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COLLEGE OF HEALTH SCIENCES

PREVALENCE OF HEPATITIS B INFECTION AMONG PREGNANT WOMEN
AND ASSOCIATED RISK FACTORS IN GUSEGU DISTRICT

BY

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THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA,
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AWARD OF MASTER OF PUBLIC HEALTH DEGREE.

DECEMBER, 2018
DECLARATION

I RAYMOND ZIMTANI, declare that this proposal is my original work, except for duly referenced ones and that no form of this has been presented elsewhere for another research.

………………………………………………

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(Student)

………………………………………………

Dr. Samuel Sackey
( Supervisor)
DEDICATION

This piece of work is dedicated to the Almighty God by whose amazing grace and power I have been able to take this giant step in life.

To my beloved wife, Mrs. Gifty Abaching Zimtani and my dear son, Graham Wepiah Abaching Zimtani.
ACKNOWLEDGEMENT

I am forever grateful to my supervisor, Dr. Samuel Sackey for his tutelage, guidance and timely interventions throughout the period of this work. I wish to state that, your friendliness, calmness and humility are attributes I greatly admire and pray that the good Lord imbibes in me. I have never come across any such high calibre of academician with such humility in my life. May the good Lord grant you good health and long life.

I am equally grateful to the Principal of NMTC-Gushegu, Madam Winifred Wondong for the requests granted me to further my studies. May the Almighty God richly bless you.

To my lovely wife, Mrs. Gifty Abaching Zimtani and my precious son, Master Graham Wepiah Abaching Zimtani, I am eternally grateful for having you.

To my dear sister, Madam Josephine Abaching and my lovely brother-in-law, Mr. Alexis Atiyire. I say a big thank you and pray that may the good Lord grant you good health.

Last but not the least, I extend my gratitude to my dear mum, Madam Mary Abagoone Awopuguba Zimtani and all my siblings for your prayers and support throughout the period of this work. May God richly bless you all.

And above all, to the Almighty God.
ABSTRACT

Background: Hepatitis B has been reported to be the 10th leading cause of death worldwide which accounts for 500,000 to 1.2 million deaths every year (Alavian et al., 2007). Alavian et al., (2007) also reported that hepatitis B related deaths are caused by chronic hepatitis, cirrhosis, and hepatocellular carcinoma. The WHO estimated that, there are 240 million people who are chronically infected worldwide, particularly in low and middle-income countries (LMICs). The purpose of this study was to determine the prevalence and associated risk factors of HBV infection among pregnant women in the Gushegu district in the Northern Region of Ghana.

Method: A cross-sectional study was conducted using a consecutive sampling method to select women confirmed pregnant at any gestational age by clinical examination or an ultrasound scan. Blood samples were taken and tested for HBsAg. Data collected with the questionnaire and the test results were entered into Epi-info 7 and further exported into STATA 15.0 for analysis. Analysis was mainly univariate, bivariate and multivariate.

Results: Out of the 160 pregnant women included in the study, 15 (9.4%) were positive for Hepatitis B viral infection. The significant risk factors for hepatitis B infection were female genital mutilation (AOR-7.07; CI-95% 0.37-13.60; p=0.019), ear piercing history (AOR-1.58, CI-95%-015-2.31; p=0.20) and history of body tattoo or traditional marks (AOR-2.29; 95%CI- 0.63-8.37; p=0.020).

Conclusion: The Prevalence of Hepatitis B infection amongst pregnant women in the Gushegu district was 9.4%. This therefore makes the infection highly endemic in the locality based on the WHO criteria (≥8%).
Compulsory screening, vaccination at free or cheaper cost and avoidance of traditional practices such as FGM, body tattooing and ear-piercing practices are the interventional approaches that must be considered to decrease the burden of hepatitis B infection in the district.
TABLE OF CONTENTS

DECLARATION....................................................................................................................... i
DEDICATION........................................................................................................................... ii
ACKNOWLEDGEMENT....................................................................................................... iii
ABSTRACT............................................................................................................................ iv
TABLE OF CONTENTS ....................................................................................................... vi
LIST OF TABLES ................................................................................................................ ix
LIST OF FIGURES ............................................................................................................ x
LIST OF ABBREVIATIONS ................................................................................................ xi
CHAPTER ONE .................................................................................................................. 1
INTRODUCTION................................................................................................................... 1
  1.1 Background .................................................................................................................. 1
  1.2 Problem Statement ..................................................................................................... 4
    1.2.2 Narrative of the conceptual framework .............................................................. 7
  1.3 Justification of the Study ......................................................................................... 8
  1.4 Research Questions .................................................................................................. 8
  1.5 General Objective ................................................................................................... 9
    1.5.1 Specific Objectives ............................................................................................ 9
CHAPTER TWO ................................................................................................................... 10
LITERATURE REVIEW ..................................................................................................... 10
  2.0 Overview .................................................................................................................. 10
  2.1 Epidemiology of Hepatitis B .................................................................................... 10
    2.1.1 Serological markers .......................................................................................... 12
    2.1.2 The Natural History of Hepatitis B Virus Infection ......................................... 12
  2.2 Prevalence ............................................................................................................... 13
    2.2.1 Global prevalence ............................................................................................ 13
    2.2.2 Prevalence among Pregnant Women .............................................................. 14
  2.3 Risk Factors for HBV Infection .............................................................................. 16
    2.3.1 Hepatitis B Transmission ............................................................................... 16
    2.3.2 Hepatitis B and Educational Level .................................................................. 16
    2.3.3 Other Risk Factors and HBsAg ...................................................................... 18
  2.4 Knowledge about the prevention and control of HBV ............................................ 19
    2.4.1 Knowledge about the risk of contracting HBV .............................................. 19
    2.4.2 Knowledge about the vaccine for HBV .......................................................... 19
CHAPTER THREE ............................................................................................................. 21
METHODS ...................................................................................................................... 21
  3.1 Study Design .......................................................................................................... 21
5.1 Introduction .................................................................................................................... 47
5.2 Demographic characteristics of respondents ............................................................... 47
5.3 Prevalence of hepatitis B infection among the pregnant women ......................... 47
5.4 Knowledge of pregnant women on HBV infection prevention and control .......... 48
5.5 Risk factors of hepatitis B infection among pregnant women ................................. 49

CHAPTER SIX ...................................................................................................................... 51

CONCLUSION AND RECOMMENDATIONS ................................................................. 51
6.1 Conclusion ................................................................................................................... 51
6.2 Recommendation ....................................................................................................... 51

REFERENCES ....................................................................................................................... 53

APPENDICES ........................................................................................................................ 61
Appendix I: Study Questionnaire ..................................................................................... 61
Appendix II: REFERRAL FORM .......................................................................................... 67
Appendix III: Consent Form ............................................................................................... 68
Appendix IV: Information Sheet ......................................................................................... 70
LIST OF TABLES

Table 4.1: Demographic Characteristics of respondents .........................................................32
Table 4.2: Prevalence of hepatitis B infection among the various demographic groups........35
Table 4.3: Pregnant women’s knowledge on the HBV infection. ...........................................36
Table 4.4: Bivariate analysis of demographic risk factors associated hepatitis B infection....41
Table 4.5: Bivariate analysis of risk factors associated hepatitis B infection.........................43
Table 4.6: Logistic regression analysis of risk factors to HBV infections ..............................45
LIST OF FIGURES

Figure 1.1: Conceptual Framework .........................................................7
Figure 3.1: Districts of Northern region ..................................................22
Figure 4.1: Occupational status of respondents ......................................33
Figure 4.2: Prevalence of hepatitis B among pregnant women ..............34
Figure 4.3: Respondent's knowledge on the sources of HBV infections ....37
Figure 4.4: Reasons for not vaccinating for HBV Infection by respondents 38
Figure 4.5: Risk factors related to HBV infection .................................39
Figure 4.6: Other risk factors related to HBV infection among the respondents 40
## LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANC</td>
<td>Antenatal clinic</td>
</tr>
<tr>
<td>CHB</td>
<td>Chronic Hepatitis B</td>
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<tr>
<td>ELISA</td>
<td>Enzyme Linked Immunosorbent Assay</td>
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<tr>
<td>HBcAb</td>
<td>Hepatitis B core antibody</td>
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<tr>
<td>HBeAg</td>
<td>Hepatitis B e antigen</td>
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<td>HBsAg</td>
<td>Hepatitis B surface antigen</td>
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<tr>
<td>HCC</td>
<td>Hepatocellular Carcinoma</td>
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<tr>
<td>HBV</td>
<td>Hepatitis B virus</td>
</tr>
<tr>
<td>LMICs</td>
<td>Low and Middle-Income Countries</td>
</tr>
<tr>
<td>W.H.O</td>
<td>World Health Organization</td>
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<tr>
<td>DNA</td>
<td>Deoxyribonucleic acid</td>
</tr>
<tr>
<td>FGM</td>
<td>Female Genital Mutilation</td>
</tr>
<tr>
<td>NMTC</td>
<td>Nursing and Midwifery Training College</td>
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<td>GDFA</td>
<td>Ghana Food and Drugs Authority</td>
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CHAPTER ONE

INTRODUCTION

1.1 Background

The Hepatitis B virus (HBV) is the cause of Hepatitis B infection. It is an enveloped DNA virus that predominantly invades the liver, causing liver cell damage and inflammation (WHO, 2015). According to Kwon & Lee (2011), HBV infection present early symptoms such as fatigue, fever and anorexia, with an incubation period of 3 to 4 months akin to other viral hepatitis.

Chronic hepatitis B infection refers to an infection with the hepatitis B virus that persists for more than six months (Wilkings, Zimmerman, & Schade, 2010). When hepatitis B viral infection is unresolved after six (6) months, it is an indication that the immune system was unable to get rid of the infection in the blood and liver. Lin & Kirchner (2004) stated that, unlike chronic hepatitis B infection, acute hepatitis B is a short-term disease which show up symptoms within 3 months of exposure and can last up to 6 months. Research indicates that the age at which an individual is infected may determine whether or not the HBV infection shall progress from acute to chronic. Early life infection poses a higher possibility of becoming chronic as compared to later in life. About 80–90 % of neonates, and 30–50 % of children are unable to recover from the infection when exposed to the virus because their immune system is immature to fight and successfully get rid of it. The resultant effect of an early infection is therefore a life-long chronic disease (Adjei, Asamoah, Atibila, Ti-enkawol, & Ansah-Nyarko, 2016).

WHO (2015) estimated that, there are 240 million people who live with chronic Hepatitis B infection worldwide, predominantly in low and middle-income countries (LMICs). Liver cirrhosis and hepatocellular carcinoma (HCC) are the main complications of
chronic hepatitis B infection. About 20% to 30% of persons with chronic hepatitis B infection will end up with such complications, and an estimated 650,000 people will die yearly from liver cirrhosis and liver cancer secondary to chronic hepatitis B. Ombeni (2013) found that, up to 45% of the world’s population lives in areas of high chronic HBV prevalence including the sub-Saharan Africa, the Pacific and Asia. The 10th leading cause of death worldwide is hepatitis B which accounts for 500,000 to 1.2 million deaths every year as a result of unresolved hepatitis B infection, liver fibrosis, and primary liver cancer (Alavian et al., 2007). In addition, Franco et al. (2012) documented that nearly 4.5 million fresh HBV transmissions arise annually across the globe, out of these new infections, 1/4th develop to liver ailment. In China, it has been documented that one of the commonest cancers is cancer of the liver. Nearly 383,000 deaths are recorded every year in China from liver cancer, which accounts for 51% of the deaths from liver cancer worldwide (Wang, Fan, Zhang, Gao, & Wang, 2014).

The Global Health Congress in the year 2014, approved the WHO agreement on HBV (WHA67.6), offering leadership to respective nations to produce and enforce broad and critical policy and rank actions to deal with all forms of HBV. The WHO strategies on the treatment of unresolved hepatitis B elucidates the essence of agreeing an easy open wellbeing method to curtailing the “the silent killer” (Assembly, 2014).

In Ghana, Ofori-Asenso (2016) study raises critical concerns pertaining to the safety of blood supply. The study brought to light an alarming fact where virtually one out of every nine blood givers could be sick with HBV with a larger magnitude in replacement blood givers. Ofori-Asenso (2016) added that, HBV infection among women confirmed pregnant equally continue to be high (≈1 in 8). This clearly rationalizes the essence of setting up a countrywide HBV screening platform for all expectant women in pre-natal
units. 2 in 5 patients with liver fibrosis in Ghana had chronic HBV (Blankson, Wiredu, Gyasi, Adjei, & Tettey, 2005).

The factors that continue to account for the transmission of infectious HBV are parenteral, transplacental and sexual (Alavian et al., 2007). According to Kilonzo (2010) and Ombeni (2013), hepatitis B infection in pregnancy has serious implications including the risk of mother to child transmission. Ombeni (2013) added that, in high-prevalent areas, HBV is mostly transmitted during the perinatal period from mother to infant (vertical transmission), conferring a high likelihood of chronicity. However, in regions where the prevalence is low, sexual contact with infected persons is the major source of transmission (Iloh, Chuku, Amadi, & Obiegbu, 2013). Alavian et al., (2007) further explained that nearly 90% of children infected through vertical transmission develop chronic hepatitis B infection. By contrast, 96% of adults will clear primary HBV infection. Therefore, interrupting early transmission is the key to breaking the cycle of ongoing HBV infection.

The prevalence of HBV was stated among antenatal females in Africa as 5.3% to 25% (Elsheikh, Daak, Elsheikh, Karsany, & Adam, 2007). Similarly, in Nigeria, the HBsAg sero-prevalence in pregnant women was reported to be 5% in 2008-2009 to 17.2% in 2012 (Yami et al., 2011; Otegbayo et al., 2008) while it was found to be 25% in Harare in 1996 (Giuseppe et al, 2007). A study in the Volta of Ghana by Luuse et al. (2017) found that there was some significant statistical association between age group and HBsAg positivity among pregnant women ($\chi^2=50.2$, $P<0.001$); the highest prevalence of 5.3% (2/38) was found in age group 15-20 and the lower of 0.0% was found in age groups 21-25, 26-30 and 36-40. The overall prevalence in the study was reported to be 2.4%.
It is commonly known that prevention is the surest way to avoid contracting HBV. Thus, it certainly still remain the major means to fight the spread of viral hepatitis. Hakim (2007) emphasized that the best way to prevent hepatitis B is to avoid the practices that may increase the risk of infection.

The transmission of HBV could be curtailed through lifestyle changes and enlightenment of the populace. Besides that, other significant ways to reduce the prevalence of HBV infection is to screen blood donors and employ aseptic methods in health care practices. In the case of mother-to-child transmission, such could be drastically reduce if all pregnant women are routinely tested for HBV. Neonatal prevention of HBV could be achieved through the administration of the hepatitis B vaccine immediately after child birth. The vaccine offers protection to neonates thus, preventing the possibility of contracting HBV. It can also serve as prophylaxis in HBV exposure (Franco et al., 2012).

1.2 Problem Statement

Hepatitis B infection during pregnancy poses enormous challenges. Part of the focus of health management must centre on consequence of hepatitis B on both mother and the child. About, 350-400 million persons have chronic HBV infection and more than one million deaths annually are because of end stage cancer of the liver or hepatocellular cancer (Oo & Mutimer, 2015). According to Lemoine & Thursz (2017), estimates of the worldwide burden of hepatitis, deaths increased by 60% from 0.89million to 1.45 million between 1990 and 2013 and Africa is amongst the regions with the highest mortality. Ombeni (2013), additionally found that, up to forty fifth of the global populace reside in regions where the prevalence of viral hepatitis B is high. These areas are: Sub-Saharan Africa, the Pacific and Asia. According to Blankson et al. (2005), the number of chronic hepatitis B persons in Africa is about 50 million.
The transmission of the hepatitis B virus (HBV) is through the parenteral, sexual and perinatal routes (Alavian et al., 2007). A study by Hakim (2007) indicated that transmission of HBV from carrier mothers to their babies is mainly through the perinatal period. Hakim (2007) therefore suggested that the perinatal period is the most vital factor in determining the prevalence of the infection in high endemicity areas such as China and South East Asia. Similarly, Felippe et al. (2013) found during a study that in high endemic areas perinatal or early childhood transmission is the major cause of HBV infection. Rashid Sabria (2011) additionally disclosed that the rate of transmission of hepatitis B infection will increase if the mother is HBsAg positive and even more if she is additionally HBeAg positive.

The Prevalence of Hepatitis B viral disease in Ghana is noted to be between 6.7% to 10% in blood donors, 6.4% and 15.6% in antenatal women and in youngsters respectively (Blankson et al., 2005). Dongdem et al. (2012) study estimated the prevalence of hepatitis B among voluntary blood donors at the Tamale Teaching Hospital to be 10.79%. Blankson et al. (2005) study conducted in Ghana had the results pointing out to an increased occurrence of HBV transmission among expectant women (≈1 in 8). Viral hepatitis B is considered a very important public health problem necessitating high priority methods for prevention and management.

In the Gushegu District, no study has been conducted notably on pregnant women to determine the prevalence of hepatitis B and the associated risk factors of transmission. Given the implications of transmission among pregnant women such as lifelong chronic disease, cirrhosis, liver failure, cancer of the liver, vertical transmission and mortality, it was imperative for a study to be conducted to determine the prevalence and associated risk factors of HBV transmission among pregnant women. This is because, HBV
infection poses a risk not only to the mother but her new born and also the sexual partners.
1.2.2 Narrative of the conceptual framework

The conceptual framework above is a diagram that depicts the association between the exposures (risk factors), the outcome variable (HBV infection) and the disease burden. The risk factors of Hepatitis B virus transmission amongst pregnant women include: Parenteral, sexual and perinatal. Pregnant women are likely to have more exposures to body fluids and blood of HBV infected people through activities like sexual activities...
compared to the non-pregnant ones. The more you engage in unprotected sexual intercourse, the more likely you come into contact with HBV infected person leading to an increased risk of the infection. Also, pregnant women are more likely to be exposed to HBV during child-birth when infected or unsterilized instruments are use in conducting the delivery or from injections from unsterile needles in the health care facility; this is called parenteral risk of infection.

1.3 Justification of the Study

Hepatitis B infection causes chronic disease, cirrhosis, liver failure and liver cancer. The devastating effect of these complications at the long term is high mortality and morbidity. HBV infected pregnant women are at risk of infecting their babies conferring a high likelihood of chronicity (Iloh et al., 2013).

WHO recommends the first dose of hepatitis B vaccine be given as soon as possible after birth (< 24 h) to prevent perinatal HBV transmission (Franco et al., 2012). However, it is not done in most places (Teye, 2015). A research carried out on pregnant women to ascertain hepatitis B infection positivity as well as the risk elements would reveal any likelihood of mother–to-child transmission in the population and this information would be useful in deciding whether the first dose of HBV vaccine should be administered at birth or not. Findings from this study may inform policy on routine testing of pregnant women and immunisation against hepatitis B virus. Besides that, results from this study provide information that can be used by health institutions to intensify educational awareness on infectious diseases in the locality.

1.4 Research Questions

1. What is the prevalence of hepatitis B virus infection amongst pregnant women in the Gushegu locality
2. What is the knowledge of pregnant women about HBV infection prevention and control measures?

3. What are the associated risk factors of hepatitis B infection among pregnant women

1.5 General Objective

To determine the prevalence of HBsAg among pregnant women and its associated risk factors in the Gushegu District.

1.5.1 Specific Objectives

1. To identify the prevalence of hepatitis B infection within the study population

2. To determine knowledge of pregnant women concerning HBV infection prevention and control.

3. To identify the associated risk elements of hepatitis B transmission amongst pregnant women.
CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

The inflammation of the liver that occurs due to viruses is referred to as viral hepatitis. These liver disease causing viruses though distinct are generically known as viral hepatotropic virus. The most notable ones are hepatitis A, hepatitis B, hepatitis C, hepatitis D and hepatitis E viruses. But, different viruses other than those stated above are also known causes. These include yellow fever virus, Epstein-Barr, Herpes simplex, Cytomegalovirus virus that can also cause hepatitis. An estimated five hundred thousand people are chronically infected with HBV or HCV. Additionally, 70000 deaths and 3500 stillbirths are attributed to hepatitis E. Globally; there is an estimated 1,400,000 new hepatitis A infections every year. Moreover, 2.7% of total mortality recorded yearly in the world is viral hepatitis B related (Perz et al., 2006, World Health Organization. Secretariat, 2009).

2.1 Epidemiology of Hepatitis B

One of the major and common irresistible infectious diseases of the liver worldwide is caused by a little encompassed DNA virus, the hepatitis B virus (HBV). The infection was first found as "Australia antigen”, later named hepatitis B surface antigen (HBsAg), in tolerant blood Hepatitis (Mno, An, and Damen, 2008). HBV infection is exceptionally predominant in Asia, Africa, and parts of southern and eastern Europe. There are around 350 million chronic bearers of HBV out of an expected 2 billion individuals with serological confirmation of past or current HBV infection. It has been estimated that, between 14-15% of HBV infected patients will advance to liver cirrhosis, or hepatocellular carcinoma HCC (Lok, 2002). The yearly HBV related mortality is
between 500,000 to 1.2 million (Lee, 1997; Mahoney, 1999: World Health Organization, 2012).

The number of persons infected with the HBV infection determines the endemicity of HBV infection (Hou et al., 2005). There is additionally, a relationship between the route of hepatitis B transmission and the chronicity of HBV infection in a region (Redd et al., 2007). Chronic HBV infection worldwide is classified into high, intermediate and low endemicity. There are an expected 160 million individuals living with chronic HBV infection and about 360,000 HBV related deaths recorded every year in the Western Pacific (Emiroglu, October 2010, Goldstein et al., 2005a, Nelson, June 2002). Most HBV infections in the Western Pacific area occur at infancy and childhood. This accounts for the higher prevalence of hepatitis B infection amongst adults (Alter, 2003).

Eastern and Southern Europe, the Middle East, Japan, and part of South America are classified under intermediate endemicity. Hepatitis B infection prevalence ranges between 10-16% in these populations but 2-7% are chronically infected (Hou et al., 2005). Chronic HBV disease is high in certain localities as a result of infections at infancy or amongst newborn children (Toukan, 1990). HBV infection in low endemic regions, for example, North America, Northern and Western Europe and Australia is between 5-7% of the population and between 0.5-2% are chronic HBV carriers (McQuillan et al., 1989). In high endemic regions such as South East Asia, China, sub-Saharan Africa and the Amazon Basin, 8% or more of the population are affected by chronic hepatitis B (Hou et al., 2005).

The prevalence of chronic hepatitis B differs across parts of Africa: 8% in West Africa; 5-7% in Central, Eastern and Southern Africa. An estimated 100 million individuals living in Africa with chronic HBV infection are in the South-East Asia district (World
Health Organization, 2012). However, 65% of those with HBV infection don't know about their status (Emiroglu, October 2010) In Ghana; the prevalence of hepatitis B infection among voluntary blood donors was reported to be 10.79% (Dongdem et al., 2012).

2.1.1 Serological markers

The most common cause of chronic hepatitis is hepatitis B or C viruses. Hepatitis B infection may present either as an acute or chronic illness. The first, specific detectable serological marker in the diagnosis of acute infection is the hepatitis B surface antigen, HBsAg, 6 weeks after exposure (Grosheide et al., 1996). The presence of this marker reflects infectivity but does not distinguish acute from chronic infection. Following the disappearance of HBsAg is the formation of the antibody against hepatitis B surface antigen [anti-HBs] (Ve Uinga et al., 1999). The anti-HBs marker indicates successful vaccination as well as recovery from infection. The only marker found and detectable in the liver is the hepatitis B core antigen, (HBcAg). Antibodies to this core antigen, anti-HBc is usually detectable at the onset of clinical illness and indicates current or past infection.

2.1.2 The Natural History of Hepatitis B Virus Infection

HIV and HBV share risk factors and modes of transmission. The three main modes of transmission are by sexual contact, perinatal transmission and horizontal transmission mainly in early childhood by close contact with an infected person and sharing contaminated items. Following acute HBV infection, less than 10% of children aged below 5 years and 30%-50% of persons aged above 5 years are asymptomatic. Symptoms of HBV infection include nausea, vomiting, malaise, jaundice, fever, dark urine and clay coloured stools (Ejele et al, 2005; Olokoba et al, 2009; Kagu et al, 2005;
Esumeh et al, 2003; Fasola et al, 2009). Acute hepatitis in pregnancy presents in a similar way as in the non-pregnant state and may be confused with other causes of liver disease in pregnancy such as intrahepatic cholestasis, acute fatty liver of pregnancy and the haemolysis, elevated liver enzyme and low platelet (HELP) syndrome (Uneke et al., 2005).

According to Abdalla et al (2005), Fulminant hepatitis, liver failure and death occur in 0.5% - 2% of acutely infected persons. Research indicates that about 90% of HBV infections are transmitted around the period of child birth. Additionally, 25% - 35% of such infections acquired between the ages 1-5 years, and 2%-5% of grown-ups with a weak immune system advance to long lasting HBV disease. Cirrhosis of the liver and liver cancers develop in 25% - 30% and 5% -10% of persons whose infection fails to resolve after six (6) months and are between the ages of 30 - 40 years and 32-37 years respectively (Syed and Mark, 2008).

2.2 Prevalence

2.2.1 Global prevalence

WHO (2015) estimated that, there are 240 million persons who are infected with long lasting HBV worldwide, notably in low and middle-income nations (LMICs). The global existence of long lasting HBV transmission differs from place to place. For instance, a prevalence of (≥8%) is classified as high, (2-7%) is intermediate and (<2%) is low (Zenebe, Mulu, Yimer, & Abera, 2014). “Areas of high endemicity can be classified as those areas where occurrence of chronic HBV in the general population is ≥8%. This include China, South East Asia, Sub-Saharan Africa and also the Middle East, most Pacific Islands, a number of the Caribbean Islands and also the Amazon Basin” (W.H.O., 2002). “Areas of intermediate endemicity are those wherever chronic HBV within the
general population is 2-7%; this include 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” (W.H.O., 2002).

The prevalence of HBV infection in Africa is thought to be one of the highest globally: A prevalence of 8% among inhabitants in the Western part of the Africa continent; About 5-7% in middle, Eastern area and as well the Southern area of Africa. Additionally, it is projected that a hundred million individuals infected with long lasting HBV disease are residing within the locality of South-East Asia (W.H.O., 2002). Uganda around 2004-2005 indicated that the prevalence of HBV disease in that region ranges from 18.4% and 24.3% (Uganda Ministry of Health, 2004). In a preceding research work conducted by Kibassa et. al. among expectant females in Dar es Salaam, it was discovered that the rate of antenatal spread of HBV infection was 11.8% (Rashid, Kilewo, & Aboud, 2014).

A study in Ghana also estimated the prevalence of Hepatitis among voluntary blood givers as 10.79% (Dongdem et al., 2012).

United States of America finds itself amongst geographical areas with intermediate prevalence. Prevalence of HBV infections these populations is 2-7% with long lasting HBV persons (Hou, Liu, & Gu, 2005).

2.2.2 Prevalence among Pregnant Women

The prevalence of HBV was stated among antenatal females in Africa as 5.3% to 25% (Elsheikh, Daak, Elsheikh, Karsany, & Adam, 2007). Similarly, in Nigerian, a prevalence of 11% with HBeAg positivity of 33% was identified among women who were pregnant (M et al., 2008). In another study, 290(2.89%) of pregnant women tested
positive of HBsAg in an antenatal clinic in Port Harcourt, Nigeria (Obi, Umeh, Okurede, & Iroagba, 2006). In Nigeria, the HBsAg sero-prevalence in pregnant women was reported to be 5% in 2008-2009 to 17.2% in 2012 (Yami et al., 2011; Otegbayo et al., 2008) while it was found to be 25% in Harare in 1996 (Giuseppe et al, 2007). A study in Mali in May 2008 to December 2009 found the prevalence of hepatitis B in pregnant women to be 8%. In Central Africa, HBsAg prevalence of 6.5% was found in pregnant women. The HBV prevalence in pregnant women was 5.3% in Ethiopia in 2004, 5.6% Sudan in 2006 and 6.3% Tanzania in 1999(King et al., 2012).

Okoth et al, in a multicentre hospital based cross-sectional study of 2241 women attending antenatal clinic (ANC) in Kenya National Hospital (KNH) indicated HBsAg prevalence of 9.3% among pregnant women. The average 9.3% prevalence of HBsAg seropositivity reported by Okoth et al was in agreement with the findings of Murugu N.M in pregnant women in Machakos District Hospital in 1984 (Utsumi et al., 2012).

Similarly, a cross-sectional study in two hospitals in northern Uganda among pregnant women attending antenatal estimated one in eight pregnant women attending antenatal care in the two study hospitals has evidence of hepatitis B infection (Bayo et al., 2014)).A study among pregnant women in a public hospital in Ethiopia found that 11(5.4%) of the study participants were positive for HBsAg (Rajappa & Shaji, 2015).

The Prevalence of Hepatitis B viral disease in Ghana is noted to be between 6.7% to 10% in blood donors, 6.4% and 15.6% in antenatal women and in youngsters respectively (Blankson et al., 2005). A study in the Volta of Ghana by Luuse et al. (2017) found that there was some significant statistical association between age group and HBsAg positivity among pregnant women ($\chi^2$ test=50.24, $P<0.001$) ; the highest prevalence of 5.3% (2/38) was found in age group 15-20 and the lower of 0.0% was found in age...
groups 21-25, 26-30 and 36-40. The overall prevalence in the study was reported to be 2.4%. In Nigeria, Kolawole et al. had a Prevalence rate of 16.5% among pregnant women in Osogbo, 3.9.0% was reported among pregnant women in Kaduna by Aba, and Akani et al. reported a prevalence of 4.3% in pregnant women in Port Harcourt. In Yaounde, Cameroon, Kfutwhah and colleagues reported a prevalence of 16% among pregnant women and in Ghana; Damale et al. reported a prevalence of 10.5 % in Accra. Cho and others also reported a prevalence of 10.6% in pregnant women in eastern region of Ghana.

2.3 Risk Factors for HBV Infection

Transmission of HBV occurs through exposure to infectious body fluids such as blood, saliva, semen and other body fluids. Reliable evidence shows three major modes of transmission. They are perinatal, sexual and parenteral/percutaneous (Hou et al., 2005).

2.3.1 Hepatitis B Transmission

Concerns have been raised about the safety of blood products for transfusion across the globe especially in Africa. According to Ogbu and Uneke (2009), the commonest route of transmission of hepatitis B virus (HBV) in third world countries especially Sub-Saharan Africa is through blood donation. Research has demonstrated that the hepatitis B virus is fifty to hundred times more contagious as compared to HIV and thus, places health workers at a higher risk of contracting the infection due to their occupation (Hepatitis B facts sheet, 2008).It has again been reported that, hepatitis is prevalent amongst 12.5% of patients who receive blood transfusions (Fasola et al., 2002)

2.3.2 Hepatitis B and Educational Level

Hepatitis B infection unlike HIV has not been given much attention in terms of public health campaign through national awareness on public health diseases in Ghana. It has
been estimated that over 70% of the world population had once contracted hepatitis B infection. Many studies indicate that knowledge and awareness of various ways to prevent contracting HBV such early screening and vaccination are important elements related to the incidence of hepatitis B and hepatocellular carcinoma (Hus et al., 2010).

Higher level of education was associated with more positive attitudes toward HBV testing. In the case of positive HBV test, 18.2% of mothers decided to review their prior decision for another pregnancy in future (Adibi et al., 2010).

A study conducted in the state of Mato Grosso do Sul, Brazil pertaining to the prevalence of HBV infection and the related risk factors among prisoners revealed a prevalence of 17.9%. Advanced age, low educational level and abuse of drugs were identified as the major determinants of the transmission of HBV infection in the inhabitants (Stief et al 2011).

Mustufa et al (2010) in determining hepatitis B vaccination status as well as a thorough assessment of the predisposing elements for both HBV and HCV virus infection among instructors at elementary schools in Karachi, Pakistan confirmed the following: instructors weren’t vaccinated against HBV, had received multiple therapeutic injections, had re-used syringe, participants shared razors, brushes, cigarettes. The relatives or families of participants reported suffering from hepatitis B while other household members had passed away with liver ailments devoid of any identified history.

Even among health workers (dental auxiliaries) assessment of work-related contact with injection needles, sharps showed 34 (41%) out of the 83 dental workers had history of needle piercing and sharps injury in the last 12 months. In that same study, persons who were immunized against hepatitis B infection were only 43 (51.8%). Incidentally, 62
(74.7%) of the study participants felt that there was a higher chance of getting infected with the Human Immune Deficiency Virus as compared to hepatitis B through needle stick in a dental clinic (Azado et al., 2010).

In Mongolia, a study by Tserenpuntsag et al. (2009) documented a prevalence of HBsAg of 7.8% amongst blood donors. The same study again found out that donors between the ages of 18 to 19 years recorded the maximum prevalence. Essentially, the significant risk factor for hepatitis B virus infection was youthful age (Tserenpuntsag et al., 2009).

2.3.3 Other Risk Factors and HBsAg

“Risk factors for hepatitis B infection include a variety of activities or settings where infected blood or bodily fluids can be exchanged. Multiple sexual partners, unprotected sex, and men who have sex with men are at increased risk of hepatitis B infections. The risk of infection is notably high in promiscuous homosexual men, but it is also transmitted sexually from men to women and women to men “(Johns Hopkins medicine). Other risk factors associated with hepatitis B transmission include history of blood transfusion, marital status and educational level. There are divergent views on risk factors of hepatitis B infection. While some studies agree that these factors contribute to hepatitis B transmission others say otherwise. According to Eke et al (2011) multiple sexual partners, blood transfusion, dental manipulations, sharing of sharps/needles, and circumcision were not significant modes of hepatitis B infection transmission in a cross-sectional study, conducted at the Nnamdi Azikiwe University Teaching Hospital, Nnewi, Nigeria.

However, Seyed et al (2007) in looking at changing epidemiology in Iran observed that marital status, gender, age, contact with hepatitis B infected persons, multiple sexual
partners, injection drug users, magnitude of surgery, dentists check-ups as well as some occupations such as barber, police and drivers are predisposing factors to hepatitis B virus infection. McQuillan et al (1976) in a related study suggested that the highest prevalence of HBV was in the uneducated with basic school training. However, the prevalence reduced with an increased in literacy level. The study by Zali et al (2010) pointed at risk factors including old age, masculinity, marital status, history of contact with hepatitis, sexual activity, intravenous drug use, major surgeries, visiting unqualified dentists, and certain occupations as predisposing factors on hepatitis B transmission.

2.4 Knowledge about the prevention and control of HBV

2.4.1. Knowledge about the risk of contracting HBV

Research carried out in Britain discovered that there was a limited awareness level, 50.3% about the possibility of HBV transmission from HBeAg positive persons to expected women who weren’t immunized (Stein et al, 2003). These results are buttressed by a similar research carried out in Nigerian that revealed that 54% of pregnant women recognized that they were at a high probability of contracting HBV (Ibekwe and Ibeziako, 2006).

2.4.2. Knowledge about the vaccine for HBV

The awareness about the presence of a vaccine to prevent HBV infection has been established to be high among antenatal women and health care staff worldwide. In the case of Saudi antenatal women, there was a 100% knowledge that a vaccine existed and could doubtlessly protect individuals from acquiring the infection (Paul et al, 1999); Similarly, the awareness level within Moroccan Laboratory workers, nurses, midwives, physicians, surgeons and anaesthetists was 98% (Djeriri et al, 2008); 85.1% of Pakistani medical students (Khan et al, 2010); 83.7% of dental and 95.4% of pregnant women in
India (Tibdewal et al, 2009). In spite of that, some antenatal women may actually not know much about the period of protection and its effectiveness. (Paul et al, 1999; El-Awaday, 1998). “For instance, out of 96 Saudi expectant women who were immunized, 54 had their antibody concentration checked and almost half (48.2%) of them didn’t understand or didn’t bother to ascertain if that they had sero-converted” (Paul et al, 1999). These results are in line with conclusions from an Egyptian research which revealed that 38th of pregnant women were unaware about the efficacy of the serum and 47th of them were skeptical concerning the period of fortification against HBV (El-Awady, 1998).
CHAPTER THREE

METHODS

3.1 Study Design

A cross-sectional study was conducted. Cross-sectional study gathers from whole study population at a point in time to examine the relationship between disease and other variables. It provides a snapshot of the frequency of a disease or other health related characteristics in a population at a given point in time (Hemed, 2015).

3.2 Study Area

Gushegu District is found on the eastern corridor of the region and shares boundaries to the east with Saboba and Chereponi Districts, Karaga District to the west, East Mamprusi District to the north and Yendi Municipality and Mion District to the south. The entire land area of the District is about 2,674.1 sq. kilometres. It is about 114 km from the Northern Regional capital, Tamale. The population of Gushegu District, according to the 2010 Population and Housing Census, is 111,259 representing four.5 % of the region’s total population. Males represent 48.7% and females represent 51.3 percent. The total fertility rate for the District 3.7 and the overall fertility rate is 108.8 births per 1000 girls aged 15-49 years that is among the highest rates in the region. The District is predominantly rural with a little over 3 quarters of the population (76.0%) residing in rural localities. Nearly two-thirds (63.0%) of the population in the District are married, (32.0%) have never married, 0.4 % are in consensual unions, 3 % are widowed, only one percent are divorced and less than one percent are separated. By age 25-29 years, almost 9 in 10 females (86.4%) are married compared to 63 % of males.
3.3 Study Site

The Gushegu District Hospital is the only Hospital in the Gushegu District. The antenatal clients include women and patients referred from lower level facilities (CHPS) throughout the District. About 35-40 pregnant women usually visit the ANC unit of the hospital every Tuesday and Thursday for Antenatal Care Services services. On average, 220 pregnant women are attended by professionally trained midwives at the facility each month.

3.4 Study Population

The study was conducted among pregnant women seeking ANC care services at the ANC unit of the Gushegu District Hospital and, who satisfied the eligibility criteria. Informed consent was obtained from participants before data collection. A verbal consent and thumb print was obtained from participants who were not able to write due
to illiteracy. Assent was obtained from those less than eighteen years and a written informed consent obtained from their guardians.

3.4.1 Sample Size calculation

The sample size was calculated using formula stated below:

\[ n = \frac{Z^2pq}{d^2} \] (Cochran formula 1963)

Where

\[ n = \text{estimated sample size} \]

\[ Z = \text{the constant for a 95% confidence interval given as 1.96} \]

\[ p = \text{the average prevalence of HBV infection taken as 10.6% among pregnant women in three hospitals in Eastern Region of Ghana (Ofori-Asenso & Agyeman, 2016).} \]

\[ d = \text{the percent margin of error taken as 5% = 0.05} \]

\[ q = 1 - p \]

\[ n = 146 \]

Additional 10% of the sample for non-responders 10% = 15

Hence the sample size for the study was 160 pregnant women.

3.5 Selection Criteria

3.5.1 Inclusion Criteria

The study involved women who were pregnant and attending antenatal care services at the Gushegu District Hospital who were above 18 years and confirmed pregnant at any gestational age by clinical examination or an ultrasound scan.
3.5.2 Exclusion Criteria
The study excluded pregnant women who had emergency conditions that required urgent attention.

3.6 Study variables

3.6.1 Dependent variable
✓ HBsAg status
✓ Prevention of Hepatitis B

3.6.2 Independent variables
1. Socio demographic characteristics
   ✓ Marital status
   ✓ Age
   ✓ Educational level
2. Risk factors of Hepatitis B transmission
   History of blood transfusion, history of surgical procedure, history of body tattoos, history of unsafe injection, history of FGM, history of ear piercing, history of liver disease.
3. Knowledge of pregnant women about HBV infection prevention and control

3.7 Sampling Technique
The consecutive sampling selection method was used to select pregnant women confirmed pregnant at any gestational age by clinical history and examination or an ultrasound scan. In consecutive sampling, each consecutive eligible patient who was present for care was approached for enrolment (Mathieson, 2014). This method allowed recruitment of pregnant women who satisfied the inclusion criteria and thus made it
possible to attain the sample size for the study during the limited period of data collection. The Principal researcher and assistants were stationed at the reception of the ANC where all pregnant women on each clinic day report on arrival. Pregnant women who satisfy the inclusion criteria were approached and requested to participate in the study. This was done on each clinic day until the sample size was attained.

3.8 Data Collection

3.8.1 Data Collection Procedure.

The collection of data was done in the ANC unit of the Gushegu District Hospital. It was done by administering questionnaire.

3.8.2 Data collection tools

3.8.2.1 Questionnaires

The purpose of the study was explained to the participants in their preferred language prior to the study and an informed consent was obtained from them. A structured questionnaire which showed socio-demographic variables such as age, religion, education, marital status and occupation was given to each pregnant woman to fill. HBV associated risk factors such as parenteral factor (previous history of blood transfusion), sexual factor (history of unprotected sexual exposures), percutaneous factor (history of use of unsterilized sharp instruments for various purposes), family history of hepatitis B infection and history of hepatitis B vaccination were collected.

Blood samples were taken from each pregnant woman before filling the questionnaire. Each woman was given a code, which was the same for the questionnaire and the blood sample. The samples were taken to the laboratory for testing by a professional Laboratory Technician in the Gushegu District Hospital.
3.8.2.2 Sample Collection

Enzyme-linked Immunosorbent assay (ELISA) test kits, SD bioline HbsAg was used to carry out the HbsAg test. The SD bioline HbsAg is manufactured by the Standard Diagnostics Inc. and approved by the Ghana Food and Drug Authority (GFDA). The testing was done by wiping the thumb of a participant with methylated spirit and cotton wool swab. A sterile lancet needle was used for the venepuncture and a strip of blood was drawn into a rubber tube and kept unto the ELISA to test for HbsAg. This was by a Laboratory Technician from the Gushegu District Hospital. Participants who tested positive/negative received a post-test counselling from a professional nurse and a referral written for further management by a medical officer at the Gushegu District Hospital.

3.9 Quality control measures

Samples were handled by a qualified laboratory technician to ensure quality of data gathered. The principal researcher and his assistant scrutinized every questionnaire for completeness and sought for clarification when necessary at the time study participants were still around. Each complete hepatitis B Human reagent HBsAg ELISA test kit runs 96 tests and comes with negative control (Normal human serum free of Hepatitis B markers) and Positive control (Diluted HBsAg positive human serum, inactivated). These controls were used to ascertain quality and 36 of the 96 tests. Samples testing positive in the first run were repeated in duplicate and declared positive if at least one of the repeat tests in the second run was above the cut off optical density.

3.10 Data Management and Analysis

Data from the questionnaire were cleaned, coded and entered into Microsoft Excel data sheet. Data analysis was done by vetting questionnaire and entering into STATA software package version 15 for editing and analysis. Descriptive analysis was carried
out by calculating the mean, standard deviation, 95% confidence interval and frequencies of different variables using STATA software package version 15. Bivariate analysis was performed to identify the possible risk factors for getting hepatitis B. All statistical tests were performed at 5% level of significance (95% confidence interval). Fisher’s exact correction test of statistical significance was used to determine any association between hepatitis B infection and various exposure variables.

3.11 Pre-testing of instrument

Pre-testing was done at the Zamashegu Community health Centre in the Gushegu District to evaluate the validity and reliability of the questionnaire, willingness of the respondents to answer the questions, sequencing and clarity of the questions. It also provided an opportunity to ascertain the success of the training given to the research assistants. The questionnaires were then reviewed following the feedback gathered from the pretesting before the main survey takes place.

Consecutive sampling selection method was used to select twenty (20) pregnant women confirmed pregnant at any gestational age by clinical history and examination. Data analysis was done by vetting questionnaire and entering into STATA software package version 15 for editing and analysis.

3.12 Ethical Considerations

Permission was sought from the Gushegu District Health Directorate of the Ghana Health Service as well the Medical Superintendent of the Gushegu District Hospital before collecting the data. Ethical clearance was sought from the Ethical Review Committee of Ghana Health Service. The Ghana Health Service Ethics Review number was GHS-ERC: 060/12/17.
3.12.1 Informed Consent

A detailed explanation of the procedure and its purpose were made known to the participants to obtain their consent. It was categorically spelt out to participants that research participation is entirely voluntary, and that declining to enter the study, declining to answer the questions, declining to be tested had no negative consequences. Participants women who opted out of the study received the same quality of care usually offered in the Gushegu District Hospital as those who agreed to participate in the study. HBsAg testing was also done free of charge. To wit, no form of payment was made for participation in the study. A questionnaire was administered to each participant after consent was sought. Well trained data collectors translated the questionnaires into local languages to the best of the understanding of every participant in the presence of an independent witness where the recruited patient could not read and write. Each participant was then asked to provide 3ml of whole blood for testing.

Blood samples were drawn in aseptic manner by well-trained Laboratory technician and only screened for HBsAg. The blood specimen collected were analysed the same day after which the specimen was discarded. The results were disclosed to the participant, and participants found to be HBsAg positive were given post-test counselling. They were thereafter referred voluntarily for appropriate management and follow up in Gushegu District Hospital Outpatient Clinic by the medical officer.

3.12.2 Privacy and Confidentiality

The questionnaire and the blood samples were coded with the identification number of the enrolled participant and not the name of the participant to ensure anonymity. A trained laboratory technician from the Gushegu District Hospital conducted the test in an enclosed place where participants entered for the screening one at a time to ensure
privacy. The findings of this study were shared with the Ghana Health Service as per guided procedure. The findings of the study were also presented at health seminars.

3.12.3 Counseling and Education

Pregnant women with HBsAg positive results were given post-test counselling by a professional nurse and a referral written for further management by a medical officer at the Gushegu District Hospital (where they were investigated and managed accordingly). To wit, pregnant women with HBsAg positive results were informed by a trained professional nurse to take safety precautions and to request for the Hepatitis B vaccination and immunoglobulin for her child as soon as possible after birth, preferably within 24 hours of birth (WHO, 2015).

Besides that, an emphasis on preventive measures especially, the need to get vaccinated was offered to pregnant women who were found to be HBV negative.

3.12.4 Follow-Up Attention

Participants who tested positive were followed-up to ensure those who were qualified for treatment by the medical officer duly received treatment and care.

3.12.5 Potential Risk/Benefit

This study comes with the risk of pain associated with venipuncture procedure and psychological anxiety while waiting for about fifteen minutes to receive the results of the screening outcome.

There were direct and indirect benefits to the participants as they had the opportunity to update their HBV infection status. The outcome of the study was used to plan interventional programs in addressing the problem of the disease and the risks factors
associated with pregnant women. It served as an opportunity to refer participants who tested positive to the hospital for further investigation and treatment.

3.12.6 Data Storage and Usage

Study materials (questionnaires and informed consent) were coded and given a unique study identification number. Data storage was done by the principal investigator, Raymond Zimtani, School of Public Health, University of Ghana, Legon. The study materials (questionnaires and informed consent) were stored in a locked file cabinet in the office of the principal investigator. Data was entered into Stata version 15 software with the identification numbers by the research assistants, and electronic files made accessible only to the research team.

3.13 Study Limitation

The Gushegu District has many health care facilities aside the District Hospital where antenatal care services is rendered by professionally trained health care workers. Considering the fact that the study was carried out in only the Gushegu District hospital, the study finding is limited to the Gushegu township but not the entire district given that some antenatal women might choose to attend health care centres in nearby communities.

Additionally, in view of the fact that the study was hospital based and as such was carried out on only patients who presented to the Gushegu District Hospital; patients with HBV-related liver diseases who patronize traditional and spiritual homes or purchase over the counter drugs for treatment were left out of the study. The findings of the study might therefore not be a true representative of what happens in the district.

Besides that, other essential HBV markers such as anti-HBs, HBcAg and anti-HBcAg were not tested for due to financial constraints.
CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter presents the analysis and results from the study and it has been presented in accordance of the study objectives and research questions. Findings were analysed in the descriptive and analytic statistics.

4.2 Demographic Characteristics of respondents

A descriptive analysis was performed to describe the demographic characteristics of respondents who were mainly pregnant women. The results here are described in the frequencies and percentages. Details are presented in Table 4.1
Table 4.1: Demographic Characteristics of respondents

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;25</td>
<td>52</td>
<td>32.5</td>
</tr>
<tr>
<td>25-35</td>
<td>91</td>
<td>56.9</td>
</tr>
<tr>
<td>&gt;35</td>
<td>17</td>
<td>10.6</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married (Monogamous)</td>
<td>134</td>
<td>83.8</td>
</tr>
<tr>
<td>Married (Polygamous)</td>
<td>20</td>
<td>12.5</td>
</tr>
<tr>
<td>Single</td>
<td>6</td>
<td>3.8</td>
</tr>
<tr>
<td><strong>Religious affiliation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christianity</td>
<td>19</td>
<td>11.9</td>
</tr>
<tr>
<td>Islam</td>
<td>141</td>
<td>88.1</td>
</tr>
<tr>
<td><strong>Educational Level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Education</td>
<td>81</td>
<td>50.6</td>
</tr>
<tr>
<td>Lower Primary</td>
<td>28</td>
<td>17.5</td>
</tr>
<tr>
<td>Secondary Education</td>
<td>37</td>
<td>23.1</td>
</tr>
<tr>
<td>Tertiary Education</td>
<td>14</td>
<td>8.8</td>
</tr>
</tbody>
</table>

Majority of the respondents were between 25-35 years old (56.9%), those below 25 years and those above 35 years were 32.5% and 10.6% respectively. It can again be seen that those who were in a monogamous marriage were the majority (83.8%) whilst those who were polygamous were 12.5% and single (3.8%). Half of the respondents had no formal education (50.6%) and those who had primary and secondary education were 17.5% and 23.1% respectively (Table 4.1).
Figure 4.1: Occupational status of respondents

The major occupations were housewives (35.0%), trading (29.0%) and farming (16.0%). The others were engaged in teaching; hairdressing and health work (22.0%) (Figure 4.1).

4.3 Prevalence of hepatitis B infection among the pregnant women

As part of the study, laboratory tests were performed on the selected study population to determine the prevalence of hepatitis B virus infections among the pregnant women. It was found that 15 (9.4%) out of 160 of the tested population were reactive or tested positive for Hepatitis B viral infection (95% CI=1.048-1.139). Therefore, the prevalence of HBV found among the pregnant women was 93.8 cases per 1,000 population (figure 4.2).
Figure 4.2: Prevalence of hepatitis B among pregnant women

4.3.1 Prevalence of hepatitis B infection among the various demographic groups

The prevalence of HBV was also determined among the pregnant women according to their demographic characteristics. Detailed results are shown in Table 4.2
Table 4.2: Prevalence of hepatitis B infection among the various demographic groups

<table>
<thead>
<tr>
<th>Variables</th>
<th>Reactive</th>
<th>Non-reactive</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;25</td>
<td>6 (40.0)</td>
<td>46 (31.7)</td>
</tr>
<tr>
<td>25-35</td>
<td>9 (60.0)</td>
<td>82 (56.6)</td>
</tr>
<tr>
<td>&gt;35</td>
<td>0 (0.0)</td>
<td>17 (11.7)</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married (Monogamous)</td>
<td>15 (100.0)</td>
<td>119 (82.1)</td>
</tr>
<tr>
<td>Married (Polygamous)</td>
<td>0 (0.0)</td>
<td>20 (13.8)</td>
</tr>
<tr>
<td>Single</td>
<td>0 (0.0)</td>
<td>6 (4.1)</td>
</tr>
<tr>
<td><strong>Religion</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christianity</td>
<td>1 (6.7)</td>
<td>18 (12.4)</td>
</tr>
<tr>
<td>Islam</td>
<td>14 (93.3)</td>
<td>127 (87.6)</td>
</tr>
<tr>
<td><strong>Education Level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Education</td>
<td>7 (46.7)</td>
<td>74 (51.0)</td>
</tr>
<tr>
<td>Lower Primary Education</td>
<td>3 (20.0)</td>
<td>25 (17.2)</td>
</tr>
<tr>
<td>Secondary Education</td>
<td>5 (33.3)</td>
<td>32 (22.1)</td>
</tr>
<tr>
<td>Tertiary Education</td>
<td>0 (0.0)</td>
<td>14 (9.7)</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farmer</td>
<td>3 (20.0)</td>
<td>22 (15.2)</td>
</tr>
<tr>
<td>Health worker</td>
<td>2 (13.3)</td>
<td>7 (4.8)</td>
</tr>
<tr>
<td>House wife</td>
<td>5 (33.3)</td>
<td>51 (35.2)</td>
</tr>
<tr>
<td>Seamstress/Hairdresser</td>
<td>1 (6.7)</td>
<td>11 (7.6)</td>
</tr>
<tr>
<td>Teacher</td>
<td>0 (0.0)</td>
<td>12 (8.3)</td>
</tr>
</tbody>
</table>
| Trader             | 4 (26.7) | 42 (29.0)    

Table 4.2 provides details of the prevalence of HBV infections among the pregnant women from various demographic groups. According to their age group, the prevalence was higher among those within 25-35 years (60%) than those less than 25 years (40%). Almost all of the active infection was found among women in a monogamous relationship (100%) whilst none was found with those single and those in a polygamous relationship. Comparing their religious affiliations, 93.3% of the prevalence was found among the Muslims and 6.7% of the Christians. Again, according to their occupational status, the prevalence was higher among house wives (33.3%), traders (26.7%) and farmers (20.0%).
4.4 Knowledge of pregnant women on HBV infection prevention and control.

This section provides details on pregnant women’s knowledge on the causes, prevention and control of HB virus infection.

Table 4.3: Pregnant women’s knowledge on the HBV infection.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have heard about HBV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>76</td>
<td>47.5</td>
</tr>
<tr>
<td>No</td>
<td>84</td>
<td>52.5</td>
</tr>
<tr>
<td>Knowledge on how to check status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>45</td>
<td>28.1</td>
</tr>
<tr>
<td>No</td>
<td>115</td>
<td>71.9</td>
</tr>
<tr>
<td>Have ever been vaccinated before pregnancy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>4</td>
<td>2.5</td>
</tr>
<tr>
<td>No</td>
<td>156</td>
<td>97.5</td>
</tr>
<tr>
<td>Satisfied with safety measures at the ANC/hospital</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>153</td>
<td>95.6</td>
</tr>
<tr>
<td>No</td>
<td>7</td>
<td>4.4</td>
</tr>
</tbody>
</table>

From Table 4.3, it is shown that 47.5% of the respondents were aware or heard about Hepatitis B viral disease whilst the majority of 52.5% were not aware. Also, only 28.1% knew about ways to check for one’s Hepatitis viral status and only 2.5% had vaccinated against Hepatitis B virus before they became pregnant. It was again found that almost (95.6%) of the respondents were satisfied with the safety measures at the hospital.
Figure 4.3: Respondent's knowledge on the sources of HBV infections

Responses on the sources or likely causes of HBV infection shows that 34% and 25% of the respondents attributed it to blood contact with an infected person and also to sexual
intercourse with an infected person respectively. Also, 12% attributed it to infected needle pricks, 5% to infected sharp related objects. About 24% of the respondents had no idea about the sources of HBV infections (Figure 4.3).

![Figure 4.4: Reasons for not vaccinating for HBV Infection by respondents](image)

**Figure 4.4: Reasons for not vaccinating for HBV Infection by respondents**

Figure 4.4 provides information on the reasons why HBV vaccine was not taken by respondents before their pregnancy. The most occurring reason was that, they were not aware of any vaccination (77%). Other reasons include it was not compulsory (11%), there was no money for vaccination (9%) and there was no need (3%).
4.5 Risk factors of hepatitis B infection among the respondents

Some likely predisposing elements were studied among the respondents to ascertain their likelihood of a relationship with HBV infection in the respondents. Figures 4.5 and 4.6 provides details on them.

![Figure 4.5: Risk factors related to HBV infection](image)

From figure 4.5, it can be seen that 11% and 4% of the respondents had a history of blood transfusion and surgical procedures respectively. Those who had history of dental procedure and those who had tattoos on their body were also 1% and 21% respectively. History of unsafe injection was 9% whilst caesarean section was also 4%.
Figure 4.6: Other risk factors related to HBV infection among the respondents

It was found that 18% had ear piercing and 5% ever had liver problem or jaundice in the family. Those who had history of abortion and history of female genital circumcision were 21% and 2% respectively.
4.5.1 Bivariate analysis of risk factors associated hepatitis B infection

A bivariate analysis was performed to determine the various risk associated with HBV infection among the pregnant women in the study area. Risk factors involved both demographic factors and or life style factors.

Table 4.4: Bivariate analysis of demographic risk factors associated hepatitis B infection

<table>
<thead>
<tr>
<th>Variables</th>
<th>HBV infection Status</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reactive</td>
<td>Non-reactive</td>
</tr>
<tr>
<td><strong>Age group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;25</td>
<td>6 (11.5)</td>
<td>46 (88.7)</td>
</tr>
<tr>
<td>25-35</td>
<td>9 (9.9)</td>
<td>82 (90.1)</td>
</tr>
<tr>
<td>&gt;35</td>
<td>0 (0.0)</td>
<td>17 (100.0)</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married (Monogamous)</td>
<td>15 (11.2)</td>
<td>119 (88.8)</td>
</tr>
<tr>
<td>Married (Polygamous)</td>
<td>0 (0.0)</td>
<td>20 (100.0)</td>
</tr>
<tr>
<td>Single</td>
<td>0 (0.0)</td>
<td>6 (100.00)</td>
</tr>
<tr>
<td><strong>Religious Affiliation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christianity</td>
<td>1 (5.3)</td>
<td>18 (94.7)</td>
</tr>
<tr>
<td>Islam</td>
<td>14 (9.9)</td>
<td>127 (90.1)</td>
</tr>
<tr>
<td><strong>Education Level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Education</td>
<td>7 (8.6)</td>
<td>74 (91.4)</td>
</tr>
<tr>
<td>Lower Primary Education</td>
<td>3 (10.7)</td>
<td>25 (89.3)</td>
</tr>
<tr>
<td>Secondary Education</td>
<td>5 (13.5)</td>
<td>32 (86.5)</td>
</tr>
<tr>
<td>Tertiary Education</td>
<td>0 (0.0)</td>
<td>14 (100.0)</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farmer</td>
<td>3 (12.0)</td>
<td>22 (88.0)</td>
</tr>
<tr>
<td>Health worker</td>
<td>2 (22.2)</td>
<td>7 (77.8)</td>
</tr>
<tr>
<td>House wife</td>
<td>5 (8.9)</td>
<td>51 (91.1)</td>
</tr>
<tr>
<td>Seamstress/Hairdresser</td>
<td>1 (8.3)</td>
<td>11 (91.7)</td>
</tr>
<tr>
<td>Teacher</td>
<td>0 (0.0)</td>
<td>12 (100.0)</td>
</tr>
<tr>
<td>Trader</td>
<td>4 (8.7)</td>
<td>42 (91.3)</td>
</tr>
</tbody>
</table>

NB: Statistical significance at p-value<0.05; Test of significance was performed using Fisher’s exact; p-values marked with * observed measurement was statistically significant; percentage (%) totals were presented in rows.

Table 4.4 provides the results of a bivariate analysis of demographic factors and its association with HBV infections. It was observed that factors such as education, religion and occupation were statistically associated with HBV status with p-value=0.001, 0.050
and 0.043 respectively. On the other hand, no statistical association was found with age (p-value=0.448), marital status (p-value=0.297) and HBV status.
Table 4.5: Bivariate analysis of risk factors associated hepatitis B infection

<table>
<thead>
<tr>
<th>Variables</th>
<th>HBV infection status</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reactive</td>
<td>Non-reactive</td>
</tr>
<tr>
<td>History of blood transfusion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>2 (11.8)</td>
<td>15 (88.2)</td>
</tr>
<tr>
<td>No</td>
<td>13 (9.1)</td>
<td>130 (90.9)</td>
</tr>
<tr>
<td>History of surgical procedure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>0 (0.0)</td>
<td>7 (100.0)</td>
</tr>
<tr>
<td>No</td>
<td>15 (9.8)</td>
<td>138 (90.2)</td>
</tr>
<tr>
<td>History of dental procedure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>0 (0.0)</td>
<td>1 (100.0)</td>
</tr>
<tr>
<td>No</td>
<td>15 (9.4)</td>
<td>144 (90.6)</td>
</tr>
<tr>
<td>Had body tattoos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>5 (15.2)</td>
<td>28 (84.9)</td>
</tr>
<tr>
<td>No</td>
<td>10 (7.9)</td>
<td>117 (92.1)</td>
</tr>
<tr>
<td>History of unsafe injection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>0 (0.0)</td>
<td>15 (100.0)</td>
</tr>
<tr>
<td>No</td>
<td>15 (10.3)</td>
<td>130 (89.7)</td>
</tr>
<tr>
<td>Had undergone Caesarean section procedure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>0 (0.0)</td>
<td>7 (100.0)</td>
</tr>
<tr>
<td>No</td>
<td>15 (9.8)</td>
<td>138 (90.2)</td>
</tr>
<tr>
<td>History of ear piercing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>11 (8.40)</td>
<td>120 (91.6)</td>
</tr>
<tr>
<td>No</td>
<td>4 (13.8)</td>
<td>25 (86.2)</td>
</tr>
<tr>
<td>Ever had liver problem or jaundice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1 (12.5)</td>
<td>7 (87.5)</td>
</tr>
<tr>
<td>No</td>
<td>14 (9.2)</td>
<td>138 (90.8)</td>
</tr>
<tr>
<td>History of liver disease among the members of the family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>0 (0.0)</td>
<td>6 (100.0)</td>
</tr>
<tr>
<td>No</td>
<td>15 (9.7)</td>
<td>139 (90.3)</td>
</tr>
<tr>
<td>History of abortion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>4 (11.8)</td>
<td>30 (88.2)</td>
</tr>
<tr>
<td>No</td>
<td>11 (8.7)</td>
<td>115 (91.3)</td>
</tr>
<tr>
<td>History of female circumcision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1 (3.3)</td>
<td>2 (66.7)</td>
</tr>
<tr>
<td>No</td>
<td>14 (8.9)</td>
<td>143 (91.1)</td>
</tr>
</tbody>
</table>

NB: Statistical significance was observed at p-value<0.05; Test of significance was performed using Fisher’s exact; p-values marked with * means the observed measurement was statistically significant; percentage (%) totals were presented in rows.

Table 4.5 provides detailed results on the bivariate analysis of other lifestyle factors and its association with HBV infection status. History of blood transfusion and having tattoo.
on the body were statistically significant with HBV infection with p-values =0.036 and 0.019 respectively. Also, a statistically significant was found between history of ear piercing (p-value=0.047), history of liver problem (p-value=0.035), history of abortion (p-value=0.026), history of female genital circumcision (p-value=0.025), and HBV infection.

4.5.2 Multivariate analysis of risk factors associated hepatitis B infection

A multivariate analysis was performed using a logistic regression analysis to ascertain the risk factors to HBV infection among pregnant women. Both simple and multiple logistic regressions were performed to determine the crude and adjusted odds ratios.
Table 4.6: Logistic regression analysis of risk factors to HBV infections

<table>
<thead>
<tr>
<th>Variables</th>
<th>P-value</th>
<th>COR</th>
<th>P-value</th>
<th>AOR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Religion</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christianity</td>
<td>Ref</td>
<td>1</td>
<td>Ref</td>
<td>1</td>
</tr>
<tr>
<td>Islam</td>
<td>0.51</td>
<td>1.98 (0.24-16.16)</td>
<td>0.535</td>
<td>2.18 (0.19-25.65)</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farmer</td>
<td>Ref</td>
<td>1</td>
<td>Ref</td>
<td>1</td>
</tr>
<tr>
<td>Health worker</td>
<td>0.046*</td>
<td>2.10 (0.28-15.91)</td>
<td>0.029*</td>
<td>6.12 (0.32-11.70)</td>
</tr>
<tr>
<td>House wife</td>
<td>0.67</td>
<td>0.72 (0.15-3.31)</td>
<td>0.584</td>
<td>0.61 (0.10-3.64)</td>
</tr>
<tr>
<td>Seamstress/Hairdresser</td>
<td>0.74</td>
<td>0.67 (0.05-7.44)</td>
<td>0.707</td>
<td>0.61 (0.5-8.11)</td>
</tr>
<tr>
<td>Trader</td>
<td>0.66</td>
<td>0.70 (0.14-3.45)</td>
<td>0.631</td>
<td>0.64 (0.11-3.87)</td>
</tr>
<tr>
<td><strong>Education level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Education</td>
<td>Ref</td>
<td>1</td>
<td>Ref</td>
<td>1</td>
</tr>
<tr>
<td>Lower Primary Education</td>
<td>0.74</td>
<td>1.27 (0.30-5.22)</td>
<td>0.561</td>
<td>1.64 (0.31-8.72)</td>
</tr>
<tr>
<td>Secondary Education</td>
<td>0.42</td>
<td>1.65 (0.41-5.64)</td>
<td>0.573</td>
<td>1.60 (0.31-8.20)</td>
</tr>
<tr>
<td>Tertiary Education</td>
<td>0.26</td>
<td>Empty</td>
<td>Empty</td>
<td>Empty</td>
</tr>
<tr>
<td><strong>History of blood transfusion</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Ref</td>
<td>1</td>
<td>Ref</td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>0.15</td>
<td>1.33 (0.43-61.36)</td>
<td>0.768</td>
<td>0.75 (0.11-5.04)</td>
</tr>
<tr>
<td><strong>Had body tattoos</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Ref</td>
<td>1</td>
<td>Ref</td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>0.021*</td>
<td>2.09 (0.66-6.62)</td>
<td>0.020*</td>
<td>2.29 (0.63-8.37)</td>
</tr>
<tr>
<td><strong>History of ear piercing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Ref</td>
<td>1</td>
<td>Ref</td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>0.037*</td>
<td>1.39 (0.41-4.71)</td>
<td>0.042*</td>
<td>0.58 (0.15-2.31)</td>
</tr>
<tr>
<td><strong>Ever had liver problem or jaundice</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Ref</td>
<td>1</td>
<td>Ref</td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>0.047*</td>
<td>1.41 (0.16-12.37)</td>
<td>0.960</td>
<td>0.94 (0.08-10.94)</td>
</tr>
<tr>
<td><strong>History of abortion</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Ref</td>
<td>1</td>
<td>Ref</td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>0.59</td>
<td>1.39 (0.41-4.71)</td>
<td>0.595</td>
<td>1.45 (0.37-5.74)</td>
</tr>
<tr>
<td><strong>History of female circumcision</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>Ref</td>
<td>1</td>
<td>Ref</td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>0.047*</td>
<td>1.41 (0.16-12.38)</td>
<td>0.019*</td>
<td>7.06 (0.37-13.60)</td>
</tr>
</tbody>
</table>

Note: A measurement is statistically significant at p-value<0.05; AOR: adjusted odds ratio; OR: Crude odds ratio*: statistically significant; 95%CI: confidence interval; Ref: reference group.
Table 4.6 shows the results of a multivariate logistic regression which was fitted to ascertain the risk factors of HBV infection among pregnant women. It can be observed that with reference to farmers, women who were health workers had 6 times higher the odds of having HBV infection holding all other factors constant (p-value=0.029; AOR:6.12; 95% CI: 0.32-11.70). It was also found that history of ear piercing had statistically significant association with HBV infections with a crude odds ratio of 1.39 and a p-value of 0.037. Again, compared to women who had no tattoo on their body, those who had were 2 times more likely to have a positive HBV infection. History of female genital circumcision was also found to be statistically significant with HBV status. Thus, with reference to women who had not undergone circumcision, those who were circumcised had 7 times higher the odds of having HBV infection.
CHAPTER FIVE

DISCUSSIONS

5.1 Introduction

This study was conducted to ascertain the prevalence of hepatitis B virus infection and associated risk factors among pregnant women in the Gushegu district in the Northern Region of Ghana.

5.2 Demographic characteristics of respondents

This study was among women who were pregnant. It was found out that most of the study participants were within the age group of 25-35 years old. The study also found that married women who were in monogamous marriages formed the majority of the study participants (83.8%) as compared to those in polygamous marriages (12.5%) whilst participants who were not married were (3.8%). This finding is contrary to the popular believe that most of the marriages in the northern part of Ghana are polygamous marriages (Ofori-Asenso & Agyeman, 2016). Also, it was found that women who had no formal education were half (50.6%) of the respondents.

5.3 Prevalence of hepatitis B infection among the pregnant women

This study revealed that the prevalence rate of hepatitis B among the pregnant women in the Gushegu District was 9.4%. That is, 15 out of 160 of the tested population had active or tested sero-positive for HB surface antigen which is higher than the WHO cut off level of endemicity of 8% hence classifying the area as highly endemic. This finding is similar to what was found in some previous studies in Ghana and Kenya. In Accra, Ghana, a much higher sero-prevalence of 10.5% was however reported by Damale, Lassey & Bekoe (2005). Again, in Ghana, among pregnant women in the Asante Akim North Municipality of the Ashanti region, Ephraim et al, (2015) reported a similar prevalence rate of 9.5%.
Again, in Garissa and Maragua both Kenya, Hyams et al., (1989), reported a high prevalence of HBV infection, with HBsAg carrier rates ranging from 5 to 30%. Abade (2008) also found in Garissa, Kenya that 14.1% of the mothers attending antenatal tested positive for Hepatitis B infections. The findings of this present study is also consistent with a study carried out in Nigeria which gave a prevalence of 11.6% (Harry et al, 1994) as well as in Cameroon, where a prevalence of 25.3% was reported (Ndumbe et al. 1993).

However, the results of this current study are not in agreement with the studies done on pregnant women in India which had lower prevalence rates of 4.6% (Juszozyk, 2000). Other studies on pregnant women have shown varying prevalence rates; in United States of America (USA), it was found to be 0.14%-0.97% in all races, except among the Asian-Americans where prevalence was 5.6%, (Euler et al, 2003).

HBV infection in this present study was found to be unequally distributed among the different age groups with age group 25-35 years (60%) having the highest prevalence rate. However, this could be due to the majority of the study subjects falling under this age category. No Hepatitis B infection was detected among pregnant women aged above 35 years old.

Unequal distribution of infection was also found among the different occupational groups with pregnant women who were house wives and those who were traders also recorded higher prevalence of 33.3% and 26.7% respectively.

5.4 Knowledge of pregnant women on HBV infection prevention and control

Knowledge level regarding HBV infection was found to be low among the pregnant women studied under this current study. It was found that awareness about HBV was 47.5%, however, is higher than the awareness level found among similar group in Nigeria and Kenya.
where awareness was recorded as 26% and 32% respectively (Rabiu, Akinola, Adewunmi, Omololu, & Ojo, 2010; Yakasai, Ayyuba, Abubakar, & Ibrahim, 2012).

Again, only 28.1% of the study respondents knew where to go for HBV status checking. This was worrying because low knowledge about where to go for testing means that majority of this people may not know of their status and take their necessary step to protect themselves and their fetuses. These findings also translate into low vaccination with HBV vaccine before pregnancy as it was found to be only 2.7% of the pregnant women under this current study had vaccinated prior to their pregnancy.

5.5 Risk factors of hepatitis B infection among pregnant women

Several predisposing factors of hepatitis B viral infection were evaluated in the study period. Lack of formal education was significantly associated with HBV infection in this study with higher prevalence found among those with no formal education (p-value=0.049). Study participants with some level of formal education are more likely to understand the modes of transmission of hepatitis B infection hence are likely to protect themselves. In contrast to the finding by this current study, a similar study done on pregnant women attending Antenatal Clinic at Aminu Kano Teaching Hospital, Kano, Nigeria found a high proportion of HBsAg seen among women in polygamous setting of marriage (16.7%) (15/90) and was statistically significant (P<0.001) (Yakasai et al., 2012).

Risk factors to hepatitis B infection include blood contacts, sexual intercourse, being exposed to sharp objects, unsafe injections among others. This current study found that 11.5%, 21% and 9% of the pregnant women studied had history of blood transfusion, body tattoos and unsafe injections respectively. This study also found that, other risk factors such as ear piercing (18%), and abortion (21%) were also found among pregnant women.
In a bivariate analysis of associated risk factors, it was found that factors such as history of blood transfusion (p-value=0.036), body tattoo (p-value=0.019), ear piercing (p-value=0.047), history of female circumcision (p-value=0.025), and history of unsafe abortion (p-value=0.026) were statistically significant with HBV infection (p<0.05). However, when these factors were put in multivariate logistic regression model and adjusted for other factors, only three factors including history of tattoos or traditional marks, ear piercing and history of female genital mutilation were found to be predisposing elements for HBV infection among the pregnant women. The results of this study agree with results reported by Abade (2008), in Garissa, Kenya it was realised that female genital mutilation was significant risk factor. In that same study body tattoo and ear piercing were not found as significant. Similar to this study, a study in Mexico revealed the presence of tattoo as a risk factor for hepatitis B infection (Tanaka, 2000). In Thailand, history of jaundice was an important risk factor for HBV among pregnant women (Kuszewski, 2001) unlike the findings in this present study. Lack of sufficient infection control procedures has made ear piercing one of the risk factors for HBV contraction due to lack of sufficient knowledge in infection control (Mendez, 1999) which is wholly inconsistent with finding from this study.

Female genital circumcision was also found to be a risk factor to contracting HBV infection. Thus; women who had undergone circumcision were 7 times more likely of contracting HBV infection. This could be explained by the fact that many of such procedures are mostly done in home by people who are not in medical professionals. In most cases unsterile surgical equipment are used to conduct the surgery predisposing victims to hepatitis B infection.
CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This study revealed a high prevalence of hepatitis B infection among pregnant women which is higher than the WHO limit (≥8%) making the district highly endemic area according to WHO criteria. Women with no formal education and those engaged in trading seemed to have increased chance of getting hepatitis B.

Hepatitis B viral infection was not associated with age group or marital status meanwhile a high proportion was found among women in monogamous marriages. Body tattooing, ear piercing and history of Female Genital Mutilation were the known risk factors that were found to be associated with Hepatitis B infection.

The main path of HBV transmission in Gushegu district could be either through tattooing or traditional marks, ear piercing or Female Genital Mutilation. Knowledge or awareness level about HBV infection was low as the majority did not know about their status or where to go for testing and vaccination in the district. The study also revealed that high cost of vaccination and inadequate knowledge about hepatitis B infection were the major reasons cited by the women for not going for vaccination before pregnancy.

6.2 Recommendation

The following recommendations are made based on the findings from this study:

- MOH/GHS should develop clear guidelines for testing, vaccination and treatment for pregnant women in view of the higher prevalence of HBV disease in the study area and similar prevalences in other studies in Ghana.
• The District Health Directorate should adopt interventional strategies such as screening, intensive health education about hepatitis B amongst antenatal women and mandatory vaccination of all antenatal women who test negative for HBsAg. These strategies would help to curtail Hepatitis B infection in this vulnerable population.

• Health workers especially community health workers should also intensify health education about the risk factors of hepatitis B infection in the district.

• Traditional practices such as body tattooing or traditional marks, female genital mutilation should be banned by the District Assembly to reduce the high prevalence of HBV infection in the district.

• Administration of hepatitis B immunoglobulin to all infected expectant women during pregnancy.

• Future study should focus on other high-risk groups such as drug peddlers, sex workers, health workers among others to come out with a general prevalence across all segments in the district.
REFERENCES


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Rashid Sabria. (2011). *Hepatitis B Virus Infection Among Antenatal Clinic Attendees At the Muhimbili National Hospital, Seroprevalence and Associated Factors.*


Rashid Sabria. (2011). *Hepatitis B Virus Infection Among Antenatal Clinic Attendees At the Muhimbili National Hospital , Seroprevalence and Associated Factors*.


APPENDICES

Appendix I: Study Questionnaire


SECTION A-DEMOGRAPHIC DATA

<table>
<thead>
<tr>
<th>NO</th>
<th>QUESTION (Tick one only)</th>
<th>RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Year of birth</td>
<td>(dd/mm/yyyy) ______________</td>
</tr>
<tr>
<td>2</td>
<td>Age</td>
<td>...............</td>
</tr>
<tr>
<td>3</td>
<td>Religious affiliation</td>
<td>1. Christianity ☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Traditional ☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Islam ☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Other specify ☐</td>
</tr>
<tr>
<td>4</td>
<td>Relationship/ Marital status</td>
<td>1. Single ☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Married (Polygamous) ☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Married (Monogamous) ☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Separated/Divorced ☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Widowed ☐</td>
</tr>
<tr>
<td>5</td>
<td>Occupation</td>
<td>...............</td>
</tr>
<tr>
<td>6</td>
<td>Education (Tick one only)</td>
<td>1. No Education ☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Lower Primary Education ☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Upper Primary Education ☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Secondary Education ☐</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Tertiary Education (or other Higher Education Institution) ☐</td>
</tr>
</tbody>
</table>
SECTION B: RISK FACTORS INFORMATION

7. Have you ever been transfused?
   □ Yes
   □ No

8. If yes to question (7), how many times?
   1 □
   2 □
   3 □
   4 and above □

9. Have you had any history of surgical procedure?
   □ Yes
   □ No

10. If yes to question (9), how many times? ________________

11. Any history of dental procedure?
   □ Yes
   □ No

12. If yes to question (11), how many times? ________________

13. Do you have any tattoo on your body?
   □ Yes
   □ No

14. Have you ever had history of unsafe injection?
   □ Yes
   □ No

15. Have you ever undergone Caesarean section procedure?
   □ Yes
   □ No

16. Any history of ear piercing?
   □ Yes
   □ No

17. If yes to question (16), where?
   □ In jeweller’s shop
   □ At home

18. Have you ever had liver problem or jaundice?
   □ Yes
19. Is there any history of liver disease among the members of your family?
   - [ ] Yes
   - [ ] No

20. Any history of Abortion or Miscarriage?
   - [ ] Yes
   - [ ] No

21. Any history of Female circumcision?
   - [ ] Yes
   - [ ] No

22. If yes to question (21), was it done individually or in a group of other ladies?

   ..................................................................................................................
SECTION C - PREVALENCE OF HBV INFECTION

23. Do you know your HBV infection status?  
Yes……………………………………1  
No……………………………………2

24. If Yes in 23, when did you know your status?  
Provide date…………………………

25. confirm your status by testing  
Reactive ..................................1  
Non-reactive..............................2

26. If No in 23, would you like us to check your status for you?  
Yes……………………………………1  
No……………………………………2

27. If Yes in 26, confirm HBV infection status by testing.  
Reactive......................................1  
Non-reactive..............................2

SECTION D – KNOWLEDGE ON HBV INFECTION PREVENTION

28. Have you heard about Hepatitis B infection (HBV) before?  
Yes ......................  
No......................

29. If Yes in 28, what are some of the causes of hepatitis B viral infection?  
Sexual intercourse with infected person……………………………………1  
Unsafe injection…………………………2  
Use of unsterile surgical instruments..........3  
Mother-to–child transmission………………………………4  
Don’t know…………………………………………………………5  
Others (Specify)……………………………………………………6
30 Do you know the means by which someone can get to know his/her hepatitis B status? 

Yes..............1
No..............2
Don’t Know.....3

31 If yes in 30, what are the means? 

........................................1

........2

........................................3

31 Have you ever been vaccinated against HBV infection before becoming pregnant? 

Yes..............................1
No...............................2

32 If Yes in 31, provide date

........

33 If No in 31, did you vaccinate against HBV when pregnant? 

Yes..............................1
No...............................2

34 If No in 33, why 

No money......................1
No need.........................2
Not compulsory...............3
Others (specify)...........4

35 Did you receive any prior information or education on HBV infection before getting pregnant? 

Yes..............................1
No...............................2

36 Are you satisfied with safety measures in the ANC/Hospital 

Yes..............................1
No...............................2
If No 29, which ones are not well observed?

1. Barrier nursing
2. No safety boxes
3. Improper disposal of needles
4. Others (specify)

THANK YOU FOR TAKING PART IN THIS STUDY
Appendix II: REFERRAL FORM

Name:
Age:
Date:

Brief Medical history
........................................................................................................................................
........................................................................................................................................

Laboratory investigation done:
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................

Initial treatment
........................................................................................................................................
........................................................................................................................................

Provisional diagnosis
........................................................................................................................................

Name of Hospital referred to:
........................................................................................................................................

Name of clinician ....................................................................................................................

Signature and stamp.............................................................................................................
Appendix III: Consent Form

INFORMED CONSENT FORM

CONSENT TO PARTICIPATE IN A HUMAN RESEARCH PROTOCOL

**Project title: Prevalence of Hepatitis B Among Pregnant Women and Associated risk factors in Gushegu**

I…………………………………………. have been duly briefed to take part in the research Prevalence of Hepatitis B Among Pregnant Women and Associated risk factors in Gushegu to be conducted by Mr. Raymond Zimtani (MPH student, SPH, University of Ghana, Legon). I have also been duly briefed on the methodology and significance of the study.

On my own free will, I hereby consent to be part of the study, based on my understanding of what the study entails.

I am consenting to this study based on the condition that there will be no reference made to my identity to any person after providing all the information requested from me and the test result for the HBV infection for this study as promised by the researcher. The findings of this study will be reported at meetings, seminars and in medical journals but my name will not be used in the reports.

**My right to refuse or withdraw:**

I have being 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.

Dr. Samuel Sackey  
School of Public Health  
Tel: 0242216542  

Hannah Frimpong  
Ethical Review Chairperson  
Tel: 0507041223
Raymond Zimtani
Tel: 0204109314/0249033594
Email: rzimtani@gmail.com

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:………………………………………………

Name:……………………………………………….Date:…………………………

Place…………………………………………………..

If illiterate right thumb print Name of witness………………

……………………………… Signature…………………………..
Appendix IV: Information Sheet

Consent Form – Participants

Study Title: Prevalence of Hepatitis B Among Pregnant Women and Associated risk factors in Gushegu.

Principal Investigator: Raymond Zimtani

Qualification: BSc Nursing

Address: Box LG 13, School of Public Health, College of Health Sciences, University of Ghana, Legon. Tel. 0204109314/0249033594

Greetings, my name is ………………………………………….. and I am conducting administering this questionnaire on behalf of Raymond Zimtani, an MPH (Epidemiology and Disease control) resident, School of Public Health, University of Ghana.

General Information about the Research

Cirrhosis and hepatocellular carcinoma (HCC) are the foremost complications of CHB. According to WHO (2015), 650 000 people are projected to die yearly from HCC and cirrhosis as a result of CHB. Hepatitis B infection in pregnancy has serious implications including the risk of mother to child transmission. In localities with high prevalence of HBV, the predominant mode of spread is reportedly, perinatal whereas the major mode of transmission in areas of low prevalence is sexual contact among high risk persons. The main objective of the study is to ascertain the prevalence of hepatitis B viral infection (HBV) within expectant women and associated risks elements of infection in the Gushing District.

I would like to request you to be part of my study. I shall ask you some questions centred on this pregnancy if you concur to take part in the study. This will take about 15 minutes of your time. If you agree to participate, you will be among 160 pregnant women who will also be participating in the study in this hospital. Participating in this study is entirely voluntary. You have the right to refuse to participate and this will not affect your rights in any way, especially with receiving healthcare. You are also at liberty to pull out at any stage of the study if you wish to. I would however, love to see you participate to the end.
Possible Risk and Discomfort

This study poses no risk to participants as sterile materials will be used to test participants. The only discomfort will be the needle prick in testing for HbsAg. The participants will approximately spend about 15 minutes in answering the questionnaires. Consent form will be signed by participants before they are allowed to participate. Participants will be considered as volunteers and can opt out of the study or decline to answer any question.

Possible Benefits

There will be a direct benefit to the participants as they will be having the opportunity to update their HBV infection status, outcome of the study can be used to plan interventional programs in addressing the problem of exposures among the pregnant women. It will also be an opportunity to refer participants who are positive to the hospital for further treatment.

Confidentiality

All the data collected from you will be kept strictly confidential and will be used for the intended purpose only. You will not be identified by name in any dissemination reports or publications resulting from this study.

Data Security and Record Keeping

Study materials (questionnaires and informed consent) will be stored in a locked file cabinet in the office of the principal investigator. Data will be entered STATA software package version 15 by the research assistants, and electronic files will be made accessible only to the research team. Study materials (questionnaires and informed consent) will be labelled and given a unique study identification number for the participants. The data storage will be done by the principal investigator, Mr. Raymond Zintani-School of Public Health, University of Ghana, Legon.

Do you have any questions or clarifications?

If any of your questions were not satisfactorily answered by me, or you have further questions regarding this study, you may contact:

Mr. Raymond Zintani, (Principal Investigator) at NMTC-Gushegu,
Tel.:0204109314 or e-mail: rzimtani@gmail.com

Dr. Samuel Sackey, (Supervisor), School of Public Health
Tel: 0242216542
sackey492003@yahoo.co.uk

Hannah Frimpong: Ghana Health Service Ethical Review Committee
Tel 0507041223 or ghserc@gmail.com