission of HBV infection during the antenatal

period (WHO,2021). This prophylactic treatment is to add-on to the neonatal vaccination to help reduce the risk of mother-to-child transmission.

1.2 PROBLEM STATEMENT

HBV infection is a potentially fatal infection of the liver. Globally, about 257 million are HBV-positive, with nearly 900,000 dying yearly (Mandal, 2019; WHO, 2015). In Sub-Saharan Africa, perinatal transmission of HBV infection contributes to 40% of chronic cases in the territory (Keane et al., 2016). The high proportion of HBV infection has made it a paramount public health concern. Over the years, the trends of HBV infection have seen an increase in cases (Schweitzer et al., 2015). Mother-to-child transmission is a major contribution to the prevalence of HBV infection. It is estimated to account for about 50% of the burden of chronic HBV infection (Thio et al., 2015). Therefore, expectant mothers are considered a group at high risk for HBV infection and a target for managing the spread of HBV infection (WHO, 2015).

In Ghana, the prevalence of HBV infection among expectant mothers is estimated to be 7.9% - 9.5% (Anabire et al., 2019; Ephraim et al., 2015). This incidence is relatively high and has significant public health implications. For example, a high prevalence of HBV infection among pregnant women may raise the risk of acute neonatal hepatitis and a 40% rise in the likelihood of chronic HBV infection in babies (Sinha & Kumar, 2010). HBV infection is linked to an elevated risk of congenital anomalies, preterm delivery, and other adverse outcomes (Safir et al., 2010).

Anaemia in pregnancy can cause undesirable maternal and foetal outcomes like postpartum bleeding, low birth weight, prematurity, maternal mortality, and foetal demise (Suryanarayana et al., 2017). The prevalence of anaemia among pregnant women is as high as 50.8% in some parts

of Ghana (Wemakor et al.,2019). Several studies have established that persons with HBV infection are at an elevated risk of aplastic anaemia (Gonzalez-Casas et al., 2009). Considering the dilapidating effect of anaemia among pregnant women, it is imperative to investigate its relationship with HBV infection. However, the relationship between anaemia and HBV infection is least explored by researchers in Ghana. Therefore, studying the possible association between HBV infection and anaemia in pregnant women and anaemia would broaden scientists' knowledge of the nutritional requirements needed to prevent anaemia among pregnant women who have HBV infection.

There have been findings of ABO/Rh blood group type antigens playing active roles in an individual's susceptibility to diseases, notably viral infections, over the years (Anstee, 2010; Zhao et al., 2020). As a result, some studies have attempted to link ABO/Rh blood groups to developing persistent HBV infections (Genc, 2017; Jing et al., 2020). However, the statistical confirmation of a link between ABO/Rh blood groups and HBV infection is questionable in several of these investigations (Pourhassan, 2014; Siransy et al., 2015). Furthermore, little is known about the relationship between ABO/Rh blood groups and HBV infection. An analysis of the association between ABO/Rh blood group types and HBV infection may provide greater insight into which blood groups are susceptible to contracting HBV infection, transmission, and chronic status development. In Ghana, around three-quarters of pregnant women are unaware of the dangers of hepatitis B infection (Kwadzokpui et al., 2020). This is a significant public health concern because these pregnant women are the primary conduit for mother-to-child transmission. The transfer from mother to baby is the most prevalent pathway for persistent infection. (WHO,2021). Poor knowledge implies that mothers cannot prevent disease transmission to the child. A study in Nigeria showed that 13.2% of pregnant women were fully or partially vaccinated against HBV

infection (Eleje et al.,2021). This HBV vaccine uptake rate among pregnant women is woefully inadequate to reduce the prevalence of mother-to-child transmission.

1.3 JUSTIFICATION

Chronic hepatitis, liver cirrhosis, hepatic failure, and malignancy are all caused by HBV infection. These complications have disastrous consequences in the long run, including a high death rate and illness load. In addition, HBV-infected mothers are more likely to infect their babies, predisposing them to chronic HBV infection (Iloh et al., 2013). To prevent perinatal HBV transmission, the WHO advises that the primary dose of the HBV vaccine be administered within 24 hours following birth (Franco et al., 2012). However, this preventative therapy is rarely used (Awuku et al., 2015). A study to ascertain the prevalence of HBV in expectant women and risk variables would reveal the ubiquity of the virus among pregnant women and any probability of mother–to–child transmission in the population, especially if mothers cannot afford the newborn HBV vaccination due to poor socio-economic status.

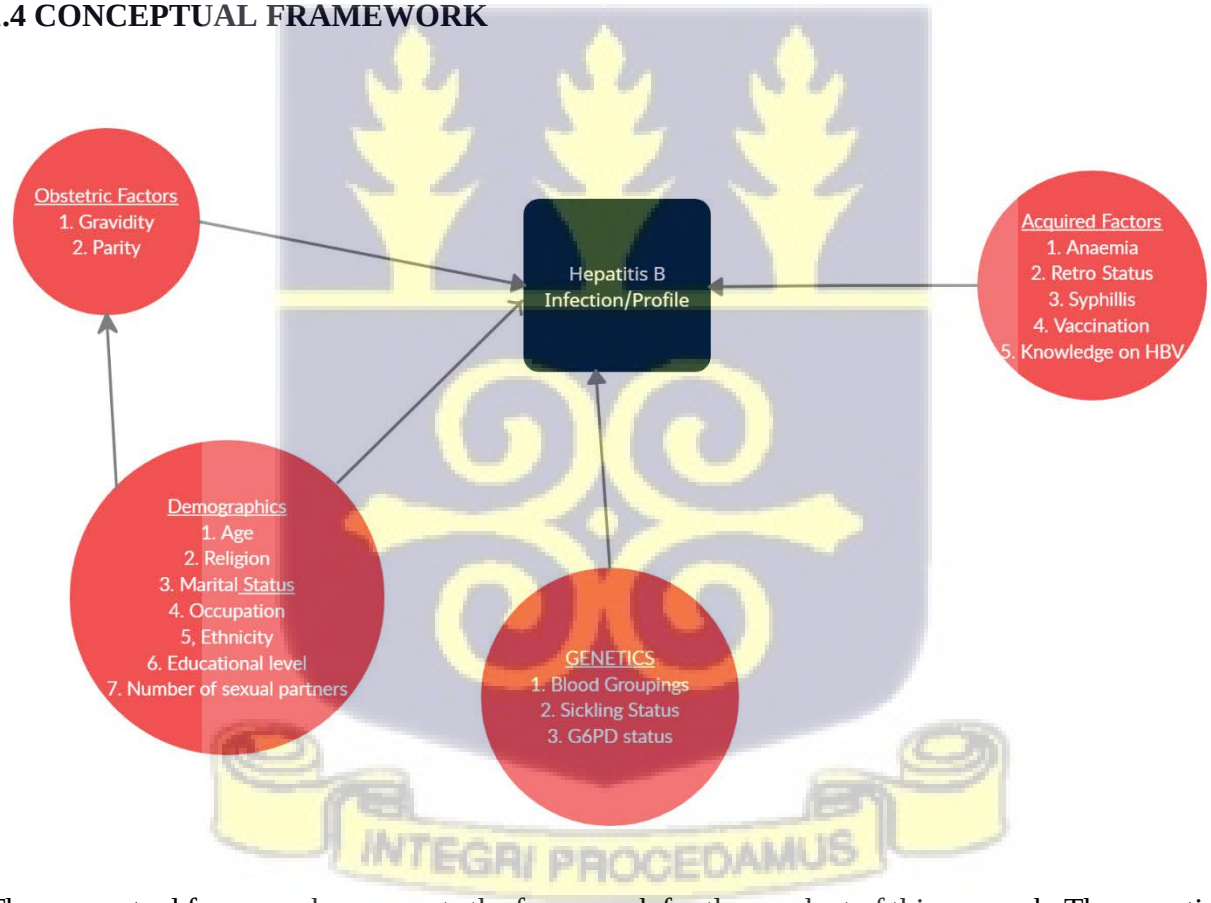
Maternal HBV infection has been implicated in undesirable pregnancy outcomes like gestational hypertension, low birth weight, and prematurity (Lao et al.,2013). A study to explore the various genetic and acquired factors influencing or associated with HBV infection in pregnant women will help find ways to curb the undesirable prevalence of the infection so that it does not lead to poor pregnancy outcomes. Most chronic HBV infections are due to mother-to-child transmission. The mother-to-child transmission risk is as high as 70%-90% among mothers with a high viral load (WHO, 2021). Investigating maternal factors that influence or are associated with HBV infection will help find solutions to such factors that influence the spread of the infection, helping to save newborns from chronic HBV. 77% of pregnant women in Ghana have poor knowledge of HBV

infection (Kwadzokpui et al., 2020). Assessing the understanding of expectant mothers who are the main conduit for newborn HBV infections will help identify knowledge gaps in HBV infection health education programmes and may inform change in approach. Where findings from this study establish a relationship between hepatitis B status and the risk of anaemia among pregnant women, this may guide policy on standard testing of pre-conceptive and pregnant women, HBV immunization, and the subsequent recommendation for anaemia treatment among this risk group. A study in Nigeria showed that 13.2% of pregnant women were fully or partially vaccinated against HBV infection (Eleje et al.,2021). This HBV vaccine uptake rate among pregnant women is woefully inadequate to reduce the prevalence of mother-to-child transmission. Not many studies have assessed the HBV vaccination uptake rate among pregnant women in Ghana. A study on this will help evaluate the Ghana situation and help find ways to mitigate its deficiencies.

The WHO recommendation on using antiviral prophylaxis to prevent HBV transmission from mother to child is not commonly practised in Ghana. Findings from this study will inform government policy on stringently implementing this practice to decrease the chance of mother-to-child transmission. This study will give information that health organizations can utilize to concentrate educational awareness on HBV infection in the local community. In Ghana, treatment for chronic HBV infection costs between $50-60 monthly (Mekonnen et al., 2018). This shows that preventing or managing HBV infection in Ghana is quite expensive for the average Ghanaian. Mass vaccination by the government will also have a toll on the health budget. A study to evaluate the connection between HBV infection and blood group will help reveal the susceptible blood group and inform targeted vaccination if mass vaccination affordability is a constraint.

Findings from this study will inform further scientific studies on the reasons for susceptibility and non-susceptibility of blood groupings and the possible development of new treatments for HBV infection. In the long run, this would help reduce mother-to-child transmission, especially in cases where the mother cannot afford the HBV immunoglobulin for an exposed newborn. It would have been prudent to run the study in the general population but using pregnant women as a study population reduces cost and logistic constraints. Pregnant women must run blood groupings, haemoglobin, and hepatitis B test for antenatal care, so they qualify as the best group for the study. Additional information like the retroviral test, syphilis test, and glucose-6-phosphate dehydrogenase (G6PD) test can be found in their antenatal folders.

1.4 CONCEPTUAL FRAMEWORK



The conceptual framework represents the framework for the conduct of this research. The narrative attempts to explain the associations of the various explanatory variables with HBV infection. The

HBV profile is a further test done after the simple hepatitis B test to determine whether the infection is acute or chronic and whether the virus is actively replicating or not replicating. The researcher grouped explanatory variables into demographic, obstetric, genetic, and acquired factors (anaemia, retroviral infection, vaccination, and syphilis infection). Several studies have shown that the HBV virus status of pregnant women and HBV profile are influenced directly and indirectly by the demographic characteristics of the woman. HBV is prevalent among 16-39-year-olds (Ofori-Asenso & Agyeman, 2016). People in this age group are sexually active and at risk of acquiring a sexually transmitted disease like HBV infection. People of a low educational class have an increased risk of HBV infection because most have little or no knowledge about the infection. There is a risk of HBV infection among pregnant women in polygamous unions compared with monogamous marriages (Talla et al., 2020). Having multiple sexual partners increases the risk of acquiring HBV infection. This is because having several sexual relations increases the chance of contracting and spreading HBV infection (Obi et al., 2006). People who practise traditional religion have a fivefold increased risk of HBV infection compared to Christians and Muslims. Multiparous women were 20 times at risk compared to primiparous women (Kwadzokpui et al., 2020). This may be due to the polygamous nature of the traditional religious system, poor socioeconomic status, and lack of knowledge among people who practise traditional religion (Shorter.,1978). Occupations involving frequent blood contact have a greater risk of HBV infection than those without.

Parity is directly proportional to gravidity. Increased parity and gravidity primarily increased sexual exposure and increased the risk of HBV infection. Kwadzokpui et al., 2020 found that primiparous women were more at risk than their multiparous counterparts. The genetic and obstetric factors are thought to influence the risk of HBV status and HBV profile status of a

pregnant woman directly (Akcay et al., 2018; Matsuura et al., 2016). Recent research has demonstrated that host hereditary factors affect the risk of infection. (Thursz et al., 2011). Human leukocyte antigens, cytokine genes, toll-like receptor genes, gene insertions/deletions, and copy number variants are linked to the probability of HBV infection, according to 2019 research by Zhang et al. Manifestation of these genes may either suppress infection or increase the host's susceptibility to infection. The blood group or the G6PD status may directly influence the risk of a pregnant woman acquiring HBV infection (Wang et al., 2012). HBV infection is prevalent in individuals with G6PD abnormalities. (Zhao et al., 2019). Researchers have propounded that individuals with blood group B have protective properties against blood-transmitted infection. Thus, they have a reduced risk of acquiring HBV infection. However, blood group O is associated with greater vulnerability to developing HBV infection (Jing et al., 2020). The modifiable risk factors such as anaemia, retroviral status, and syphilis status are thought to influence the HBV infection status and profile (Al-Fawaz & Ramia, 1993; Bratos et al., 1993; Oseni Okolo & Omatola, 2021). About 14.2% of people with retroviral infections have chronic HBV infections in Ghana (Ofori-Asenso & Agyeman, 2016). The risk of HBV infection is increased among people with sexually transmitted infections (STI) like syphilis and chlamydia (Inoue et al., 2016). This is attributable to the break in the skin integrity and the epithelium of sexual organs during an STI.

The anaemia may directly influence the risk of acquiring HBV infection and vice versa (Al-Fawaz & Ramia, 1993; Lin et al., 2008). Anaemia may reduce immunity, predisposing individuals to diseases like HBV. Likewise, HBV infection is linked to an elevated anaemia risk (Chen et al., 2017).

1.5 RESEARCH QUESTIONS

1. What is the prevalence of HBV infection among pregnant women seeking care?
2. What is the level of knowledge on HBV infection among pregnant women?
3. What is the association between blood group, haemoglobin, syphilis, human immune virus, G6PD and HBV infection?

1.6 OBJECTIVES

GENERAL OBJECTIVES

To assess HBV infection among pregnant women seeking care at the Jamestown Maternity

SPECIFIC OBJECTIVES

1 Determine the prevalence of HBV infection among pregnant women

2. Assess the knowledge of HBV infection among the pregnant women

3. Determine the association between HBV and blood group, haemoglobin, syphilis, human immune virus, G6PD)

2. CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

The chapter seeks to review the literature. Under this, the prevalence of HBV infection among pregnant women and the association between HBV infection and genetic and sociodemographic characteristics will be reviewed.

2.2 OVERVIEW

The inflammation of the liver induced by viruses is known as viral hepatitis. Again, viruses that cause liver illness are generically referred to as hepatotropic viruses. Hepatitis A, B, C, D, and E viruses are the most prominent. Nevertheless, in addition to the viruses mentioned earlier, other viruses are also known to be responsible. These include the virus that causes yellow fever, Epstein-Barr, Herpes simplex, and Cytomegalovirus, which are capable of causing hepatitis. HBV or HCV infects an estimated 500 thousand persons on a long-term basis. Hepatitis E is also responsible for 70000 fatalities and 3500 stillbirths. Globally, about 1,400,000 new HAV infections are diagnosed annually. Furthermore, viral hepatitis B is responsible for 2.7 percent of global mortality annually (Perz et al. 2006, WHO. Secretariat 2009).

2.3 THE EPIDEMIOLOGY OF HBV

HBV, a small DNA virus, causes one of the most prevalent and deadly viral illnesses of the liver in the world (HBV). According to Mbaawuaga and colleagues in 2008, the virus was initially discovered in tolerant blood as "Australia antigen," subsequently renamed hepatitis B surface antigen (HBsAg). HBV infection is extremely prevalent in Asia, Africa, and parts of southern and eastern Europe. Approximately 350 million individuals of the 2 billion people with proof of past

or present HBV infection as determined by serology are chronic HBV carriers. Estimates indicate that 14 to 15 percent of HBV-infected individuals will develop liver cirrhosis or HCC. (Funk, Rosenberg, & Lok, 2002.). Annually, between 500,000 and 1.2 million people die due to HBV. (WHO, 2012).

Its endemicity is based on the number of people afflicted with the HBV virus (Hou et al., 2005). In addition, Redd et al. (2007) discovered an association between the routes of HBV transmission and the prevalence of chronic HBV infection in a particular region. The endemicity of chronic HBV infection is divided into three categories: low, moderate, and high. An estimated 160 million people in the Western Pacific have chronic HBV infection, with around 360,000 HBV-related fatalities yearly (Emiroglu et al., 2010, Goldstein et al., 2005). Childhood and adolescence are the peak ages for HBV infection in the Western Pacific. Consequently, HBV infection is more prevalent in adults. (Alter, 2003).

Intermediate endemicity encompasses parts of South America, Eastern and Southern Europe, the Middle East, and Japan. In these groups, hepatitis B infection is common (10-16%), although only 2-7 percent are chronic HBV infections (Hou et al.,2005). Due to infections in childhood or among newborns, chronic HBV illness is common in some areas (Toukan, 1990). In low-endemic locations such as North America, Northern, and Western Europe, and Australia, HBV infection affects 5-7 percent of persons, with chronicity between 0.5-2 percent (McQuillan et al., 1989). Chronic hepatitis B affects 8% or more of the population in high-endemic regions such as Southeast Asia, China, Sub-Saharan Africa, and the Amazon Basin (Hou et al., 2005). Chronic HBV is prevalent in different areas of Africa: West Africa has 8 percent, and Southern, Eastern, and Central Africa have 5-7 percent. Nonetheless, 65 percent of those infected with HBV are

unaware of their infection (Emiroglu, October 2010). According to Dongdem and colleagues' research, HBV infection was present in Ghana's 10.79% of voluntary blood donors (Dongdem et al., 2012).

2.3 SEROLOGICAL MARKERS

Chronic hepatitis is most commonly caused by Hepatitis B or C viruses. HBV infection can manifest as an acute or chronic condition. Six weeks after exposure, HBsAg, the surface antigen of HBV, is the first specific serological sign of acute infection **(**Grosheide et al., 1996). This antigen makes no distinction between acute and chronic infection. After HBsAg elimination, the anti-hepatitis B surface antigen [anti-HBs] antibody is produced. (Ve Uinga et al., 1999). The presence of an anti-HBs signature suggests both a successful immunization and recovery from infection. The hepatitis B core antigen is the sole marker detected and detectable in the liver (HBcAg). Antibodies to this core antigen, anti-HBc, are frequently detected at the start of clinical disease, indicating an active or recent infection.

2.4 HBV INFECTION AND ITS NATURAL HISTORY

HIV and HBV have similar risk determinants and transfer mechanisms. The three primary routes of transmission are through sex, perinatal transmission, and horizontal transmission, which occur primarily during childhood through direct contact with an infected individual and the exchange of stained objects. Less than 10% of children younger than five years and 30% to 50% of adults older than five years are asymptomatic after acute HBV infection. HBV infection manifests as nausea, unwellness, yellowing of eyes and sclera, high body temperature, dark urine, vomiting, and stools with a clay-like hue (Eleje et al., 2005; Olokoba et al., 2011; Kagu et al., 2005). Acute hepatitis in pregnancy appears similarly to acute hepatitis in the non-pregnant condition. Therefore, it can be

confused with intrahepatic cholestasis, acute fatty liver of pregnancy, and HELLP syndrome (Uneke et al., 2005).

Fulminant hepatitis causes liver failure and mortality in 0.5 percent to 2 percent of acutely infected people, according to Abdalla et al. (2005). According to research, approximately 9 in 10 HBV infections are transferred during childbirth. In addition, 25% to 35% of infections contracted between the ages of 1 and 5 years, and 2% to 5% of adults with compromised immune systems progress to chronic HBV illness. Liver cancers and cirrhosis manifest in 25 – 30 percent of 30- to 40-year-olds and 5-10 percent of 32-37-year-olds whose infection does not resolve within six months (Syed & Mark, 2008).

2.5 PREVALENCE OF HEPATITIS B

2.5.1 GLOBAL PREVALENCE

According to WHO (2015), 240 million people worldwide have long-term HBV, primarily in low- and LMICs. The worldwide prevalence of long-term HBV transmission varies by location. For example, an 8 percent prevalence is considered high, 2-7 percent is considered moderate, and 2% percent is considered low (Zenebe et al., 2014). "Areas of high endemicity can be classified as those areas where the occurrence of chronic HBV in the general population is ≥8%. This includes China, South East Asia, Sub-Saharan Africa, the Middle East, most Pacific Islands, a number of the Caribbean Islands, and the Amazon Basin" (WHO, 2002). "Areas of intermediate endemicity are those where chronic HBV within the general population is 2-7%; this includes Central and South America, the Mediterranean, India, Japan, and Southern Europe (WHO, 2002). Areas of low endemicity are those wherever chronic HBV is <2%; these areas are America (USA), Canada, Western Europe, and Australia" (WHO, 2002).

It is believed that Africa has one of the highest rates of HBV infection in the world: 8% among residents of the western portion of the African continent and 5-7% in the central, eastern, and southern regions. Additionally, it is anticipated that 100 million persons infected with chronic HBV disease will reside in South-East Asia (WHO, 2002). In Uganda, between 2004 and 2005, the prevalence of HBV illness was between 18.4 percent and 24.3 percent (Uganda Ministry of Health, 2004). In a previous study, Kibassa et al. found that 11.8% of pregnant women in Dar es Salaam transmitted HBV to their unborn child (Rashid, Kilewo, & Aboud, 2014).

According to research conducted in Ghana, about one out every ten voluntary blood donors have HBV infection (Dongdem et al., 2012). The prevalence of HBV infections in these groups ranges from 2 to 7 % in long-term HBV patients (Hou et al., 2005).

2.5.2 PREVALENCE AMONG PREGNANT WOMEN

In prenatal African females, the prevalence of HBV ranged from 5.3% to 25% (Elsheikh et al., 2007). In Nigeria, pregnant women had an 11 percent prevalence of HBeAg positivity and a 33 percent prevalence of HBeAg positivity (Mbaawuaga et al., 2008). In a separate study, 2.89 percent of expectant women in a Port Harcourt, Nigeria, ANC clinic tested positive for HBsAg. (Obi et al., 2006). In Nigeria, HBsAg seroprevalence in expectant women increased from 5% in 2008-2009 to 17.2% in 2012 (Zimtani, 2018), while it was found to be 25% in Harare in 1996 (Otegbayo et al., 2008). Hepatitis B was reported to be prevalent among pregnant women in Mali between May 2008 and December 2009. Pregnant women in Central Africa had an HBsAg prevalence of 6.5 percent. In 2004, the prevalence of HBV in pregnant women in Ethiopia was 5.3 percent, 5.6 percent in Sudan in 2006, and Tanzania had 6.3% in 1999 (King et al., 2012).

In a multicentre hospital-based cross-sectional survey of 2241 pregnant females visiting the ANC clinic at Kenya National Hospital, Okoth et al. (2006) discovered a prevalence of 9.3% for HBsAg (KNH). Okoth et al. (2006) found a prevalence of HBsAg seropositivity of 9.3%, which is consistent with the 1984 results of Murugu N.M. in expectant females at Machakos District Hospital. (Utsumi et al., 2012). Another cross-sectional investigation of pregnant women receiving ANC in two hospitals in northern Uganda revealed that 12.5% of respondents exhibit HBV infection signs (Bayo et al., 2014). A study of pregnant mothers at an Ethiopian public hospital revealed that HBsAg positivity was found in 11 (5.4%) research subjects (Rajappa & Shaji, 2015).

In Ghana, the prevalence of HBV illness is 6.7-10% in blood donors and 6.4-15.6 percent in pregnant mothers and children (Blankson et al., 2005). Luuse et al. (2017) identified a statistically significant correlation between age group and HBV infection in expectant mothers in Ghana's Volta region (2 test=50.24, P0.001). The highest prevalence, 5.3%, was discovered in the age group 15-20, while the least prevalence, 0%, was realized in the age groups 21-25, 26-30, and 36-40. The total prevalence observed was 2.4 percent. In Nigeria, Kolawole et al. (2012) observed a prevalence of 16.5% among expectant women in Osogbo. Aba also observed about 4 percent among expectant women in Kaduna. Ojule et al. (2005) observed 4.3% among expectant mothers in Port Harcourt. Kfutwah et al. (2012) recorded 16 percent in Yaoundé, Cameroon. Damale et al. (2005) realized a prevalence of 10.5 percent in Accra, Ghana. Cho and colleagues in 2012 observed 10.6% among expectant women in Ghana's eastern area.

2.6 HEPATITIS B INFECTION AND BLOOD GROUP

Multiple studies have suggested that ABO blood groups may be linked to HBV infection. However, its association remains contentious. According to Lao et al. (2014), The prevalence of

HBV was less prevalent in blood group B (9.6%) and AB (9.1%) than in blood group O. (10.2 percent). Liu et al. (2018) conducted population-based cross-sectional research among 3.8 million Chinese individuals to examine the distribution of ABO/Rh blood types and their correlation with hepatitis B virus infection. Blood type O has been linked to an increased risk of HBV infection. Furthermore, Mohammadali et al. (2014) discovered that donors with blood type O had a reduced percentage of hepatitis B surface antigen (HBsAg). Szmuness et al. (1971& 1975) and Behal et al. (2008), on the other hand, were unable to discover a relationship between blood type and HBV infection.

Jing et al. (2020) conducted a systematic review and meta-analysis on ABO blood types and HBV infection. Their meta-analysis showed that blood type B was linked with a reduced risk of HBV infection, shown in subgroups, and remained consistent in sensitivity analyses, supporting the statistical and biological relationship between ABO blood groups and HBV infection. People living in higher endemic regions are more likely to be infected with HBV than those living in less endemic areas. This might explain why the link between the ABO blood group and HBV infection was only identified in endemic areas, not in less endemic ones. Moreover, due to the strong correlation between HBV endemicity and regional health and economic growth, this relationship may be partially attributed to regional factors. In addition to the above findings, Jing and colleagues discovered that people with blood group O had a higher risk of HBV infection in more endemic regions than non-O blood group subjects, which was in agreement with previous research by Lao et al. (2014), Liu et al. (2020), and Abate et al. (2016).

Genc (2017) conducted retrospective research with 937 participants: 453 patients with chronic hepatitis and 484 healthy persons as the control group. The study aimed to look for HBV infection

and ABO/Rh blood types association. In the chronic HBV group (44.3%) and the control group (41.9%), blood group A Rh positive was greater than other blood types, but blood types O, AB, and B were similar between patients with chronic hepatitis and controls (p>0.05). In addition, HBV infection was shown to be less common in patients with the AB blood type (p=0.07). Rh positivity was found in 89.1 percent of patients and 88.2 percent of the control group (p>0.05) (Genc, 2017). Genc found no association between ABO/Rh blood types and persistent HBV infection, although he suggested that further case-control studies be conducted on the issue.

Jana et al. (2018) investigated the distribution of ABO and Rh blood groups among Southern Nepalese blood donors and their relationship with HBV infection. They found that blood Group O and Rh-positive donors were the most likely to be infected with HBV. However, their study found no statistical association between ABO and Rh groups and HBV infection. According to Pourhassan et al. (2014).'s case-control study, there was no correlation between blood types and HBV infections; however, there was a prospective relationship between certain ABO groupings (O and AB) and HCV infections.

2.7 THE RELATIONSHIP BETWEEN HEPATITIS B STATUS AND ANAEMIA

Many hematologic aberrations accompany chronic liver disease. Iron deficiency is typically observed in patients with advanced chronic liver disease. Its etiopathogenesis involves multiple factors. It is primarily caused by gastrointestinal tract bleeding (Gkamprela, Deutsch & Pectasides, 2017) either due to portal hypertension, varices, or derangement in the coagulation factors that are produced by the liver. Hepatitis-associated aplastic anaemia can also occur, though quite uncommonly, 2–3 months after an acute attack of hepatitis, leading to pancytopenia (Gonzalez-Casas et al., 2009). It is a syndrome of acquired aplastic anaemia associated with HBV and other

viruses; the onset of aplastic anaemia in HBV infection can be life-threatening if not treated immediately (Cengiz, Turhan, Yolcu & Yılmaz, 2007).

In the first and third trimesters, a haemoglobin level of <11 g/dL indicates anaemia during pregnancy in the developing world (Assessment, W. I. D. A. 2001); however, some women may be anaemic before conception. Few studies have been done on HBV and anaemia. In their case report study, Hafeez et al. (2016) reported that HBV infection is associated with anaemia. Another study by Brown et al. (1997) confirms that no known hepatitis virus appears to be responsible for hepatitis-associated anaemia. Marrow aplasia is mediated by immunologic mechanisms, as suggested by the clinical manifestations and the response to immunosuppressive therapy (Brown et al.,1997).

2.8 HBV VACCINATION

HBV vaccines for children were introduced into Ghana's Extended Programme of Immunization (EPI) in 2002. It is given 6, 10, and 14 weeks after birth (Breakwell et al.,2017). For adults, it is administered at 0, 3, and 6 months. The vaccine confers about 90% protection against the infection (Zanetti et al.,2008). Hagan et al.,2018 discovered that HBV infections were more in children born before 2002, the year the HBV vaccine was added to Ghana's EPI. Health workers at Legon Hospital in Accra, Ghana, had a 79.1% vaccine uptake even though they had more knowledge about the disease (Ansa et al.,2019). Eleje et al.,2021 found that only 13.2% of pregnant women in Nigeria had full HBV vaccination.

3. CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

Chapter three provides the operational approach to obtaining pertinent information to address the study purposes of this research. The chapter describes the study design, location, target population, and methods and processes for participant selection and data collection. Moreover, data analysis, management, and ethical considerations were covered.

3.2 STUDY DESIGN

Analytical cross-sectional design was utilized for this study.

3.3 STUDY LOCATION

The study was conducted at the Jamestown Maternity. It serves as one of the many health facilities in the community where obstetrics and gynaecology services are rendered. It is situated east of the Korle Lagoon. It is located in Jamestown, one of the coastal communities in the Ashiedu Keteke sub-metro, Accra Metropolis. About 88,000 people reside in this town (GHANA PHC,2021). The inhabitants of the Jamestown community are predominantly Ga, and the main occupation of the community is fishing. This maternity provides antenatal and delivery services for most pregnant women in the major markets in the Accra Metropolis, namely Makola, Timber, Kantamanto, Konkomba, and Salaga markets. The clientele base is very diverse and cosmopolitan but predominantly Ga indigenes.

3.4 STUDY POPULATION

The population considered for this research was pregnant women seeking antenatal care at the Jamestown Maternity.

3.5 INCLUSION CRITERIA

All pregnant women who presented to Jamestown Maternity for antenatal care with their record book and had their booking visit labs done.

3.6 EXCLUSION CRITERIA

- Pregnant women experiencing any form of bleeding at their first trimester booking visits. Participants who are have an altered haemoglobin so their haemoglobin values are not reliable.
- Pregnant women who had any haemoglobinopathies (Ex- Sickle cell disease, thalassemia).
- Pregnant women who were on higher doses of ferrous medications during their booking visit.

3.7 STUDY VARIABLES

Table 1: Study variables

VARIABLE	OPERATIONAL DEFINITION OF TERMS	MEASUREMENTS
Hepatitis B status	Whether a participant tested positive or negative to the HBV test	Binary
Blood group	The Blood group the participant belongs to	Unordered categorical
Booking haemoglobin	Haemoglobin level of participant at booking	Numerical
Anaemia	Whether the participant is anaemic or not at first trimester book	Binary
Maternal age	Age of respondent from last birthday	Ordered categorical
Marital status	Whether the participant is married or not	Unordered categorical
Educational level	The highest education attained by respondent	Unordered categorical

Occupation	The job the participant is engaged in	Unordered Categorical
Parity	Number of children of the respondents	Ordered categorical
Gravidity	Number of pregnancies	Ordered categorical
Retroviral status	Whether the mother is retro positive or negative	Binary
Number of sexual partners	The number of persons the participant is having sexual relations with.	Ordered categorical
G6PD status	Whether mother is normal or deficient	Binary
Syphilis status	Whether mother is positive for syphilis or not at first trimester booking	Binary
Vaccination	Whether the mother is vaccinated or not	Binary
Level of HBV knowledge	Whether mother has no, poor, good, excellent knowledge on HBV	Ordered Categorical

3.8 SAMPLE SIZE

Using the following Cochrane formula, the study's sample size was determined.:

$$N = \frac{Z^2 pq}{d^2}$$

Z = z score for 95% confidence interval

P = estimated prevalence

q = complement of estimated prevalence

d = precision (fixed at 5%)

The prevalence is estimated from a similar research carried out in Ghana where the prevalence of mothers who were hepatitis B positive was 12.3% (Ofori-Asenso & Agyeman, 2016).

$$N = \frac{1.96^2(0.722x0.278)}{0.05^2}$$

$$= 166$$

Taking into consideration of non-response an additional 10% was added. Therefore, the sample size is 183.

3.9 SELECTION AND SAMPLING TECHNIQUE

The selection process employed for this investigation was systematic sampling. The study's goal was explained to mothers seeking prenatal care at the selected facility. Participants who concurred to engage in the research were provided with comprehensive information about the study and its objectives. The research assistants subsequently obtained informed consent from the participants. Participants who voluntarily agreed to engage in the study were screened for eligibility. Eligible participants were selected using systematic sampling where all the prospective participants were given numbers at the antenatal clinic. Participants whose numbers were multiples of 3 were selected for the study.

3.10 DATA COLLECTION

Using a well-structured questionnaire, information was gathered from participants. Most questions were close-ended except the age, gravidity, parity, and number of lifetime sexual partners. Responses to questions about demographics and HBV vaccination status were obtained through interviews with the selected participants. Response on hepatitis B status and profile at booking visit, haemoglobin level at booking visit, parity, gravidity, retroviral status, syphilis, G6PD status,

and blood grouping were obtained from secondary data (maternal health record book). The researchers extracted this information from the participants' maternity folders presented to the Jamestown Maternity.

3.11 DATA ANALYSIS

The questionnaire data were validated, labelled, and entered into Stata 15. Descriptive statistics were used to describe the demographic characteristics of the participants. Categorical predictor variables were summarized using frequencies and percentages, while the continuous predictor variables were summarized using means and medians. Analysis was done to determine the prevalence of HBV infection among expectant women. The prevalence rate was calculated by dividing the total of individuals who tested positive for HBV by the overall number of study participants.

The HBV status was measured as a binary (categorical) variable that is as positive or negative. The blood group were measured as a categorical variable. Thus, the Pearson's Chi-square test was used to examine the relationship between the HBV status of pregnant women and their blood group. The strength of that association was determined using simple logistic regression.

The relationship between the HBV status and haemoglobin levels was assessed using the paired sample student t-test for means. The mean haemoglobin level of participants with positive HBV status was compared to the mean haemoglobin level of participants with negative HBV status.

The influence of sociodemographic characteristics, blood group and anaemia status were assessed using Multiple Logistic Regression. The Multiple Logistic Regression would determine the strength of association between sociodemographic characteristics, anaemia status, blood group and

the dependent variable hepatitis B status. The adjusted Odds ratio was stated for the multiple logistic regression. The results were expressed with their respective p-values and confidence intervals. A p-value <0.05 is considered statistically significant.

3.12 ETHICAL CONSIDERATION

Before beginning the study, The Ghana Health Service Research Directorate's Ethics Committee approved the study's ethical propriety. In addition, consent was sought from the Jamestown Maternity. Informed consent, the permission to involve pregnant women in the study, was obtained from all the respondents before enrolment. Respondents were briefed on the study's objectives and any potential risks or advantages inherent to the research. Privacy and confidentiality were ensured by dealing with the respondents individually.

3.13 RISKS AND BENEFITS

This research posed negligible danger to the participants. In place of this, participants were permitted to withdraw from this study or skip any question they feel is discomforting. Results obtained from this study will be made available to the Ghana Health Service so that issues relating to HBV infection will be addressed to improve maternal and child health.

3.14 FREEDOM TO PARTICIPATE / VOLUNTARY WITHDRAWAL.

Participants in the study were offered the opportunity to decide whether to be part of the study or not. Participation and withdrawal from the study were voluntary. Respondents were permitted to terminate the interview or avoid answering any questions if they felt uneasy. The researcher of this study did not deny any participant who refused to continue the study the opportunity to opt-out.

3.15 PRIVACY AND CONFIDENTIALITY

The researcher ensured confidentiality and privacy by not labelling participants with their names. Instead, code numbers were assigned to the datasets and stored in a password-protected laptop file that correlates numbers to names.

3.16 PROTECTION OF SUBJECTS' PRIVACY

Participants may decline to respond to any question they deem a privacy violation. In addition, respondents may opt out of any parts of the research they find intrusive.

3.17 PROVISION TO PREMATURELY TERMINATE A SUBJECT'S INVOLVEMENT IN THE RESEARCH.

Participants had the option to discontinue their participation at any time. However, if an unanticipated event or distressing circumstance occurred, a subject's participation in the research was terminated early.

3.18 DATA STORAGE AND PROTECTION

All investigational files and forms were safeguarded against unauthorized access, disclosure, loss by malice or accident, and erasure. On a secure laptop, data were password-protected with limited access. After completing the research, data or devices were destroyed or disposed of securely, as required (e.g., paper documents were shredded, and electronic media was securely erased). Paper survey forms were discarded at the end of the research.

3.19 DECLARATION OF CONFLICT OF INTEREST

I, Michael Ofosu Atuah, certify that there are no current or future conflicts of interest associated with the conduct of this research.

3.20 CONSENTING PROCESS

Respondents sought permission after information about this research had been meticulously discussed and clarified. For participants to consent, they must understand and ultimately agree to the reasons for collecting the data. In addition, participants were assured of their autonomy and rights to either participate in this study or not.

3.21 QUALITY CONTROL

Prior to the beginning of the study, research assistants received training. The data collection instrument was designed for the study's objectives. 10% of the study population at the antenatal clinic at Jamestown Maternity was used in a pilot study to evaluate the validity and usability of the data collection instrument. Prior to the actual study, pre-testing was conducted to eliminate unimportant questions and ensure that participants understood the questions to produce reliable and accurate results. During the data collection and analysis, the respondent's private information was also considered secret and treated with confidentiality. Data were encrypted and saved digitally with password protection.

All completed questionnaires were checked daily prior to data entry, and all incomplete questionnaires were returned to the field to be completed prior to data entry. Before running the analysis, the data entry database was purged.

4. CHAPTER FOUR

4.1 RESULTS

From the results, out of 305 respondents, nearly 13.1 % were below 20 years, and about 14.8% were 35 years and older. The majority (68.5%) were Christians, 28.2% were Moslems, while the remaining were traditionalists or Atheists. About a quarter were single, 35.7% were monogamously married, 31.2% were co-habiting, and 9.8% were polygamously married. Forty-three percent of the respondents were traders, and 29.8% were artisans. About 18.7% of the respondents had no education, while a third had upper primary education. The Ga-Adangbe were 36.4%, while the Mole-Dabgani were 31.5%.

Table 4.1: Characteristic of Participants

Variable	Category	Frequency	Percentage
Age	Less than 20	40	13.1
	20 – 24	66	21.6
	25 – 29	92	30.2
	30 – 34	62	20.3
	> or = 35	45	14.8
Religion			
	Christianity	209	68.5
	Islam	86	28.2
	Other	10	3.3
Marital Status			
	Single	71	23.3
	Married (Monogamy)	109	35.7

	Married (Polygamy)	30	9.8
	Co-habitation	95	31.2
Occupation			
	Student and others	18	5.9
	Trader	131	43.0
	Artisan	91	29.8
	Head potter	25	8.2
	Unemployed	40	13.1
Education			
	No Education	57	18.7
	Lower Primary	45	14.8
	Upper Primary	104	34.1
	Secondary	80	26.2
	Tertiary	19	6.2
Ethnicity			
	Akan	72	23.6
	Ga-Adangbe	111	36.4
	Mole-Dabgani	96	31.5
	Others	26	8.5

In assessing the obstetric characteristics of respondents, about 27.9 % were primigravida, while the remaining were multigravida. About a third (32.8 %) were nulliparous, 29.8 % had parity of 1, while 37.4 % were multiparity. About 39.0 % of the respondents were anaemic, and 3.6 % were positive for syphilis. About a hundredth of the respondents were retro positive. About 1% of the respondents were Glucose-6-phosphate deficient.

Table 4.2: Obstetric Characteristics of participants

Variables	Category	Frequency	Percentage
Gravidity			
	Primigravida	85	27.9
	Multigravida	220	72.1
Parity			
	Nulliparity	100	32.8
	Parity-1	91	29.8
	Multiparity	114	37.4
Syphilis			
	Negative	294	96.4
	Positive	11	3.6
Blood Group			
	A+ & A-	53	17.3
	B+ & B-	57	18.7
	O+ & O-	189	62.0
	AB+ & AB-	6	2.0
Anaemic Status			
	Anaemic	119	39.0
	Not Anaemic	186	61.0
Sickling status			
	Positive	11	3.6
	Negative	294	96.4
Retro screen			
	Reactive	3	1.0
	Non-reactive	302	99.0
Glucose-6-phosphate Deficiency			
	Defect	3	1.0
	No Defect	302	99.0

4.1.1 ASSESSING THE ASSOCIATION BETWEEN THE HBV STATUS AND LEVEL OF HAEMOGLOBIN

From table 4.3 the mean haemoglobin level for respondents who tested positive for HBV was 11.12 ± 1.55, while that of HBV negative respondents was 11.08 ± 1.08. However, the mean haemoglobin levels for positive respondents were not statistically different from the mean haemoglobin levels for negative respondents (p= 0.84)

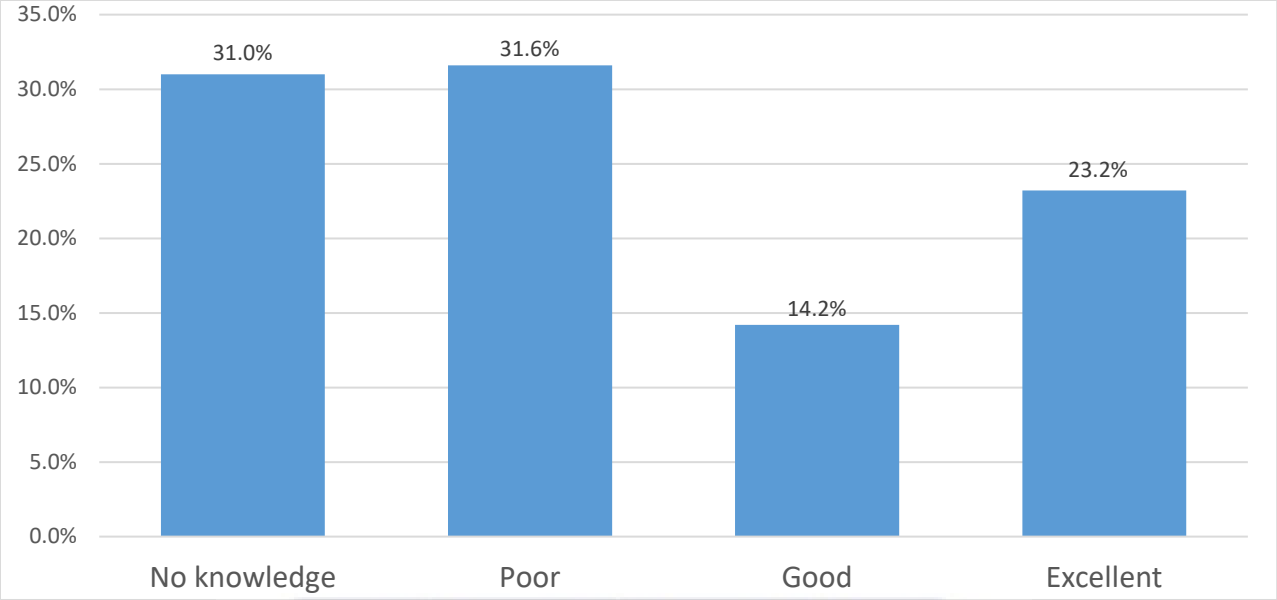
Table 4.3: Test for the association between HBV status and Haemoglobin level

Hepatitis status	Number of participants	Mean Haemoglobin level	P-value
Positive	35	11.12 ± (1.55)	0.84
Negative	270	11.08 ± (1.08)	

4.1.2 LEVEL OF KNOWLEDGE ON HEPATITIS B INFECTION

When the level of knowledge of respondents on HBV infection among pregnant women was assessed, about 31% of the respondents had no knowledge of HBV infection, and a similar proportion had poor knowledge of HBV infection. In comparison, 14.2% had good knowledge of HBV infection, and about 23.2% of the respondents had excellent knowledge.

Figure 1: Level of Knowledge on Hepatitis B infection



4.1.3 ASSESSING THE ASSOCIATION BETWEEN HBV STATUS AND DEMOGRAPHIC VARIABLES

Results in table 4.4 indicate that demographic factors such as the age of religious affiliation, marital status, and occupation of respondents were not statistically associated with the HBV infection status respondents. Nonetheless, the association between the respondent's education and HBV infection was statistically significant (p= 0.02).

Table 4.4: Association between HBV status and Socio-demographic variables

Variable	Category	HBV status		χ^2	P-value
		Negative	Positive		
Age	Less than 20	31	9 (25.7%)	6.67	0.15
	20 – 24	61	5 (14.3%)		
	25 – 29	82	10 (28.6%)		
	30 – 34	57	5 (14.3%)		
	>or = 35	39	6 (17.1%)		
Religion					
	Christianity	187	22 (62.9%)	N/A	0.58
	Islam	74	12 (34.3%)		
	Other	9	1 (2.9%)		
Marital Status					
	Single	58	13 (37.1%)	N/A	0.27
	Married (Monogamy)	99	10 (28.6%)		
	Married (Polygamy)	27	3 (8.6%)		
	Co-habitation	86	9 (25.7%)		
Occupation					
	Student and others	17	1 (2.9%)	N/A	0.47
	Trader	114	17 (48.6%)		
	Artisan	84	7 (20%)		
	Head potter	22	3 (8.6%)		
	Unemployed	33	7 (20%)		
Education					
	No Education	50	7 (20%)	N/A	**0.02**
	Lower Primary	39	6 (17.1%)		
	Upper Primary	98	6 (17.1%)		
	Secondary	64	16 (45.7%)		
	Tertiary	19	0 (0%)		
Ethnicity					
	Akan	43	5 (14.3%)	N/A	0.55
	Ga-Adangbe	63	8 (22.9%)		
	Mole-Dabgani	57	13 (37.1%)		
	Ewe	10	1 (2.9%)		
Sexual Partner					
	One	165	14 (40%)	N/A	0.06
	Two	76	17 (48.6%)		
	Three	19	3 (8.6%)		
	Four or more	10	1 (2.9%)		

Table 4.5 shows the HBV vaccination status, gravidity, parity, anaemic status, sickling status, glucose-6-phosphate deficiency status, syphilis infection status, blood group, and respondents' knowledge of HBV infection statistically associated with the HBV infection status of respondents.

Table 4.5: Association between HBV status and Maternal variables

Variable	**Category**	**HBV status**		χ^2	**p-value**
		Negative	**Positive**		
HBV vaccination status					
	Unvaccinated	253	35 (100%)	N/A	0.36
	Vaccinated	17	0 (0%)		
Gravidity					
	Primigravida	77	8 (22.9%)	2.21	0.48
	Multigravida	193	27 (77.1%)		
Parity					
	Nulliparity	90	10 (28.6%)	3.28	0.19
	Parity -1	76	15 (42.9%)		
	Multiparity	104	10 (28.6%)		
Anaemic Status					
	Not Anaemic	165	21 (60%)	0.02	0.89
	Anaemic	105	14 (40%)		
Sickling status					
	Non-Reactive	262	32 (91.4%)	N/A	0.09
	Reactive	8	3 (8.6%)		
Retro screen					
	Non-Reactive	268	34 (97.1%)	N/A	0.31
	Reactive	2	1 (2.9%)		
G6PD					
	No Defect	268	34 (97.1%)	N/A	0.31
	Defect	2	1 (2.9%)		
Syphilis					
	Negative	267	34 (97.1%)	N/A	0.39
	Positive	3	1 (2.9%)		
Blood group					
	A+ & A-	46	7 (20%)	N/A	0.83
	B+ & B-	52	5 (14.3%)		
	O+ & O-	165	24 (68.6%)		
	AB+ & AB-	6	0 (0%)		
Knowledge on HBV					
	Very Poor	39	9 (25.7%)	N/A	0.79

	Poor	42	7 (20%)		
	Good	19	3 (8.6%)		
	Excellent	32	4 (11.4%)		

4.1.4 ASSESSING STRENGTH OF ASSOCIATION BETWEEN HBV INFECTION AND DEMOGRAPHIC VARIABLES

From Table 4.6, respondents with secondary education were seven times more likely to be HBV positive than those without education **(**AOR= 6.9, 95% CI: 1.15–42.08**,** p=0.034**).** It established that Mole-Dagbanis were 12 times more likely to be HBV positive compared to Akans **(**AOR= 12.0,95% CI: 1.49–95.95, p=0.018**).** A respondent with two sexual partners was 3.8times more likely to be HBV positive compared to those having one sexual partner **(**AOR= 6.9,95% CI: 1.37–10.52 p=0.011).

Table 4.6: Strength of association between HBV status and socio-demographic variables

Variables	**Category**	**COR**	**95% CI**	**P-value**	**AOR**	**95% CI**	**P-value**
Age	Less than 20	1			1		
	20 – 24	0.28	**0.09 – 0.91**	**0.035**	0.26	0.06 – 1.12	0.05
	25 – 29	0.42	0.16 – 1.13	0.086	0.34	0.08 – 1.42	0.135
	30 – 34	0.30	**0.09 – 0.98**	**0.046**	0.44	0.07 – 2.72	0.379
	> or = 35	0.53	0.17 – 1.65	0.273	1.00	0.15 – 6.61	0.991
Religion							
	Christianity	1			1		
	Islam	1.38	0..65 -2.93	0.404	0.46	0.08 – 2.62	0.371
	Other	0.94	0.11 – 7.81	0.958	0.17	0.01 – 3.20	0.238
Marital Status							
	Single	1			1		
	Monogamy	0.45	0.19 – 1.09	0.078	0.33	0.08 – 1.43	0.165
	Polygamy	0.50	0.13 – 1.89	0.303	0.20	0.03 – 1.44	0.125
	Co-habitation	0.47	0.19 – 1.16	0.102	0.31	0.09 – 1.10	0.072
Occupation							
	Student and others	1			1		

	Trader	2.54	0.32 – 20.30	0.381	3.25	0.12 – 84.49	0.508
	Artisan	1.42	0.16 – 12.27	0.752	1.72	0.06 – 46.10	0.773
	Head potter	2.32	0.22 – 24.31	0.483	2.35	0.06 - 92.50	0.660
	Unemployed	3.61	0.41 – 31.76	0.248	1.79	0.07 - 46.84	0.721
Education							
	No Education	1			1		
	Lower Primary	1.10	0.34 – 3.53	0.874	1.62	0.36 – 7.27	0.487
	Upper Primary	0.44	0.14 – 1.37	0.156	1.16	0.24 – 5.61	0.829
	Secondary	1.79	0.68 – 4.67	0.238	**6.95**	**1.15 – 42.08***	**0.034**
	Tertiary	N/A			N/A		
Ethnicity							
	Akan	1			1		
	Ga-Adangbe	1.33	0.48 – 3.73	0.583	0.59	0.14 – 2.4	0.473
	Mole-Dabgani	2.04	0.75 – 5.54	**0.164**	**12.00**	**1.49 – 95.95***	**0.018**
	Ewe	0.92	0.17 – 4.86	0.919	1.00	0.11 – 9.20	0.989
Sexual Partner							
	One	1			1		
	Two	**2.64**	**1.24 – 5.62**	**0.012**	**3.80**	**1.37 – 10.52***	**0.011**
	Three	1.86	0.49 – 7.07	0.362	2.89	0.47 – 17.57	0.278
	More than four	1.18	0.14 – 9.89	0.880	0.89	0.06 – 14.10	0.950

From the results presented in table 4.7, gravidity, parity, anaemic status, sickling status, syphilis status and the blood group were not statistically associated to the HBV infection status of respondents.

Table 4.7: Strength of association between HBV status and Maternal Independent

Variables	**Category**	**COR**	**95% CI**	**P-value**	**AOR**	**95% CI**	**P-value**
Gravidity							
	Primigravida	1			1		
	Multigravida	1.35	0.59 – 3.09	0.483	1.99	0.25 – 15.76	0.507
Parity							
	Nulliparity	1			1		
	Parity-1	1.78	0.75 – 4.18	0.189	1.69	0.24 – 12.15	0.620
	Multiparity	0.87	0.34 – 2.17	0.758	0.79	0.08 – 7.42	0.830
Anaemia status							

	Not anaemic	1			1		
	Anaemic	1.05	0.51 – 2.15	0.899	1.34	0.53 – 3.35	0.514
Sickling status							
	Non-Reactive	1			1		
	Reactive	3.07	0.77 – 12.16	0.110	3.37	0.46 – 24.48	0.231
Retro screen							
	Non-Reactive	1			1		
	Reactive	3.94	0.35 – 44.63	0.268	2.11	0.04 – 107.60	0.700
G6PD							
	No Defect	1			1		
	Defect	3.94	0.35 – 44.63	0.268	3.70	0.20 -67.96	0.371
Syphilis							
	Negative	1					
	Positive	2.62	0.26 – 25.88	0.410	3.37	0.12 – 114.79	0.463
Blood Group							
	A+ & A-	1			1		
	B+ & B-	0.50	0.14 – 1.80	0.287	0.41	0.09 – 1.93	0.273
	O+ & O-	0.96	0.39 – 2.36	0.922	0.96	0.31 – 3.00	0.954
	AB+ & AB-	N/A			N/A		

5 CHAPTER FIVE

5.1 DISCUSSION OF FINDINGS

This chapter discusses the study's findings in line with existing literature.

5.2 PREVALENCE OF HBV INFECTION AMONG PREGNANT WOMEN

Findings from this study reveal that HBV infection prevalence among pregnant women at the Jamestown Maternity is 11.48%. This indicates that about 1 in every ten pregnant women seeking care has HBV infection. This prevalence is high and of public health concern. Pregnant women are considered a vulnerable group, and a high prevalence of hepatitis infection among these groups would imply an increased risk of transmission of the infection to the child. The WHO guidelines establish that most patients with HBV infection result from maternal transmission, thus increasing the disease burden in the population (WHO, 2017). The prevalence is higher than that recorded in a similar study conducted by Kwadzokpui et al. (2020) among pregnant women in the Prampram-Ningo District. Kwadzokpui et al (2020) recorded 4.4% prevalence. The difference in the prevalence may be due to the smaller sample size and the rural settings of the study areas used in those studies. Additionally, the Jamestown community is a bustling commercial area with increased cases of unintended pregnancies and risky sexual behaviours (Bain, 2020; Lahti, 2018). The prevalence reported for our study is, however, consistent with the prevalence of 12.3% recorded by Asenso-Ofori & Agyemang (2016) in a systematic review conducted in Ghana.

5.3 HBV VACCINATION AMONG PREGNANT WOMEN

Despite the availability of HBV vaccine for infection prevention, there is a seeming increased prevalence of HBV infection in Ghana compared to HIV infection, which has no vaccine for prevention.

This is of grave public health concern. In trying to eliminate hepatitis B virus infection, the pregnant woman plays a key role. In order to decrease the burden of HBV infection, the WHO targets the perinatal transmission of the virus. Critical among this approach is the use of the HBV vaccine. Vaccination is critical to reducing the burden of hepatitis B virus infection transmission. Nonetheless, the result of the study showed that only 5.5% of respondents were vaccinated against HBV infection. 94.5% of pregnant women are vulnerable to the infection.

The vaccination rate among the pregnant women in the study is a far cry from the 34.3% rate recorded in the United States for persons in the same age bracket (CDC, 2017). Even though the difference in the size of the sample, geographical location, and socio-economic difference may account, the 5.5% recorded is woefully inadequate to help eliminate the viral infection. This is even less than the 13.2% recorded by Eleje et al.,2021 in Nigeria. The Nigerian study was a national pilot study done in six tertiary hospitals across the country. The difference in sample size and study location may have accounted for the difference in vaccine uptake percentage even though both studies used systematic random sampling technique.

This low uptake of HBV vaccination could be attributed to the low knowledge of HBV infection among pregnant women. Findings from this study on the level of knowledge among pregnant women in Jamestown reveal that about 63% of the respondents had no or poor knowledge of HBV

infection. Thus, a reduced knowledge on the prevention of HBV infection, increased risk of transmission and an overall increase in the burden of the infection among the population. It is therefore not surprising that the infection is prevalent among pregnant patients at Jamestown Maternity. Therefore, there is a need for increased sensitization on HBV infection, transmission, and complications associated with its spread by relevant stakeholders such as the Ghana Health Service and Non-governmental organizations such as Marie Stopes and PPAG. In addition, pregnant women must be educated during preconception, antenatal and postnatal care to increase their knowledge of HBV infection. This would go a long way to improve vaccine uptake and reduce perinatal transmission.

A study done in 2020 showed that the HBV vaccine's cost hindered its uptake even among healthcare workers who had excellent knowledge about the infection (Botchway et al., 2020). This cost factor seems to have affected vaccine uptake among pregnant who have excellent knowledge of the disease. The lack of knowledge on HBV infection may also be due to the low educational status of the pregnant women in this study. Most of them had upper primary to upper primary education. Due to the lack of knowledge, pregnant women may not see the need for the vaccine. The Ministry of Health and the Ghana Health Service should intensify the need for vaccination against HBV infection. Midwives should intensify education on HBV infection and prevention during ANC clinics. Public health nurses who visit schools for school health should educate school girls on HBV infection and prevention.

5.4 HBV INFECTION AND GENETIC FACTORS OF PREGNANT WOMEN

The study showed that genetic factors like blood grouping, G6PD, and sickling confer no immunity or risk to HBV infection. This supports Pourhassan's (2014) and Siransy et al. (2015) findings of

statistical uncertainty of the association between HBV infection and blood grouping. However, this finding is at variance with the findings of Zhang et al. (2019) and Jing et al. (2020). According to Zhang et al. (2019) and Jing et al. (2020), genetic factors such as blood grouping confer susceptibility or immunity. Jing et al. established in their systematic review that blood group B is linked to a reduced HBV infection risk. They attributed this to the erythrocyte antigen system, which confers some immunity to individuals with blood group B. However, the odds of such immunity are rare, which could have accounted for the statistical insignificance in this study. For an association to be established, a larger sample size may be required, which would power the study to detect genuine associations, thereby reducing type 1 error.

5.5 HBV INFECTION AND ANAEMIA IN PREGNANT WOMEN

Anaemia reduces immunity by reducing the immunological response. It has been established that the number of antibodies released is reduced when there is anaemia. This predisposes individuals to infections such as HBV infection (Chen et al., 2017). Therefore, this study expected an association between anaemia and HBV infection. However, evidence from this study suggests no association between HBV infection and anaemia. The proportion of mothers with anaemia is 39%, which is lower than the 50.8% reported by a similar study conducted among pregnant women in the Northern part of Ghana by Wemakor et al. (2019). This difference may be due to the variation in study areas. The research by Wemakor et al. (2019) was undertaken in Northern Ghana, where malnutrition and extreme poverty are more prevalent. There is a high incidence of anaemia-causing schistosomiasis in these areas due to the presence of the Volta Lake. Both studies used a systematic random sampling technique. There was no statistical difference between the haemoglobin of HBV-positive pregnant and HBV-negative pregnant women.

5.6 HBV INFECTION AND SOCIO-DEMOGRAPHICS OF PREGNANT WOMEN

Numerous studies have found several factors contributing to the risk of HBV infection. Thus, the researcher of this study sought to investigate these factors and their association with HBV infection among pregnant women seeking care at the Jamestown Maternity. From the findings of this study, it was realized that pregnant women who had secondary school education were nearly seven times at an increased risk of hepatitis b infection compared to pregnant women with no education (AOR= 6.95; p=0.034). This evidence is shocking as one would have expected individuals with no education to have an increased risk of HBV infection. Since the risk of infection is high among the participants with secondary education, there should be target awareness campaigns by stakeholders such as the Ghana Health Service and Ghana Education Service at the various secondary schools on the risk of HBV infection and its complication.

Secondly, the results establish that the number of sexual partners was associated with the risk of HBV infection. Pregnant women with two sexual partners were 3.8times more likely to be infected with HBV infection compared to pregnant women with one partner (AOR= 3.8; p=0.011). Thus, it is evident from this study that multiple sexual relations elevated the risk of contracting HBV infection. Individuals with multiple partners should be encouraged to use condoms to reduce the risk of contracting HBV infection. Additionally, these individuals should vaccinate against HBV infection. Ultimately individuals should stick to a single partner to prevent the risk of exposure and subsequent spread of HBV infection.

The Ashiedu Keteke Sub-Metro is a busy and commercial part of the Greater Accra Region. Though it is known to be a Ga community, it is made up of people from diverse ethnic groups. Assessing the association between ethnicity and the risk of HBV infection, evidence suggests that

pregnant women from the Mole Dagbani were 12 times more at risk of contracting HBV infection compared to Akans (AOR= 12.0; p-0.018). This finding is an interesting one. However, the increased burden of HBV infection among this group may be due to a lack of knowledge among persons from this group and the low socio-economic status of people from this group. Again, most of these Mole-Dagbanis are head potters in the commercial centres of Ghanaian cities. Often, they travel from remote areas in the northern part of Ghana to the southern cities to seek greener pastures. They are often left stranded on the streets and are associated with poor education, risky sexual behaviours, rape, and unintended pregnancies (Alatinga et al., 2021). They are therefore at risk of sexually transmitted infections. Further studies may be conducted to ascertain the cause of the disparity in risk between the two groups.

6. CHAPTER SIX

6.1 SUMMARY

The prevalence of HBV infection among the 305 pregnant women surveyed was 11.48%.39% of pregnant women who have anaemia. Two-thirds of pregnant women had no knowledge or poor knowledge of HBV infection. There was no significant association between HBV infection and demographic factors like age, religion, marital status, occupation, educational level, ethnicity, and number of sexual partners. There was also no significant association between HBV infection and obstetric factors like parity and gravity. There is also no association between HBV infection and genetic factors and acquired factors like retro screen status, G6PD status, blood groupings, anaemia, sickling status, and sickling status. Additionally, there was no significant difference in the haemoglobin levels of HBV-positive and HBV-negative individuals.

Mole Dagbanis were 12 times at risk of acquiring HBV infection compared to Akans (AOR= 12.0; p=0.018). Pregnant women with two-lifetime sexual partners were four times at risk compared to those with one-lifetime sexual partner (AOR= 3.8; p=0.011). Those with secondary school education were seven times more likely to be HBV positive than those without education (AOR= 6.95; p=0.034).

6.2 STRENGTH AND LIMITATION

The strength of this study lies in its ability to generate evidence in establishing associations between the factors affecting HBV infection among pregnant women seeking care at Jamestown Maternity. In addition, the rigour sampling method makes the findings of this study generalizable, at least to the district level.

The limitations to this study may lie in the mistakes regarding recording some of the data extracted from secondary sources such as the maternal health record book. However, the data collectors meticulously extracted the data, keeping errors to the barest minimum. Additionally, some responses from the participants were subject to recall; an example is responses to the number of lifetime sexual partners. The specificity and sensitivity of the test kits used for HBV, haemoglobin, G6PD, syphilis, and blood group test cannot be ascertained, so errors made during testing cannot be accounted for.

6.3 CONCLUSION

HBV infection is high prevalence among pregnant women at Jamestown Maternity and Ashiedu Keteke sub-metro. This suggests that there could be a high transmission of infection in the area. Two-thirds of pregnant women at Jamestown Maternity have poor or no knowledge of HBV infection. There is a low vaccination rate among pregnant women. Vaccination and educating pregnant women on HBV infection are essential to eliminating the viral infection. There was no association between the haemoglobin levels and the risk of HBV infection among pregnant women. However, having multiple sexual partners was associated with an increased risk of HBV infection, and the burden of HBV infection among the Mole-Dagbani pregnant women was high compared to other ethnic groups.

6.4 RECOMMENDATION

The Ghana Health Service and Ghana Education Service with the support community leaders and educators plan educational and outreach programmes to help educate the public, especially school girls of reproductive age on HBV infection to help improve knowledge on the disease and improve

vaccination rates to decrease the HBV prevalence. In addition, midwives at Jamestown Maternity should intensify education on HBV infection prevention during ANC clinics. The aim is to improve the proportion of expectant mothers with good knowledge of HBV from 19% to 90% within the next five years.

The Ghana Health Service and Ministry of Health, through the Accra Metropolitan Health Management Team, should help subsidize HBV vaccines for minority groups like the head porters to help improve vaccine uptake and reduce the prevalence rate. The objective is to increase the HBV vaccine uptake rate from 5.6% to 50% within three years.

Policymakers like Ministry of Health, Ministry of Education, and Ministry of Gender and Social Protection should advocate for the testing of women of reproductive age for HBV through the schools and put in place policies to make adolescent HBV vaccination part of the routine immunization schedules.

Further studies should be undertaken to establish the cause of the risk disparities among the various ethnic groups to help find an antidote to those disparities.

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APPENDIX

APPENDIX ONE: ETHICAL CLEARANCE

STATEMENT OF COMPLIANCE TO ETHICAL PRINCIPLES

The research will be conducted in accordance with all the ethical principles on research. The scope of the research will be within the guidelines laid down by the Ethics Review Committee (ERC) of the Ghana Health Service.

Any subsequent modifications to the research will be communicated to the ERC for clearance.

28/02/2022 _____

Date Michael Ofosu Atuah

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted.

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*MyRef. GHS/RDD/ERC/Admin/App*121383
Your Ref. No.

13th September, 2021

Dr Michael Ofosu Atuah
University of Ghana
P.O Box GP 2105

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	**GHS-ERC039/08/21**
Study Title	Hepatitis B Virus Infection among Pregnant Women at Jamestown Maternity
Approval Date	13th September, 2021
Expiry Date	12th September, 2022
GHS-ERC Decision	Approved

This approval requires the following from the Principal Investigator

- Submission of a yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

You are kindly advised to adhere to the national guidelines or protocols on the prevention of COVID -19

Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED.....
Dr. James Akazili
(Head, Ethics & Research Management Department)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra

APPENDIX TWO: CONSENT FORMS

STUDY TITLE: Hepatitis B Virus Infection Among Pregnant Women at Jamestown Maternity, Accra

PARTICIPANTS' STATEMENT

I acknowledge that I have read or have had the purpose and contents of the Participants' Information Sheet read and all questions satisfactorily explained to me in a language I understand (……name of language). I fully understand the contents and any potential implications as well as my right to change my mind (i.e., withdraw from the research) even after I have signed this form.

I voluntarily agree to be part of this research.

Name of Participant……...

Participants' Signature ……...OR Thumb Print……

Date……

STATEMENT OF PARENT OR GUARDIAN OF MINOR

I, ……...who is the parent or guardian of

……. ……. acknowledge that I have read or have had the purpose and contents of the Participants' Information Sheet read and all questions satisfactorily explained to me in a language I understand (……name of language). I fully understand the contents and any potential implications as well as my right to change my mind (i.e., withdraw my child from the research) even after I have signed this form.

I voluntarily agree to be my child partake in this research.

Name……

Signature…….. OR Thumb Print …….....

Date……

INTERPRETERS' STATEMENT

I interpreted the purpose and contents of the Participants' Information Sheet to the afore named participant to the best of my ability in the (……name of language) language to his proper understanding.

All questions, appropriate clarifications sort by the participant and answers were also duly interpreted to his/her satisfaction.

Name of Interpreter……

Signature of Interpreter…….... OR Thumb Print …….....

Date……

Contact Details……

STATEMENT OF WITNESS

I was present when the purpose and contents of the Participant Information Sheet was read and explained satisfactorily to the participant in the language, he/she understood (….name of language)

I confirm that he/she was given the opportunity to ask questions/seek clarifications and same were duly answered to his/her satisfaction before voluntarily agreeing to be part of the research

Name……

Signature…….. OR Thumb Print …….....

Date……

INVESTIGATOR STATEMENT AND SIGNATURE

I certify that the participant has been given ample time to read and learn about the study. All questions and clarifications raised by the participant have been addressed.

Researcher's name…….

Signature …….

Date…….

My right to refuse or withdraw:

I have been informed that I have the liberty to either participate or not without losing any benefit.

I may withdraw from the work whenever I desire.

Contact information:

Please contact these persons responsible for this study if you have any issue with the study.

Supervisor: Dr Gloria Folson

Tel- 0206027411

Principal Investigator- Michael Ofosu Atuah

Tel: 0249084130

Email: atuahgravity9.81@gmail.com

Ghana Health Service Ethics Review Committee Administrator

Nana Abena Apatu, 0503539896,

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The information indicated above was read and translated to me in my local language in the presence of a witness. I have had the chance to ask questions and answers were provided to all the questions to my satisfaction. I hereby consent to voluntarily take part in the research and I am fully aware that I have the liberty to pull out from this research whenever I desire.

Signed by: ……

Date: ……

Place……

If illiterate right thumb print, Name of witness……

Signature……

APPENDIX THREE: STUDY QUESTIONNAIRE

My name is Michael Ofosu Atuah from the School of Public Health, University of Ghana. We are asking for your help in carrying out an important scientific study on Assessing Hepatitis B infection among Pregnant women at the Jamestown Maternity.

Your participation is very important to the success of the study. All information that you give us will be treated with care and will not be released to anyone but researchers conducting study. Confidential information will be stored in locked files accessible only to study staff. We would administer a questionnaire.

Do feel free to skip any question in the form or stop at any point of the interview/procedure.

Please do you have any questions about the study? Thank you for agreeing to participate in this important research project.

A: General Information

Participant's code…….

Contact information……

Name of interviewer ……

Date of interview ……

Place of interview……

Hepatitis B Infection Among Pregnant Women at The Jamestown Maternity

SECTION A-DEMOGRAPHIC DATA

1. Year of birth (dd/mm/yyyy)

2. Age …….

3. Religious affiliation

a. Christianity

b. Traditional

c. Islam

d. Other specify

4. Relationship/ Marital status

a. Single

b. Married (Polygamous).

c. Married (Monogamous)

d. Separated/Divorced

e. Widowed

5. Occupation

a. Unemployed

b. Student

c. Trader

d. Artisan (Hairdresser, Carpenter, mechanic)

e. Civil Servant

f. Health worker

g. Others (……...)

6. Education (Tick one only)

a. No formal Education

b. Lower Primary Education

c. Upper Primary Education

d. Secondary Education ……

e. Tertiary Education (or other Higher Education Institution)

7. Ethnicity

a. Ga-Adangbe

b. Akan

c. Guan

d. Ewe

e. Mole-Dagbani

f. Foreigner (……)

g. Others (…….)

8. Gravidity…….

9. Parity……

10. Number of lifetime sexual partners…….

11. Hepatitis B status

a. Positive

b. Negative

12. If positive, what is the hepatitis B profile

a. Chronic non-replicating virus

b. Chronic infection with active replication

c. Early phase of acute infection

d. Late phase of acute infection

13. Haemoglobin level at 1st Trimester booking …….

14. Anaemia

a. Yes

b. No

15. ABO Blood group……...

a. A+

b. B+

c. AB+

d. O+

e. A-

f. AB-

g. B-

h. O-

16. Retro screen status

a. Positive

b. Negative

17. Syphilis Status at 1st trimester booking

a. Reactive

b. non-reactive

18. G6PD status

a. Normal

b. Deficient

19. HBV Vaccination status

a) Vaccinated

b) Unvaccinated

c) Never heard of HBV vaccination

20. HBV can be vertically transmitted

a) Yes

b) No

21. HBV can be sexually transmitted

a. Yes

b. No

22. HBV can be transmitted through sharps and needles

a. Yes

b. No