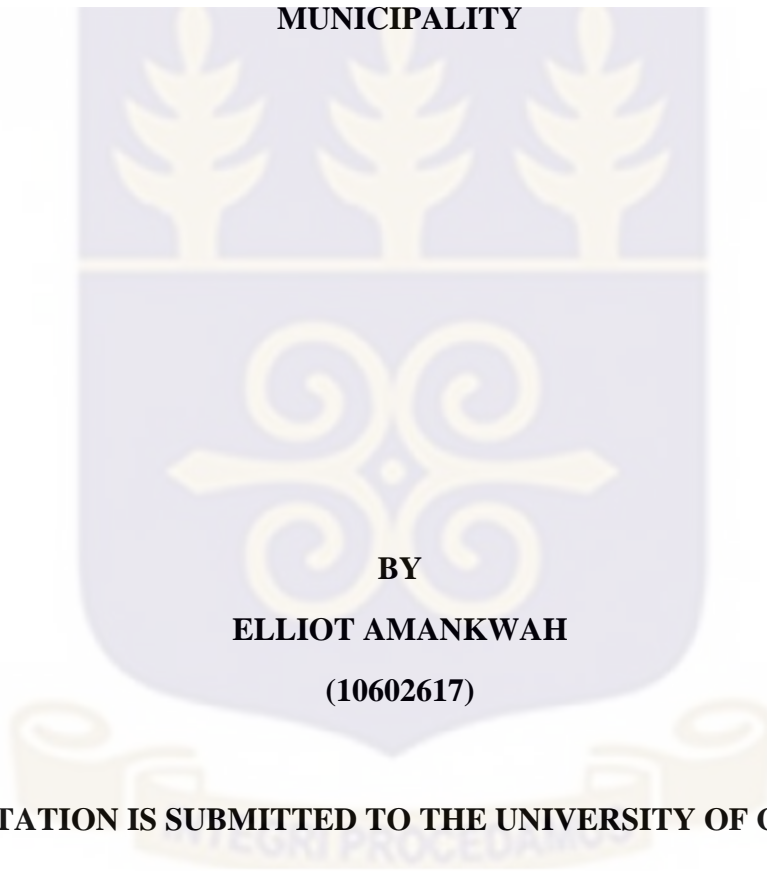


**SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA**

**FACTORS ASSOCIATED WITH HEPATITIS B INFECTION AMONG PREGNANT
WOMEN ATTENDING ANTE NATAL CARE IN LA NKWANTANANG MADINA
MUNICIPALITY**



**BY
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**THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF A
MASTERS IN PUBLIC HEALTH DEGREE**

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DECLARATION

I, Elliot Amankwah declare that apart from references to other people's works which have been duly acknowledged, this dissertation is my own independent work under the supervision of my academic supervisor, and that it has not been submitted to this university or any university elsewhere for an award of any certificate.

Date:...../...../.....

Signature:.....

Elliot Amankwah (Student)

Date:...../...../.....

Signature:.....

Dr. Bismark Sarfo (Academic Supervisor)

DEDICATION

This work is specially dedicated to my dearest Afua Owusua Paintsil for her immense love and support to me in diverse ways, likewise my uncle Gideon Opare Akuffo for his encouragement.



ACKNOWLEDGEMENT

I am only sufficient in the sufficiency of the Lord God almighty who has made me reach this far out of his love, grace, mercies and protection throughout my entire life and particularly the tenure of this course.

My children; Nana Yaw Opare Amankwah, Nyamekye Oparebea Amankwah and Sylvette Nhyira Amankwah who have also been a source of inspiration to move me on till date. My heartfelt thanks also go to Gifty Antwiwah for her immense support for me in diverse ways.

Additionally, I am indebted in gratitude to my mother, Anna Opare Akuffo and my sister Catherine Serwaa Boateng for their prayers and encouragement throughout the difficult moments in my life.

My colleagues in the “learning to pass study group” who supported me immensely in diverse ways, to you am so thankful. Notwithstanding the contributions made by Mrs. Vivian Senoo at the La Nkwantanang Madina Health Directorate.

Most importantly my academic supervisor, Dr. Bismark Sarfo, Head of the Epidemiology and Disease Control department who took time out his busy schedule to guide me through this study successfully, I am so grateful.

ABSTRACT

Background: Hepatitis B disease is a major threat to public health and its chronic carriers constitute about 5% of the world's population. Some regions of Africa and Middle East have a disproportionately higher carrier rate of 10% and 15% respectively.

The risk of developing chronic hepatitis B is 95% for infections acquired during the perinatal period compared with 5% for those who acquired during adulthood and a pooled prevalence of hepatitis B infection among pregnant women in previous studies is 13.1% and among the public is 12.3%.

The objective of this study was to determine the prevalence and factors associated with Hepatitis B infection among pregnant women who attended antenatal care (ANC) in La Nkwantanang Madina municipality.

Methodology: Descriptive cross-sectional study was conducted in a purposively selected four (4) health institutions. A total of 258 pregnant women were selected using systematic random sampling with the daily ANC attendance sheet as sampling frame.

A structured questionnaire was administered and data on their Hepatitis B status were extracted from the documentation in the Maternal record book. Hepatitis B profile test was done to determine their HBeAg status for those with HBsAg positivity status.

Results: The respective prevalence of HBsAg and HBeAg determined were 8 out of 258(3.1%) (CI: 0.013 –0.060) and 1 out 8 (12.5%) (CI: 0.0981 – 2.141). Parity of 4 (OR: 1.813, CI: 1.348-6.018, P<0.023) and secondary educational level (OR: 0.28857, CI:1.009-2.864, P< 0.013) showed statistically significant association upon Chi² tests and simple logistic regression however multiple logistic regression showed no statistically significant association of secondary educational level

apart from parity (OR:50.68, CI: 1.348-6.018, $P < 0.028$) which had significant association adjusting for age, number of sexual partners, marital status, receipt of blood transfusion, previous experience of caesarian session and other infections such as HIV, sickle cell and VRDL positivity.

Conclusion: The prevalence of HBsAg and HBeAg among pregnant women who attended the ANC in the La Nkwatanang Municipality is relatively low. Besides parity, none of the other factors studied had any statistically significant association with the Hepatitis B infection among the pregnant women.



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LIST OF ABBREVIATIONS

ANC: Ante Natal Care

RCH: Reproductive and Child Health

GHS: Ghana Health Services

HBV: Hepatitis B Virus

HBsAg: Hepatitis B Surface Antigen

HBeAg: Hepatitis B e Protein Antigen

ELISA: Enzyme-linked Immunosorbent assay

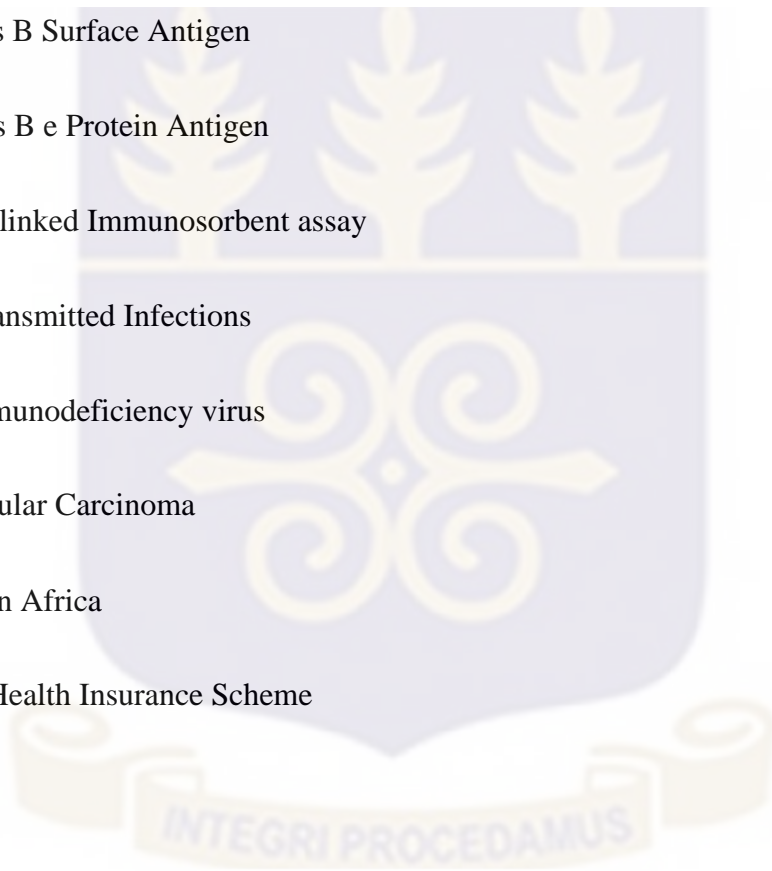
STI: Sexually Transmitted Infections

HIV: Human Immunodeficiency virus

HCC: Hepatocellular Carcinoma

SSA: Sub Saharan Africa

NHIS: National Health Insurance Scheme



CHAPTER ONE

1.1 Introduction

Hepatitis is the inflammation of the liver which is a vital organ responsible for physiological processes such as detoxification of toxins, filtering of blood and fighting of infection, hence once it becomes inflamed or damaged these functions also get compromised. This could lead to possible complications of hepatocellular carcinoma (HCC), liver cirrhosis and even death (Khan, Janjua, Akhtar, & Hatcher, 2008).

Hepatitis B disease occur as an inflammation of the liver as a result of an infection with the hepatitis B virus (HBV). It could be acute hepatitis when the onset of hepatitis B disease is within six (6) months upon diagnosis through the detection of hepatitis B surface antigen (HBsAg) and IgM antibodies to hepatitis B core antigen (anti-HBc). It is usually self-limiting and recovery occurs mostly within six (6) months (Souza et al., 2012).

It could also assume chronic hepatitis B status which is the persistence of the HBsAg for six(6) months or more after the acute infection with or without symptom (EPI Team(WHO), 2006).

The variation in proportion of patients with acute HBV infection who are likely to progress to chronic infection is dependent on age of infection and immune status (Souza et al., 2012).

About 10% of pregnant women, whom might not have a clue of their infection status yet are chronic carriers and at an increased risk of transmitting to their babies during prenatal period (EPI Team(WHO), 2006).

Similar to the occurrence in the Western Pacific region, mother-to-child transmission during perinatal life are the most crucial moments of HBV infection in most countries in the sub-Saharan region in Africa of which Ghana is part (Cho et al., 2012).

About 90% of those who acquire HBV infection from their mothers at birth or infancy becomes chronically infected whilst 30% to 50% of those who get acutely infected between the ages of 1 and 5 years becomes chronically infected and acute infection of Hepatitis B in adulthood gives only 5% chance of chronicity (Center for Disease Control and Prevention, 2016).

1.2 Statement of the Problem

Hepatitis B virus (HBV) infection is a major public health problem and its chronic carriers constitutes about 5% of the population globally. Some parts of the Africa continent, Middle and Far East Asia have an excessively higher prevalence of 10% to 15% (Kumar, Singh, & Sinha, 2012).

A survey conducted in Eastern region of Ghana with 1,500 pregnant women to determine prevalence and risk factors of Hepatitis B surface antigen positivity reported an overall regional prevalence of 10.6% which varied among the districts, thus Yilo Krobo with the lowest of 2.2% and Kwahu West with the highest of 13.8%. The factors studied which were age, level of education and gravidity were not associated with HBsAg positivity among the subjects (Cho et al., 2012).

A pooled prevalence of Hepatitis B in Ghana was 12.3% and that among pregnant women was 13.1% (Ofori-Asenso & Agyeman, 2016).

The risk of perinatal infection is also increased if the mother has acute hepatitis B in the second or third trimester of pregnancy or within two months of delivery. The risk of developing chronic Hepatitis B is 95% for infections acquired during the perinatal period compared with 5% for those acquired during adulthood (Ofori-Asenso & Agyeman, 2016).

Pregnant women contribute about 4% annually to the population growth of our society and being pregnant indicates having had an unprotected sex and hence liable of been infected with hepatitis B virus likewise other sexually transmitted infections(STIs) (Ghana Statistical Service, 2014).

Studies have shown the possibility of mother to child transmission of hepatitis B virus and contributes to about 90% of those with chronic hepatitis B infection.

This makes maternal and child health services vital, yet there is inadequate data on the HBsAg prevalence among pregnant women in Ghana particularly La Nkwantanang Madina municipality.

This study therefore was to determine the factors associated with Hepatitis B infection(HBsAg) among pregnant women so as to provide useful information in minimizing perinatal HBV infection.

1.3 Research Questions

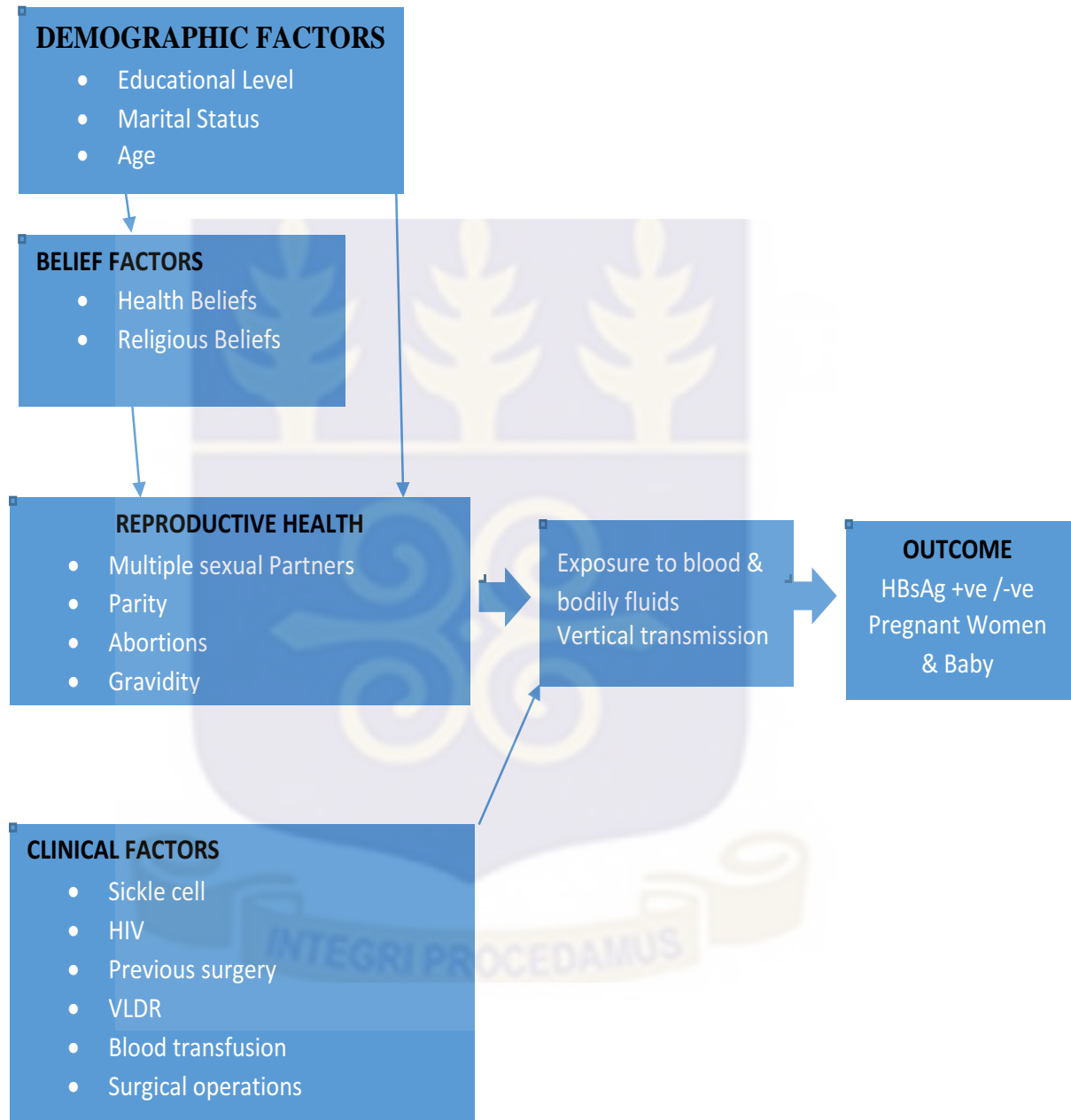
- i. What is the prevalence of Hepatitis B Surface Antigen positivity among pregnant women attending ANC in La Nkwantanang Madina?
- ii. What is the prevalence of HBeAg positive pregnant women among HBsAg positive?

- iii. What factors are associated with Hepatitis B (HBsAg and HBeAg) infection among pregnant women attending antenatal care in La Nkwantanang Madina?



1.4 Conceptual framework

Figure 1: Conceptual framework of hepatitis B infection among pregnant women



The study is grounded on the multivariate model of epidemiological analysis as its conceptual framework emphasizes on the interaction between factors such as level of

education, marital status, belief factors, reproductive health factors, health service delivery factors, clinical factors with the prevalence of hepatitis B among pregnant women (Victoria, Huttly, Fuchs, & Olinto, 1997).

The framework places the outcome (HBsAg/HBeAg status) at the far right and the interplay of the independence variable at the left with arrows indicating direction of interaction or influence between the factors that lead to the exposure of pregnant women to the infected vehicle of hepatitis B virus.

Marital status influences the sexual behavior or orientation of a pregnant woman and the number of partners to take in addition to having unprotected sex.

Belief factors in the form of religious, cultural and health beliefs either influence or are influenced by level of education of the pregnant woman. Additionally, the factors affect the willingness to accept one form of health service delivery or not.

Health service delivery factors such as blood transfusion, child birth process and clinical laboratory process without aseptic techniques exposes pregnant women to the hepatitis B virus.

Likewise, clinical history of advanced HIV and previous surgery affects the chances of a pregnant woman getting hepatitis B virus.

The belief factors, health delivery factors, sexual behavior, clinical factors, educational level and marital status were studied in this work.

1.5 Objectives of the study

1.5.1 General objective

To determine factors associated with Hepatitis B infection among pregnant women attending ante natal care in La-Nkwantanang Madina.

1.5.2 Specific Objectives

- i. To determine the proportion of HBsAg positives among pregnant women attending antenatal care in the La Nkwantanang Madina Municipal
- ii. To determine the proportion of HBeAg positives among pregnant women attending antenatal care in La Nkwantanang Madina who are HBsAg positives.
- iii. To determine factors associated with Hepatitis B infection among pregnant women attending ante natal care in La Nkwantanang Madina.

1.6 Justification

Data on Hepatitis B (HBsAg/HBeAg) prevalence and associated factors among pregnant women which should precipitate a well-informed interventional activity are woefully limited in Ghana (Cho et al., 2012)

This study therefore seeks to provide data to support the need for introducing additional interventions to prevent mother to child transmissions of hepatitis B virus especially in developing countries like Ghana.

CHAPTER TWO

Literature Review

2.1 Hepatitis B virus

The HBV is a double-shelled small virus belonging to the family hepadnaviridae with small partially double stranded DNA genome, which contains many antigenic material components which includes; HBsAg, hepatitis B core antigen(HBcAg), and Hepatitis B e antigen(HBeAg)(Gerlich, 2013).

It is also known as an oncogenic virus that confers onto their hosts a higher likelihood of developing hepatocellular carcinoma (HCC).

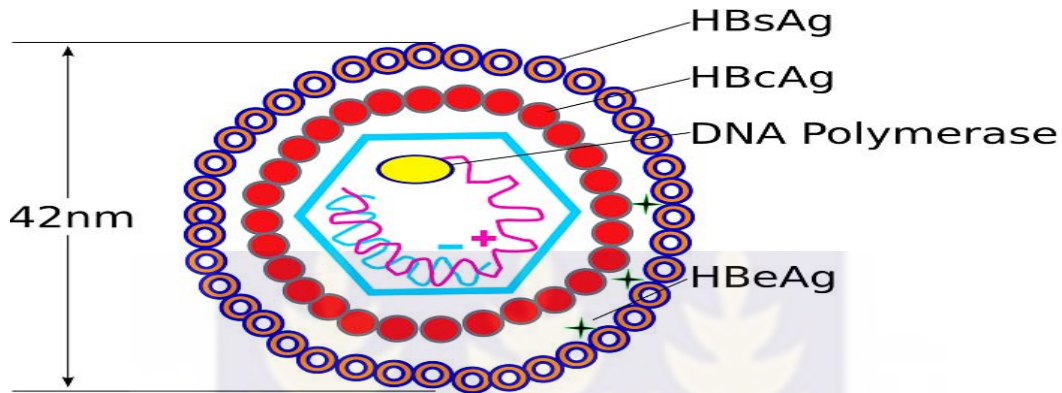
HBV DNA can be detected in serum and is used to monitor viral replication. HBeAg, unlike HBsAg and HBcAg, is not particulate, but rather is detectable as a soluble protein in serum (Seeger & Mason, 2015).

HBcAg is the nucleocapsid protein core of HBV. HBcAg is not detectable in serum by conventional techniques, but it can be detected in liver tissue of persons with acute or chronic HBV infection. HBeAg, a soluble protein, is also contained in the core of HBV. HBeAg is detected in the serum of persons with high virus titers and indicates high infectivity.

HBV is able to maintain its infectivity to about seven (7) days at room temperature and human is the only known host although under laboratory conditions some non-human primates could be infected(Araujo, 2015).

Globally a minimum of nine genotypes of HBV have been identified based on more than 8% difference in their genome sequences(Gerlich, 2013).

Figure 2: Structure of the Hepatitis B virus



2.2 Mode of transmission

Transmission of HBV is principally by exposure to infected blood and other bodily fluids such as saliva, vaginal and seminal fluids percutaneously or at the mucosal level.

This usually occurs through mother to child, unprotected sexual intercourse and additionally can be acquired from accidental injection of small quantity of blood or fluid during medical, surgical and dental procedures, or sharps and cutting items contaminated with infected blood; use of poorly sterilized needles and syringes; percutaneous and intravenous mode of abusing drugs, tattooing, acupuncture and body piercing (Shimakawa, 2014).

2.2.1 Mother to Child Transmission

Transmission of HBV from infectious woman to infant and children occurs in three identified mechanisms. Two of the three mechanisms occur in the perinatal period and one

in the postnatal period. Thus intrauterine, during delivery and postnatal period of transmission (Shimakawa, 2014).

2.2.1.1 Intrauterine

Presence of HBV DNA in the liver tissues of the newborn gives a precise indication of intrauterine transmission on a theoretical basis, although it is rare to get newborns with liver disease.

Additionally, presence of HBsAg or HBV DNA in either umbilical cord blood at delivery or peripheral blood of neonate at birth could give indication of intrauterine transmission.

The risk of perinatal infection is also increased if the mother has acute hepatitis B in the second or third trimester of pregnancy or within two months of delivery. Although HBV can infect the fetus in the uterus, this is generally as a result of antepartum hemorrhage and placental tears (Shimakawa, 2014).

2.2.1.2 During delivery

The risk of infection during this phase could be an exposure of the fetus mucosal or percutaneous membrane to the infected blood or amniotic fluids from intra-partum hemorrhage, bursting of the amniotic sac and the act of the delivery process itself which could lead to tear of the birth canal or episiotomy (Borgia & Gentile, 2014).

All these are largely determined by the maternal HBeAg status. The risk of infection ranges from 15-35% in children born to HBsAg-positive HBeAg-negative mothers to 80-100% in children born to HBeAg-positive mothers in East Asia (Shimakawa, 2014).

2.2.1.3 Postnatal

There is a possibility of infection during breastfeeding, circumcision and general activities involved during child care.

2.2.1.4 Serological markers of HBV infection

The important serological indicators of Hepatitis B virus infection which are;

- i. Hepatitis B surface antigen (HBsAg) and its antibody (anti-HBs),
- ii. Hepatitis B e protein antigen (HBeAg) and its antibody (anti-HBe),

and two (2) other types of antibody against Hepatitis B core antigen (anti-HBc IgG and anti-HBc IgM). A positive serum HBsAg indicates an active HBV infection.

The infection is considered chronic if HBsAg indicator persists for more than six (6) months, else the infection is considered acute. HBsAg is the first(1st) serological indicator that shows up and detected during acute HBV infection and it is followed by anti-HBc IgM, which usually disappears several months after the acute infection and therefore indicates recent infection. After the clearance of HBsAg, anti-HBs appears, which usually gives a good prognosis with lifelong immunity. HBeAg is present early during acute infection, and disappears before the HBsAg seroclearance. It is associated with high viral replication (i.e., high HBV DNA levels). HBeAg loss is often followed by the appearance of anti-HBe. Because anti-HBc IgG stays from the acute infection through one's entire life, it gives indication of either past or present infection state.

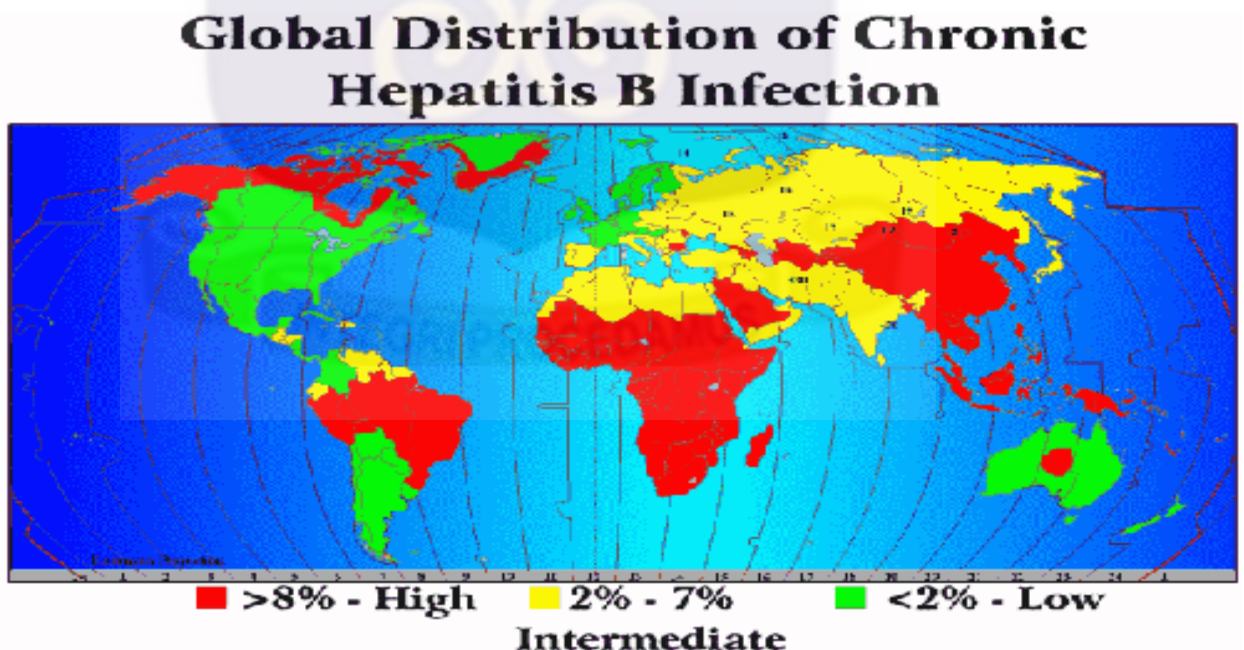
2.3 Epidemiology of Hepatitis B

2.3.1 Global burden

Global estimates indicate that over 2 billion persons have either had or have infection with HBV and 240 million are chronically infected which accounts for 5% of the world's population.

In countries which are well developed, the incidence of Hepatitis B infection is around 0.1 % whilst in the low to middle income countries it ranges from 3 to 20 % or even higher. Nonetheless, in industrializing countries, there is a higher incidence of maternal mortality with fulminant Hepatitis. This dissimilarity may be attributed to the variation in population studied, cultural practices, genetic factors, socioeconomic status and regional differences in risk factors to viral hepatitis(Molla, Munshea, & Nibret, 2015).

Figure 3: Global distribution of Chronic Hepatitis B infection



(Ott, Stevens, Groeger, & Wiersma, 2012)

Age specific (0-18years) of Hepatitis B prevalence by regions across the globe are as follows; Latin America: 1.6% -5%, Western Europe: less than 2%, Caribbean countries: 4.3% to 5.4%, Asian countries: 5% to 8.2% and sub-Saharan Africa(SSA) including Ghana: 8%-12% prevalence(Ott et al., 2012).

2.3.2 Burden of Hepatitis B in Africa

In Africa HBsAg prevalence is estimated to be 5-15% with at least 65 million people chronically infected in absolute numerical terms. Below is the tabular distribution of HBsAg in some African countries.

Table 1: Distribution of HBsAg prevalence among some African countries.

Country	HBsAg prevalence
Nigeria	2%
Central African Rep	5%
Congo	5%
Zambia	7%
Angola	13%
Ghana	13%
Namibia	18%
Benin	19%
Ethiopia	23%
Zimbabwe	25%

(Cruz, Factors, Countries, Factors, & Facts, 2010)

Among several factors thought to be associated with this high prevalence includes; unprotected sexual intercourse, having multiple sexual partners, blood transfusion and facial or body scarification(Cruz et al., 2010).

In the Mediterranean countries, a relatively lower prevalence of HBsAg of 1.3% has been documented with identified risk factors in these settings to be hematological malignancies, hemophiliacs, injection drug users and marriage (Cruz et al., 2010).

2.3.3 Hepatitis B burden in Ghana

Ghana has been grouped as part of the areas in the world where the prevalence of chronic Hepatitis B infection is high ($\geq 8\%$) which is supported by studies estimating the burden of hepatitis B in Ghana in 2013 as 12.92 % (Ofori-Asenso & Agyeman, 2016).

However, this was derived from an analysis of only 12 studies, other studies have also put the prevalence rate of HBV in Ghana to be around 10–15 % (Ephraim, Donko, Sakyi, Ampong, & Agbodjakey, 2015).

From the meta-analysis report reviewed, the pooled prevalence of HBsAg in Ghana is 12.1% among the public and 13.1% among pregnant women (Ofori-Asenso & Agyeman, 2016).

As been documented, about 90%-95% of chronically infected people get infected before the age 5 of which mother to child transmission accounts about 70-90%.

2.4 Factors associated with Hepatitis B infection

Hepatitis B (HBV) infection in pregnant women is on the rise and it requires utmost concern as the commonest means of transmission worldwide is either prepartum or perinatally, with children having greater than 90% risk of acquiring HBV infection (Opaleye et al., 2014).

However, if early diagnosed, and strict medical follow up implemented, children are prevented from being infected. HBV in pregnancy is associated with high risk of maternal complications such as induce premature labour, intra-ventricular, intrapartum and postpartum hemorrhages (Cho et al., 2012).

It also has poor outcomes like still births and neonatal deaths, jaundice, anorexia, malaise, acute and chronic liver disease, impaired mental and physical health (Olaitan & Zamani, 2010).

As such, screening of pregnant women for HBV is necessary to reduce prevalence by identifying neonates at risk of transmission.

The risks factors associated with Hepatitis B virus infection are connected to exposure to body fluids with high concentration of the virus. In pregnancy, the factors for Hepatitis B virus infection differ among communities' subject to the cultural practices and beliefs. Main factors noted in studies conducted among pregnant women and women within the reproductive age include, highest level of education reached, beneficiary of blood transfusion, surgical operation, termination of pregnancies, sexually transmitted infections, higher mean parity, early sexual initiation, polygamy and higher numbers of sexual partners.

Nonetheless, for the purpose of this study, blood and blood products, reuse of needles and needle stick injuries, socio-demographic and medical or surgically related factors were discussed as factors associated with Hepatitis B infection.

2.4.1 Blood and blood products

Hepatitis B virus is a blood-borne virus and the routes of its transmission are unprotected sexual intercourse and parenteral routes. Whole Blood and blood products continues to be major causes of Hepatitis B virus transmission in many countries; most of which are unable to satisfy the criteria of a modernized and safer blood transfusion systems.

Studies conducted in Egypt have reported that Hepatitis B virus infection is associated with receipt of blood transfusion among pregnant women along with the findings that it is also associated with HBV infection in patients with chronic hematological disorders requiring frequent blood transfusions (Ephraim et al., 2015).

Many other studies have indicated higher prevalence among those who are more dependent on blood and blood products, especially when compared with reports of a decline in seroprevalence (Mohebbi et al., 2011).

In contrast to the above-mentioned findings, studies of HBV infection in pregnant women in Sudan, Yemen, and Mauritania have failed to show any evidence of blood transfusion being a risk factor for virus transmission (Ducancelle et al., 2013).

This observed difference can be explained by better safety precautions adopted for blood donations, whereas screening for the virus is regularly done.

Kumari, Kashyap, Saikia, et al., 2016, determined whether risk factors such as fever, anorexia, abdominal discomfort, haematemesis, weight loss, high coloured urine, blood transfusion, alcoholic intake and multiple sexual partners are highly associated and derive a novel risk score for the development of HCC.

The distribution of the different categories of HBV disease in six different states of Northeastern India region were recorded. The number of chronic cases were found as the highest followed by Acute viral hepatitis, cirrhosis, HCC and FHF. The mean Age \pm SD of HCC was recorded as 53.3 ± 9.57 which was greater than other study groups of HBV. The risk factors such as fever, high coloured urine, blood transfusion and multiple sexual partners were recorded as mostly significant ($p < 0.05$).

Although a number of studies have been conducted in Ghana, no known studies have established the link between blood and blood products and hepatitis B in pregnant women.

2.4.2 Re-use of needles and needle stick injuries

There is an evidence of Hepatitis B transmission which is due to frequent re-use of needles and syringes. It has been reported that there are many group of individuals who are actively involved in repacking and recycling of used needles and syringes.

It was additionally reported that due to refine packaging, it becomes very difficult for general public to distinguish between new disposable sterilized needles and repacked unsterilized syringes (Saeed & Manzoor, 2014).

Reports in a study during 2002 to 2007 indicates that, 1,382 needle stick injuries occurred at Aga Khan University hospital in Pakistan with higher incidence associated with young doctors (28.5%), and nurses (20.4%). It has been further reported that approximately 19% of overall injuries occurred during blood collection (Zaheer, Saeed, Waheed, Karimi, & Waheed, 2014).

About 68% of individuals received injection in previous 3 months and out of those injections only 54% were provided from new syringes (Arshad 2009).

It has been reported that estimated number of injections varies from 8.2 to 13.6 per person per year, which are highest as compared to other developing countries. Among these almost 94.2% were further categorized as unnecessary (Arshad, 2009).

It has been reported that 44% of Pakistani population would prefer injections as compared to oral medicine as therapeutic options against various ailments (Khan, et al., 2000). Due to poor sanitary conditions in various health sectors, it has been reported that almost 60% of used syringes were not properly destroyed, and could be a risk factor for patients assessing health facilities, of which pregnant women were not excluded.

The prevalence of Hepatitis B Virus (HBV) carrier and infectivity status among three hundred (300) pregnant women in Makurdi were determined through random anonymous testing of volunteers attending antenatal clinics of different Hospitals within the metropolis (M, Mno, A, & Damen, 2008)

Maternal Hepatitis B virus infectivity status was determined by testing all HBsAg positive samples for the presence of hepatitis B e antigen (HBeAg). Overall, 33 (11%) pregnant women were identified as carriers of Hepatitis B virus and 10 of the 33 (30.3%) pregnant women identified as HBV carriers tested positive for HBeAg. Hence, 3.3% of the entire study population was found to have high viral replication as well as high risk of transmitting HBV to their neonates.

The rate of occurrence of Hepatitis B carriers did not differ with age; however, it differs significantly with the anaemic status of the study subjects ($P < 0.05$). This study shows the endemicity of Hepatitis B virus infection in Makurdi and high infectivity rates, suggest that

Hepatitis B virus infection is likely to be acquired by both vertical and horizontal means of transmission.

From the studies above, it is overtly clear that unsterilized syringes are risk factors to contracting HBV especially among vulnerable group of people, pregnant women, attending antenatal clinic. Similar works examining the association between reuse of needles and needle stick injuries and Hepatitis B virus infection among pregnant women in Ghana is missing.

2.4.3 Socio-demographic factors

Socio-demographic factors such as age, education level, and gravidity have been found not to be significant factors associated with transmission of HBV (Zahran, Agban, et al., 2010), however, some reports have stated that becoming sexually active at an early age is a risk factor as has been found by Rabiou et al., (2010) among Nigerian pregnant women. Other important socio-demographic risk factors for HBV infection that cannot be ignored are history of intravenous drug abuse, imprisonment, and history of multiple partners. These risk factors have not been studied, likely because of the religious and cultural backgrounds of such communities.

A cross-sectional survey among male Saudi voluntary blood donors was conducted by (Torre & Saule, 2016) in the northwest region of Saudi Arabia. Regarding age, HBV markers were significantly higher in age groups 30–39 years and 40 years compared to the youngest age group (< 20 years). HBV markers were significantly higher in married subjects compared to unmarried. Lower educated subjects showed Hepatitis B virus indicators significantly higher compared to higher educated subjects. Both occupations,

laborers and military personnel, showed significant association with HBV markers compared to professionals respectively. The subjects with a family history of HBV infection showed HBV positive markers significantly higher compared to among those without history of HBV.

In a cross-sectional study at the ante-natal clinic of the University College Hospital Ibadan. One hundred and eighty pregnant women were recruited from March to August 2013, and tested for Hepatitis B surface antigen (BIORAD FRANCE) using third generation ELISA, as well as HIV-1 and 2 using Uni-Gold Recombigen and ALERE determine (a rapid immunoassay designed to detect antibodies to HIV 1 and/or 2). Data were obtained using questionnaires. The highest HBV infection rate occurred in 25 to 29 year age group.

Multiple sexual partners (OR- 3.987, P-value=0.026) and early age at sexual encounter (OR 11.996, P-value=0.022) were independent risk factors for HBV infection (Anaedobe, C.G., Fowotade, A., Omoruyi, C.E. and Bakare, 2016).

Many studies as reviewed above established an association between socio-demographic factors and HBV. However, similar works in Ghana is missing and this study sought to add to literature by assessing how a pregnant woman's socio-demographic factors could account for them attracting HBV in the La Nkwantanang Madina Municipality.

2.4.4 Medical or Clinical risk factors

Medical and surgical risk factors such as surgical procedures, home delivery, dental procedures, and history of jaundice were all found not to be significant. A study in Iran concluded that a history of endoscopy, major surgery, and tattooing were major risk factors for developing chronic Hepatitis B infection (Junaid, Qureshi, Khan, & Faruq, 2015).

In Pakistan, the important contributors for different types of hepatitis were blood transfusion, surgical procedures and history of piercing in last six months (Ali et al., 2011) Junaid et al., 2015) evaluated the risk factors for Hepatitis B infections in Pakistan among patients attending OPD services. A cross sectional descriptive study was used. Any patient with concomitant Hepatitis C and D were excluded. Information related to presence of risk factors like dental procedures, intravenous drug abuse, occupational risk, blood transfusions, multiple sexual contact, tattooing and hemodialysis was recorded. Large proportion (83%) had at least one risk factor present for hepatitis B. The most common risk factor was IV drug abuse and dental procedure. With proper prevention and awareness this can be overcome and will significantly reduce the burden of disease.

Pregnant women seeking antenatal care services in La Nkwantanang Madina who have been exposed to one or more of these factors might be at an increased risk of being positive for hepatitis B surface antigen test, hence the study sought to determine its prevalence and factors associated with the prevalence.

CHAPTER THREE

METHODOLOGY

3.1 Study design

Descriptive cross-sectional study was used, which sought to give a snapshot of the prevalence and the factors associated with hepatitis B among pregnant women attending antenatal care. With this study design, 258 pregnant women who attended ante natal care at La Nkwantanang Madina municipality were selected from four purposively selected ante natal service delivery facilities and were tested for HBsAg status and interviewed with structured questionnaire on their demographic characteristics, reproductive health factors, history of health services received and other clinical factors that literature suggests being associated with HBsAg positivity.

3.2 Study area

The study was conducted in the La Nkwantanang Madina municipality, which is one of the newly created district in Greater Accra Region with an estimated total population of 134,421 with women in fertility age been 32,261 constituting 28% of the total population (La Nkwantanang Madina profile, 2017).

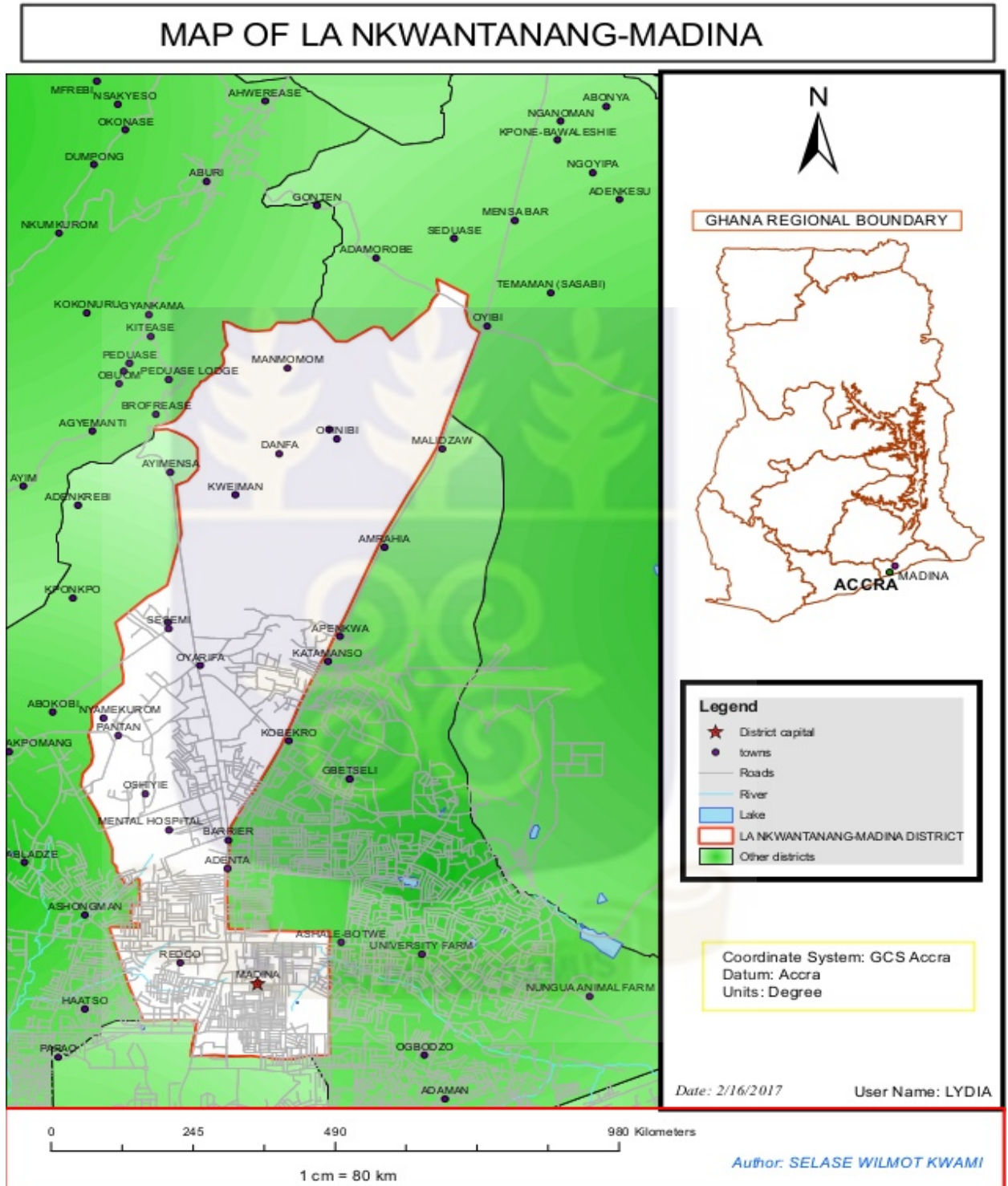
Geographically, it lies in the northeastern part of Greater Accra region which shares boarders with Ga East to the East, Accra metro to the south, Adenta to the West and Akuapem South districts to the North as shown in the map in figure 3 below.

It has five (5) sub municipalities, twenty-three (23) communities, twenty-six (26) health facilities of which five (5) are public with one (1) of each public facility in each of the five sub municipalities.

The municipality has a mixed settlement thus urban, peri-urban and rural settings with heterogeneous tribal mixed population; Akans, Gas, Ewes, Dagbani's and Gonjas.



Figure 4: Map of La Nkwantanang Madina Municipality



3.3 Study population

Pregnant women of all age groups attending ANC in the purposefully selected facilities in the municipality.

3.3.1 Study sites/Health facilities

Purposively selected four (4) facilities within the municipality were used as study sites. These are; Madina Polyclinic(Kekele), Madina Polyclinic(RC), Pentecost Hospital and Danfa Health Centre. The sum of the ANC coverage for these facilities accounts for over 90% of the total La Nkwantanang municipal ANC coverage based on their 2015 annual performance report.

3.3.2 Inclusion criteria

All consented pregnant women attending ANC at the selected facilities.

3.3.3 Exclusion criteria

- i. All Pregnant women within the municipality who sought ANC services outside the municipality during the study period.
- ii. All pregnant women who did not give consent to be part of the study.

3.3.4 Sampling technique

All pregnant women receiving care in all the four (4) purposefully selected facilities during the study had equal chances of been selected for the study.

- i. Based on 2015 performance in ANC coverage, the four (4) health facilities whose coverage accounted for about 90% of the municipal total coverage were selected purposively.

- ii. Using the daily attendance list from the ANC registers as sample frame, a probability sampling with systematic design was used in selecting the pregnant women whereby every fourth(4th) attendant was selected, consent sought and interviewed. The sampling interval was arrived at by dividing the total ANC attendance of the selected study sites by the number of pregnant women expected to be selected from that facility, then a random number was generated using the random number table which served as the starting point. Formula for sampling interval used is $K = N/n$, where N =ANC attendance, n =number of pregnant women to be selected and K =sampling interval.
- iii. Proportional allocation was used to allocate the calculated sample size to the selected facilities based on their 2015 ANC coverage as a proportion of the 46,070 total ANC attendance recorded in the La Nkwantanang municipality in 2015.

3.4 Sample size calculation

Using the Cochran sample size formula of $n = Z^2 pq / E^2$,

where n =minimum sample size,

Z =confidence interval of 95%,

p =prevalence of Hepatitis B(HBsAg),

$q=1-p$ and E =margin of error

Now a pooled prevalence from previous studies (Ofori-Asenso & Agyeman, 2016) which gives a range of 10% to 16.8% prevalence of Hepatitis B among pregnant women, $E=5\%$, $Z=1.96$, $p=0.168$, $q=0.832$

Implies $n = (1.96)^2 \cdot 0.168(1-0.168) / 0.05^2 = 3.8416 * 0.139776 / .0025$

Therefore, minimum sample size = 214.8 = 215 pregnant women.

Considering 20% to cater for non-responsiveness other unforeseen challenges, the total sample size was **258** pregnant women.

Table 2: Proportional allocation of sample to study sites

No	Name of Facility	% Performance (ANC registrants)	No of pregnant women to select
1	Pentecost Hospital	38.8	100
2	Madina Polyclinic(Kekele)	40.7	105
3	Madina Polyclinic(RC)	13.7	35
4	Danfa Health Center	6.8	18
Total		P_T=100	n=258

The above table shows the study sites sample size, using the proportional formula of $P_F/P_T * n$, where P_F = % performance of facilities, P_T = total municipal % performance to calculate the sample size for the selected study sites.

3.5 Data collection

A structured questionnaire composed of questions on socio-demographic characteristics, reproductive health factors, history of health services received and clinical factors was administered to the consented pregnant women and baseline laboratory results in their ANC card was captured as well as blood sample taken from the interviewed pregnant

women who were positive for HBsAg and Hepatitis B profile test was done to determine their HBeAg status.

3.5.1 Laboratory test

Test for the HBeAg was done in the laboratory of the respective study sites using AccuDiag™ HB profile test kits for respondents with HBsAg positivity. Two (2) to three (3) milliliters of venous blood was taken into identified coagulation and separation yellow capped tube and allowed to settle and centrifuge at RPM range of 2,200 to 2,500 for about 3 to 5 minutes. The test kit was opened and the micro pipette was used to fetch about 5 microliters of the serum portion of the blood and dropped unto each spot for the various serological markers including HBeAg. Results was read 15 minutes later.

These test kits have specificity of 99.75% and sensitivity of 99.9% using 50ul volume of blood.



Table 3: Variables

Type of Variable	Variable
Dependent	HBsAg status
Independent	<p>Demographic</p> <p>Age, Marital Status, Educational level</p> <p>Religion</p> <p>Belief Factors</p> <p>Reproductive Health Factors</p> <p>Health Service Delivery Factors</p> <p>Clinical factors</p> <p>HIV Status, VDRL/PRP Status, HBeAg Status</p>

3.6 Data Analysis Plan

Data entry were done in SPSS after which the entered data were exported to Stata version 14 software for analysis.

Descriptive statistics of mean, standard deviations and frequencies of all the variables were computed. Chi² test was applied to establish the association between each of the independent and the dependent variable (HBsAg status) considered in the study. Significant variables were entered into a logistic regression model which was run to determine the strength of association between the independent and the dependent variable. Odds ratios (OR) were determined for the independent variables and statistical significance was set at 95 % confidence level with p-value less than 0.05.

The factors considered in the study based on the known infection cycle of the Hepatitis B virus and the review of previously conducted studies has been grouped under the various types of variables in table 3 below.

3.7 Ethical Considerations

Below are the considerations that were made to ensure that the study meets the ethical standard;

- i. Respondents were educated on the Hepatitis B disease, thus its etiology, mode of transmission, signs & symptoms, complications and its prevention, prior to enrolment
- ii. Laboratory procedure involving blood sample collection and its associated risks like pain during the finger prick was fully explained to the prospective respondents before enrolment
- iii. Confidentiality of test results and all other information of subjects were assured.
- iv. Written consent was sought from each of the participant before enrolled into the study
- v. Permission was sought from the La Nkwantanang DHMT and health facilities before the study was conducted.
- vi. Ethical clearance was obtained from the GHS ethical review board with an approval number GHS-ERC:99/02/17 before study started

CHAPTER FOUR

RESULTS

This chapter presents the results of the study on demographic characteristics of respondents, Belief factors, Reproductive health factors, Health service delivery and clinical factors. The results had been presented in frequencies and percentages using both tables and figures. Statistical analysis in the form of chi-square, simple and multiple logistic regression were also applied and the results presented in Table 4 below.

Table 4: Socio-demographic characteristics of respondents

Variable	Freq N=258	Freq (%)
Age		
<20	8	3.1
20 to 29	149	57.8
29 to 39	92	35.7
>=40	9	3.5
Marital Status		
Single	62	24.0
Married	167	64.7
Co-habiting	24	9.3
Separated	5	1.9
Divorced	0	0
Highest level of Education		
No formal education	28	10.9
Primary	100	38.8
Secondary	94	36.4
Tertiary	36	14.0
Religion		
Christian	203	78.7
Muslim	52	20.2
Traditional	2	0.8
Other	1	0.4

Majority of the respondents were in the age group of 20 to 30 years (57.8%) with 3.1% being under 20 years and 3.5% above 40 years. Significantly larger proportion (78.7%) of them were Christians with 0.4% belonging to other religious groups besides Muslimas, Christianity, and traditional religion. Primary (38.8%) and Secondary (36.4%) education represents the highest levels of education that majority of the respondents have reached at the time of the study.

Most of them identified themselves as married (64.75) and about 2% separated and none of them was a divorcee.

Figure 5: Prevalence of Hepatitis B surface antigen(HBsAg)

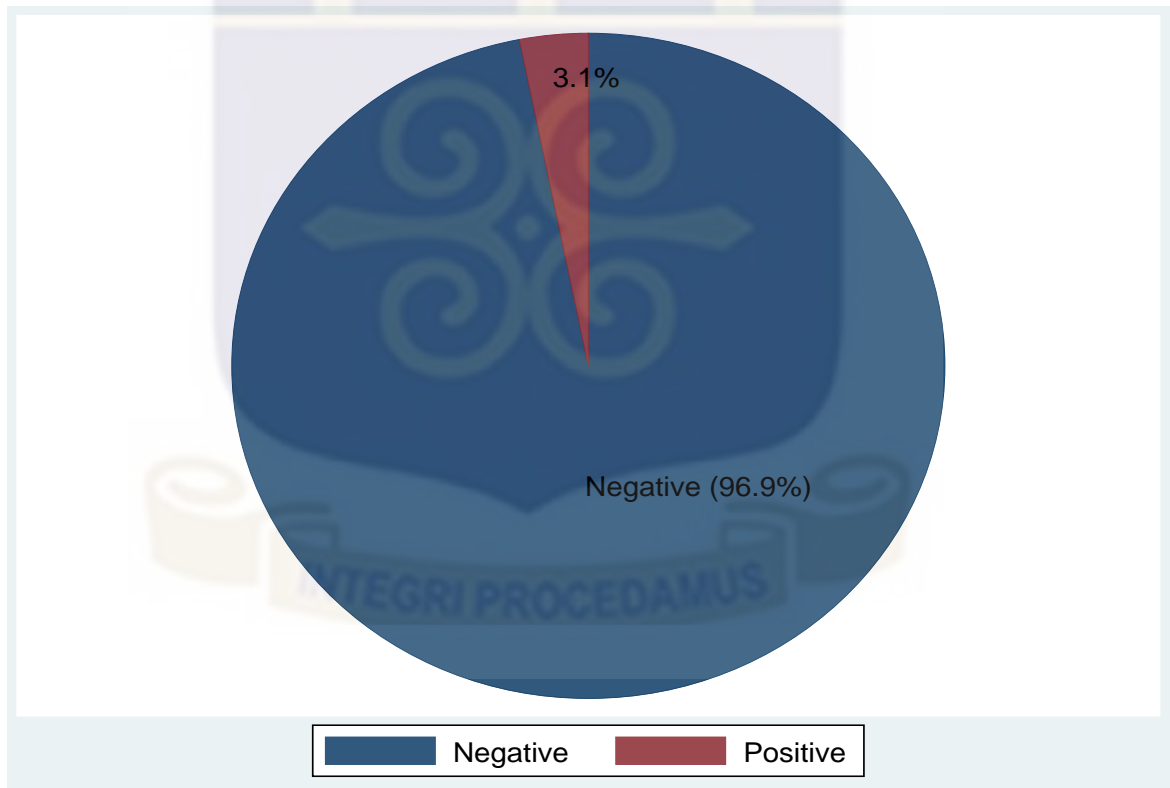


Table 5: Prevalence of HBsAg and HBeAg

Variable	Prevalence (%)	SD (\pm)	CI (95%)
HBsAg	3.1	0.17	1.348 – 4.018
HBeAg	12.5	0.10	0.098- 2.140

The overall prevalence from the study is 8(3.1%) for Hepatitis B infection based on hepatitis B surface antigen positivity status of the respondents and 1(12.5%) out of them were positive for hepatitis B envelope antigen with their respective corresponding significant confident intervals as shown in Table 5 above.

Table 6: Socio-demographic variables in all the respondents by HBsAg status

Variable	HBsAg +ve n (%)	HBsAg –ve n (%)	Total No of respondents N=258	P- Value
Age				
<20	0(0.00)	8(100)	8	0.424
20 to 30	3(2.01)	146(97.99)	149	
30 to 40	5(5.43)	87(37.5)	92	
≥40	0(0.00)	9(100)	9	
Marital Status				
Single	1(1.61)	61(98.39)	62	0.839
Married	6(3.59)	161(96.41)	167	
Co-habiting	1(4.17)	23(95.83)	24	
Separated	0(0.00)	5(100)	5	
Educational status				
No formal education	3(37.5)	25(10.00)	28	0.044
Primary	4(50.00)	96(38.40)	100	
Secondary	1(12.50)	93(37.20)	94	
Tertiary	0(0.00)	36(14.40)	36	
Religion				
Christian	4(1.97)	199(98.03)	203	0.203
Muslim	4(7.69)	48(92.31)	52	
Traditional	0(0.00)	2(100)	2	
Other	0(0.00)	1(100)	1	

Educational status ($P < 0.044$) had statistically significant association with pregnant women being positive for HBsAg upon Chi² test. From Table 6 majority of those with HBsAg positive had no formal education with Primary education as their highest level of education reached, relative to those with secondary and tertiary.

Majority of respondents with hepatitis B infection were married and co-habiting. Likewise, higher proportion positives were Muslims relative to other religious groups; thus Christians, traditionalist and others.

Majority of respondents within the age groups of 20 to 30 and 30 to 40 had HBsAg positive status relative to those under 20 years and above 40 years.

However, the associations of HBsAg positivity established with Chi² test with religious groups, age and marital status were all not statistically significant.

Table 7: Belief factors among respondents by HBsAg status

Variable	HBsAg +ve n (%)	HBsAg -ve n (%)	Total No of respondents N=258	P- Value
Acceptance of Blood transfusion				
Yes	8(3.60)	214(96.40)	222	0.247
No	0(0.00)	36(100)	36	
Use of Condoms				
Yes	1(1.61)	61(98.39)	62	0.839
No	6(3.59)	161(96.41)	167	

*Chi² Test for HBsAg status versus belief factors, Percentages in brackets

All respondents with HBsAg positive status had their beliefs allowing them to accept blood transfusion

A higher proportion of HBsAg positive pregnant women beliefs' does not allow usage of condoms for sexual intercourse (Table 7).

Table 8: Reproductive factors among respondents by HBsAg status

Variable	HBsAg +ve n (%)	HBsAg -ve n (%)	Total No of respondents N=258	P- Value
Sexual Partners in last 24 months				
0	0(0.00)	2(100)	2	0.981
1	7(3.04)	223(96.96)	230	
2	1(4.76)	20(95.24)	21	
3	0(0.00)	3(100)	3	
4	0(0.00)	2(100)	2	
Ever terminated Pregnancy				
Yes	0(0.00)	29(100.00)	29	0.307
No	7(3.59)	154(96.41)	161	
NA	1(1.47)	67(98.53)	68	
Parity				
0	1(1.22)	81(98.78)	82	0.031
1	1(1.27)	78(98.73)	79	
2	3(5.08)	56(94.92)	59	
3	1(4.00)	24(0.00)	25	
4	2(20.00)	8(80.00)	10	
5	0(0.00)	3(100.00)	3	
Caesarian Section for any previous delivery				
Yes	0(0.00)	35(100.00)	35	0.087
No	8(4.94)	154(95.06)	162	

*Chi² Test for HBsAg status with Reproductive factors, Percentages in brackets

Among the reproductive factors considered for the study, majority of respondents with HBsAg positivity were with higher parity of 2 to 4 and was statistically significant ($p < 0.031$) (Table 8).

All those with HBsAg positive status have not had any caesarian section in any of their previous deliveries and majority of them had not terminated pregnancy in the last twenty

(24) months. Additionally, majority of the respondents who have had one (1) sexual partner in the last twenty-four (4) months were positive for HBsAg relative to with 2 plus and none. However, these associations were found not to be statistically significant.

Table 9: Health Service delivery factors among respondents by HBsAg status

Variable	HBsAg +ve n (%)	HBsAg -ve n (%)	Total No of respondents N=258	P-Value
Received Blood transfusion				
Yes	1(3.03)	32(96.97)	33	0.980
No	7(3.11)	218(96.90)	225	
Surgery apart from CS				
Yes	0(0.00)	17(100.00)	17	0.445
No	8(3.32)	233(96.68)	241	

*Chi² Test for HBsAg status for Health service delivery factors, Percentages in brackets

There is a marginal difference in the proportion of respondents who had hepatitis B infection and have received blood transfusion (Table 9) or not in the last twenty-four (24) months, whilst all those who had not undergone any surgery with an exception of caesarian section prior to the study were positive to HBsAg but these established associations were all not significant statistically.

Table 10: Clinical factors among respondents by HBsAg status

Variable	HBsAg +ve n (%)	HBsAg -ve n (%)	Total No of respondents N=258	P- Value
Sickle Cell				
Positive	0(0.00)	48(100.00)	48	0.170
Negative	8(3.81)	202(96.90)	210	
HIV				
Positive	0(0.00)	6(100.00)	6	0.658
Negative	8(3.17)	244(96.83)	252	
VDRL				
Positive	0(0.00)	21(96.9)	21	0.392
Negative	8(3.38)	229(96.62)	237	

***Chi² Test for HBsAg status for Clinical factors, Percentages in brackets**

The clinical factors considered all had no statistically significant association with HBsAg positivity (Table 10), additionally none of the respondents with positive Sickle cell status, HIV status and VDRL status were positive to Hepatitis B infection.

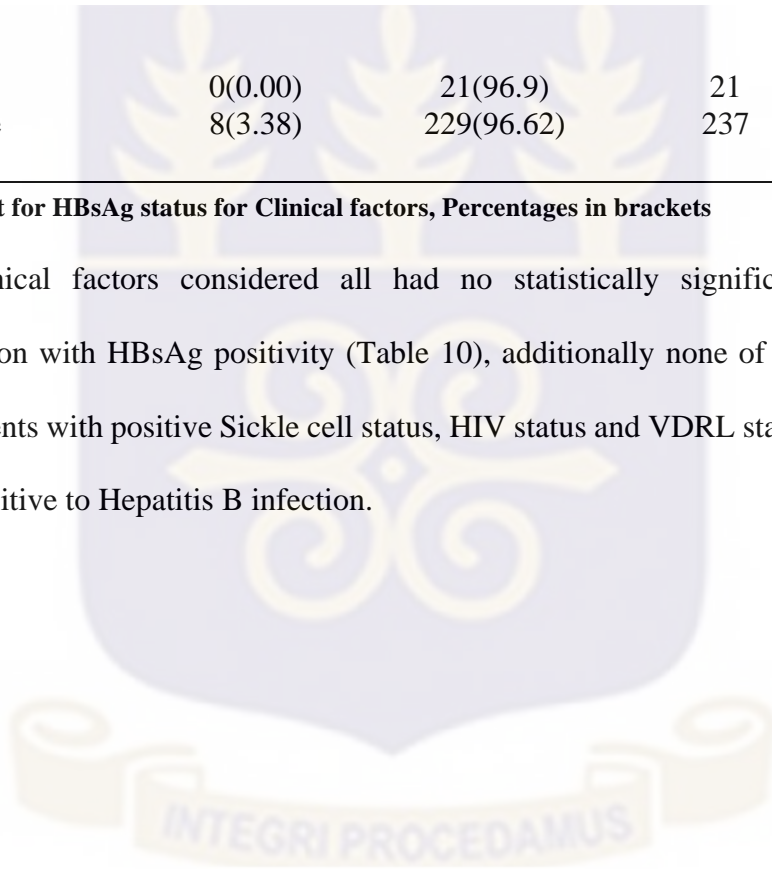


Table 11: Simple logistic regression / multiple logistics regression adjusting for other factors

Variable	Crude		Adjusted		
	OR	P-value	OR	P-value	CI (95%)
Educational Level					
No Formal education	Ref				
Primary	0.35	0.184	0.44	0.331	0.082 - 2.319
Secondary	0.09	0.040	0.13	0.094	0.012 – 1.416
Received Blood Transfusion					
No	Ref				
Yes	1.03	0.980	3.15	0.048	1.019 - 9.808
Age group					
<20	Ref				
20 - 30	0.36	0.166	0.63	0.64	0.09 – 4.01
30 - 40					
>40					
Parity					
0	Ref				
1	1.04	0.979	0.45	0.688	0.01-21.21
2	4.33	0.209	1.65	0.754	0.07 – 37.93
3	3.38	0.396	2.85	0.552	0.09-90.28
4	20.25	0.019	54.68	0.028	1.54-1938.4
Ever done CS					
No	Ref				
Yes	0.75	0.631	0.53	0.62	0.043-6.512

*Logistic regression for HBsAg status for Clinical factors, Percentages in brackets

From the logistic regression analysis, generally, the odds of being HBsAg positive increases with increase in parity reference to zero (0) parity. And particularly, the odds of having parity of 4 and Hepatitis B infection is 54.68 times the odds of having parity 3 and

below with reference to 0 parity. However, the association was not statistically significant when adjusted for receipt of blood transfusion, age groups, ever had Caesarian Section and number of sexual partners.



CHAPTER FIVE

DISCUSSION

5.1 Prevalence of Hepatitis B infection(HBsAg) and (HBeAg)

This study sought to determine the proportion of HBsAg positive pregnant women seeking antenatal care in the four (4) selected facilities who have Hepatitis B infection. This was determined by their positivity status to Hepatitis B surface antigen. The overall prevalence determined in this study is 3.1% with (CI: 0.0134801 - 0.0601811) at 95% confident level.

However, from the meta-analysis report by Ofori-Asenso and colleagues in 2016, the pooled prevalence of HBsAg among pregnant women was 13.1% in Ghana which is higher than what has been determined in this study though there is variation in the study design used in both instances.

Additionally, the prevalence of HBsAg determined among three hundred (300) pregnant women who were selected randomly in a similar cross-sectional study was 11% by (M et al., 2008). Therefore, the prevalence determined in this study is in contrast to the general assertions made in other studies that the prevalence of Hepatitis B infection among pregnant women is high in developing countries.

To give indication of maternal Hepatitis B virus infectivity to their fetus among those who are positive to Hepatitis B surface antigen, the HBeAg prevalence was determined to be 12.5% (CI: 0.000981- 0.0214052) and among the entire 258 pregnant women seeking antenatal care in the study sites the prevalence was determined to be 0.39%.

Whilst in the Mbaawuaga Enenebeaku cross-sectional study, HBeAg prevalence among those positive to HBsAg was 30.3% and 3.3% in the entire 300 pregnant women study population (M et al., 2008).

5.2 Prevalence of HBsAg and socio-demographic factors

From the study, educational status had statistically significant association ($p < 0.044$) with a pregnant woman being positive for HBsAg. Higher proportion of those with HBsAg positivity had no formal education (37.5%) and Primary (50.00) education as their highest level of education reached. The odds of having Hepatitis B infection based on HBsAg test was 0.089.

Majority of respondents with Hepatitis B infection were married and co-habiting conversely from a cross sectional study by (Frambo, Atashili, Fon, & Ndumbe, 2014), it was determined that the odds of being HBsAg positive was 0.53 ($P < 0.125$) among pregnant women who are married/living together.

Likewise, higher proportion positives were Muslims relative to other religious groups; thus Christians, traditionalist and others.

Majority of respondents with HBsAg positive status were within the age groups of 20 to 30 and 30 to 40 relative to those under 20 years and above 40 years which is similar from findings of a cross-sectional survey conducted by (Anaedobe, C.G., Fowotade, A., Omoruyi, C.E. and Bakare, 2016) in Saudi Arabia indicating Hepatitis B markers to be significantly higher among age groups 30 to 39 years.

However, the associations of HBsAg positivity with educational level was found not to be statistically significant upon adjusting for age, parity, receipt of blood transfusion and ever done caesarian section.

Similarly, Zahran Adban et al 2010, research findings showed that socio-demographic factors such as age, marital status, educational level do not have significant association with pregnant woman been positive for Hepatitis B infection.

5.3 Reproductive and Health service delivery factors

Among the reproductive factors considered for the study, majority of respondents with HBsAg positivity were with higher parity of 2 to 4 and was statistically significant. Giving indication that the more child births a pregnant woman have the more number of times of having had unprotected sexual intercourse likewise the number of times been exposed to delivery process which might require blood transfusion or possible use of non-aseptic technique in the delivery process.

All those with HBsAg positive status have not had any caesarian section in any of their previous deliveries and majority of them had not terminated pregnancy in the last twenty (24) months. Additionally, majority of the respondents who have had one (1) sexual partner in the last twenty-four months were positive for HBsAg relative to those with 2 plus and none. However, these associations were found not to be statistically significant.

However, in Pakistan, the important factors for having Hepatitis B infection among pregnant women were blood transfusion, surgical procedures and history of piercing in the last six (6) months (Ali et al., 2011).

5.4 Clinical or Medical factors

All the clinical factors determined in this study had no statistically significant association with HBsAg positivity. Additionally, none of the respondents with positive sickle cell status HIV status and VDRL status were positive to Hepatitis B infection. Being sickle cell positive gives high probability of receiving blood transfusion once every twenty-four (24) months hence being prone and susceptible to being infected with Hepatitis B virus. Moreover syphilis, HIV and Hepatitis B infection all have common prominent mode of transmission which is unprotected sexual intercourse.

5.6 Limitation of the study

Financial and time constraints hindered my ability to use a very large sample size hence the 258 from the four (4) purposively selected study sites.



CHAPTER SIX

6.0 Conclusion

The prevalence of HBsAg and HBeAg among pregnant women attending ANC services in these selected facilities is relatively low. Increasing parity (number of children) increases the odds of a pregnant woman been infected with Hepatitis B virus. None of the other factors studied had any statistically significant association with the Hepatitis B infection among the study participants.

6.1 Recommendation

Hepatitis B profile test should be made routine to detect early those with increase chance of infecting their fetus and inclusion of the cost of Hepatitis B profile test for pregnant women in National Health Insurance Scheme.

Intensification of health promotional activities on family planning and safer sexual practices should be considered a priority in all platforms to reduce the exposure to the women in reproductive age group to unprotected sex.

APPENDIX ONE

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APPENDIX TWO

Consent form

Project Title

Factors associated with hepatitis B infection among pregnant women in La Nkwantanang Madina municipality.

Institutional Affiliation

School of Public Health

College of Health Sciences

University of Ghana, Legon

Background and Personal Introduction:

Elliot Amankwah is the lead investigator, currently a Master's Student of the School of Public Health, University of Ghana, Legon and conducting a study on the factors associated with hepatitis B infection. This study is for academic purposes and a requirement for the award of Master of Science Degree in Epidemiology and Disease Control.

Procedure:

A structured questionnaire will be administered and blood sample taken for Hepatitis B (HBsAg and HBeAg) test. The data collected will be kept until after the Degree has been awarded; then it will be destroyed.

Risks and Benefits:

The study involves the draw of blood sample so your likely to incur pain at the prick site which will resolve within a day or two whilst the benefits that may arise include contribution to the development of interventional policies in hepatitis B control. Additionally, it will afford you the opportunity to know your status and been educated on the hepatitis B infection and opportunities available for preventing your unborn baby from been infected if found positive.

Right to Refuse:

Although there are no known substantial risks associated with the research protocols, if you feel uncomfortable you have the liberty to opt out.

Anonymity and Confidentiality:

You are assured that the information you will provide will be handled with the strictest confidentiality and will not be shared with third parties not directly involved in the research and thus will be used purely for academic purposes.

Before Consenting:

Do you have any questions that you wish to ask? (If yes, questions will be noted.) If you have questions you wish to ask later, or anything you wish to seek clarification regarding the research, please do not hesitate to contact the principal investigator (Elliot Amankwah) on:

Telephone number: 0243869409 OR Hannah Frimpong

Email: el2si@yahoo.com GHS-ERC Administrator

+2339(0)243235225 / 05070412233

Hannah.frimpong@ghsmail.org

Interviewer's Statement:

I have explained the procedure to be followed in this study to the client in the language that she understands best and she has agreed to participate in the study.

Signature of Interviewer.....

Date.....



APPENDIX THREE

Questionnaire

Introduction

The purpose of this study is to determine the factors associated with hepatitis B infection among pregnant women in La Nkwantanang Madina municipality. This will help informed interventional policies to help reduce mother to child transmission of Hepatitis B.

Facility:.....

Name of Interviewer:.....

Date of interview:.....

Background

1. How old are you?
2. What is your marital status?
 - a. Single
 - b. Married
 - c. Co-habiting
 - d. Separated
 - e. Divorced
3. What is your highest level of education?
 - a. No formal education
 - b. Primary
 - c. Secondary

- d. Tertiary
- 4. What is your religious affiliation?
 - a. Christian
 - b. Moslem
 - c. Traditional
 - d. Other (specify).....

Belief Factors

- 5. Does your religious belief allows you to accept blood transfusion?
 - a. Yes
 - b. No
- 6. Does your religious belief allows you to have protected sexual intercourse using condoms?
 - a. Yes
 - b. No

Reproductive Health factors

- 7. How many sexual partners have you had for the last 24 months?.....
- 8. How many pregnancies have you had for the last 24 months?.....
- 9. Have you ever terminated a pregnancy for the last 24 months?.....

10. How many children do you have(Parity)?.....

11. Did you have caesarian section for any of them?

- a. Yes
- b. No
- c. Not Applicable

Health Service delivery factors

12. Have you ever had blood transfusion?

- a. Yes
- b. No

13. Have you had surgery for any other cause apart from child birth?

- a. Yes
- b. No

14. Have you ever been vaccinated against Hepatitis B?

- a. Yes
- b. No
- c. Don't know / Can't remember

15. When was, it done if **Q 14 is Yes?**

- a. Less than 6 months
- b. Last 6 months
- c. Last 1 year
- d. Last 2 years
- e. More than 2 years ago

Clinical Laboratory data

Type of Test	Results: Negative=0 / Positive=1
Sickle cell	
HIV	
VDRL/PRP	
HBsAg	
HBeAg	

