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PREVALENCE AND PREDICTORS OF HEPATITIS B AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE IN WA MUNICIPALITY

BY

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DECLARATION

I, Emmanuel Anebakwo Awiah, declare that under the guidance of my supervisor, Dr. Judith Koryo Stephens, School of Public Health, University of Ghana-Legon, this dissertation is my original work, except for related works that have been duly referenced, and that no form of it has been presented elsewhere for another degree.

……..…… DATE……..……

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(Supervisor)

DEDICATION

This work is dedicated especially to the pregnant women attending antenatal care at the Wa municipality who made this study possible.

ACKNOWLEDGMENT

I extend my appreciation to my supervisors Dr. Judith Koryo Stephens, School of Public Health, University of Ghana-Legon, who steered me through this project work. I also thank the entire staff of Care Diagnostic Laboratory, especially Mrs. Theresa Salifu and Emmanuel Adu Afful for their enormous support and use of their facility.

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ABSTRACT

Background: Hepatitis B is the inflammation of the liver caused by the Hepatitis B virus. The risk of maternal transmission of Hepatitis B infection in pregnancy and a peri-natal period is dependent on maternal Hepatitis B envelop antigen (HbeAg).

A positive HbeAg mother has between 70-90% chances of transmitting the virus to the unborn child. This study sought to determine the prevalence of and predictors of Hepatitis B among pregnant women in the Wa municipality. The study also assessed pregnant women's awareness about Hepatitis B transmission and prevention.

Methods: A cross-sectional study was undertaken. Pregnant women were evaluated using a structured questionnaire to collect information on their socio-demographic characteristics and awareness of Hepatitis B virus (HBV) transmission and prevention. Pregnant women were screened for Hepatitis B virus sero-markers, using a commercial rapid diagnostic test, with three milliliters of blood for Hepatitis B profile. Assessment of awareness was done using a Hepatitis B basic awareness summary score.

Results: Of the 183 pregnant women screened 20.22% (37/183) tested positive for HbsAg, 7.10% (13/183) for HbeAg, 18.58% (34/183) for HbcAb, 1.64%(3/183) for HbsAb and 10.38% (19/183) for HbeAb. They type of marital relationship was significantly associated with HbsAg positivity and HbeAg positivity. Majority of pregnant women 78.7% are aware of Hepatitis B transmission and prevention.

Recommendation and Conclusion: This study has demonstrated a high prevalence of HbsAg and HbeAg and majority 78.14% (143/183) are not aware of mother to unborn child transmission of Hepatitis B among pregnant women. Pregnant women should be a screen for HbeAg before delivery and vaccines should be affordable and

available. More educational programs on the mode of HBV transmission and methods of prevention should be introduced at the antenatal care (ANC) level.

Keywords: Prevalence, Hepatitis B virus infection, pregnant women, Wa municipality, awareness, Hepatitis B envelop antigen, Hepatitis B surface antigen, Hepatitis B surface antibody.

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LIST OF ABBREVIATION

ANC	Antenatal Care
AOR	Adjusted Odd Ratio
CDC	Center for Disease Control and Prevention
CHPS	Community based Health Planning and Services
CI	Confidence Interval
CRF	Chronic Renal Failure
EDTA	Ethylenediaminetetraacetic acid
EPI	Expanded Programme on Immunization
DNA	Deoxyribonucleic Acid
GNA	Ghana News Agency
GSS	Ghana Statistical Service
HbcAb	Hepatitis B Core Antibody
HbeAb	Hepatitis B Envelope Antibody
HbeAg	Hepatitis B Envelope Antigen
HBIG	Hepatitis B Immune Globulin
HbsAb	Hepatitis B Surface Antibody
HbsAg	Hepatitis B Surface Antigen
HBV	Hepatitis B Virus
HCC	Hepatocellular Carcinoma
HIV	Human Immunodeficiency Virus
IFN	Interferon
IgM	Immunoglobulin
MTCT	Mother To Child Transmission
OBI	Occult Hepatitis B virus Infection

PCR	Polymerase Chain reaction
SD	Standard Deviation
TORCH	Toxoplasmosis, Other agents Rubella Cytomegalovirus Herpex Simplex
UWR	Upper West Region
WHO	World Health Organization

DEFINITION OF TERMS

Operational definition

- Level of education - Can be no formal education, primary, middle/Junior High School, Senior High School/Vocational, or Training College/University.
- Gestation – Can be first trimester, second trimester or third trimester
- Area of residence – Can be Urban or Rural
- Occupation – Can be civil servant, jobless, self- employed or student
- Marital status – Can be single, married or divorced
- Level of awareness – Can be limited, average or adequate

CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND

The inflammation of the liver caused by Hepatitis B virus can lead to Hepatitis B disease which can be life threatening to the person infected. Cirrhosis and liver cancer are the cause of death of a person suffering from chronic Hepatitis B infection thereby making it a public health issue(World Health Organization, 2017). Sexual contact is the major transmission route for Hepatitis B infection in low endemicity areas amongst high-risk adults while perinatal transmission account for the transmission of Hepatitis B virus (HBV) in high endemicity areas (Hou et al., 2005).

The most effective way to prevent Hepatitis B Virus transmission to newborn is through effective identification of HBV positive pregnant women (Borgia et al., 2012). Screening asymptomatic people is an important instrument in disease detection, prompt diagnosis and intervention, particularly at an early stage of the disease. This may improve the health outcome as well as better understanding of the transmission pattern of the disease(Parveen et al., 2012).

It is very common for infants to develop chronic Hepatitis B if it is transmitted from an infected mother and usually this occurs before the age of 5 years (WHO, 2017). Chronic HBV infection goes through three to four phases depending on the immunity of the individual. The immune-tolerant phase is the first phase followed by the immune clearance or immunoactive phase, then no replicative inactive phase which may lead to a rebirth of the phases. About 87-90% of patients infected with HBV may

either develop immunity or become chronic carriers, which may lead to the risk of developing liver cirrhosis or liver cancer (Ott et al., 2012).

In order to prevent mother to child transmission, a child born to a mother positive for Hepatitis B surface antigen should receive the Hepatitis B vaccine and the Hepatitis B immune globulin within 12 hours of birth, that child will be 85-95% protected from Hepatitis B virus(Center for Disease control and Prevention, 2015). Those who acquire HBV infection at birth or during childhood do not usually experience symptoms. Therefore it is necessary to target the risk group of people who are likely to acquire the infection for screening (Sarin et al., 2016).

Chronic Hepatitis B is endemic in Sub-Saharan Africa and Asia with an estimated prevalence of 5% and 10% respectively in the adult population (WHO, 2017). Ghana has been categorized among the areas of the world with a high prevalence (≥8 %) of chronic HBV The rates of chronic Hepatitis B virus infection in 2013 was 12.92 %, but some experts also put it at 10 to 15% (Schweitzer et al., 2015).Women in their reproductive age with chronic HBV infection remain a major source for continued spread of the virus. Therefore there is the need for screening of pregnant women to detect the virus in prenatal care to enable early intervention (Abdi, 2015).

The Hepatitis B screening is among the routine tests recommended for all pregnant women when they visit the antenatal clinic in Ghana. The risks of maternal complications of Hepatitis B virus are inducing premature labor, intra-ventricular, intrapartum and postpartum hemorrhages. In the case of infants, they are usually poor outcomes like stillbirths and neonatal deaths, jaundice, anorexia, malaise, acute and chronic liver disease, impaired mental and physical health (Abongwa, et al., 2016).

1.2 PROBLEM STATEMENT

There are several mechanisms in place to check the Hepatitis B status of women who are attending antenatal clinics in order to identify Positive HbsAg mothers so that measures can be put in place to prevent transmission of Hepatitis B virus to the unborn child (Kiyshi et al., 2015). Hepatitis B virus is often acquired in adolescence or adulthood through sexual contact or drug use by injection in the United States and Western Europe. This is different in Ghana and Africa where a majority of HBV is acquired through vertical transmission from mother to child and horizontal transmission from child to a child usually in pre-schools (Luuse et al., 2017). In Africa where there is scare scarcity of health resources, lack of education, and data, making a diagnosis and monitoring the infection is a major problem. Furthermore, stigma and discrimination are also invisible challenges in helping in the interventions for prevention and treatment of HBV (O'Hara et al., 2017).

Hepatitis B virus can persist in room temperature for at least seven (7) days with viral replication occurring. Hepatitis B virus can be spread from one person to another through an infected person's sore that shed the virus into the environment. Contact with the contaminated environment/surface while having an open lesion makes a person susceptible to infection with the virus(Nelson, Easterbrook, & Brian, 2017). Hepatitis B virus comes second to tobacco as the most common carcinogenic agent and a major cause of liver cirrhosis and liver cancer. Moreover, they usually have poor outcomes in terms of morbidity and mortality (Okonkwo et al., 2017).

According to WHO (2015), less than 5% of people with chronic Hepatitis infections know their status. Women may know their status only when they are pregnant and this

makes it a major public health challenge. Maternal Hepatitis B envelop antigen (HbeAg) is an important factor in the maternal transmission of HBV infection during pregnancy. A positive HbeAg mother has a 70-90% rate of transmission and less than 10% if she is HbeAg negative (Eke et al., 2016). It is necessary to differentiate between a low replicative patient and a risk of progressive disease. A Hepatitis B virus deoxyribonucleic acid (DNA) more than 2000 IU/ml is considered as a risk of progression to disease. According to Sarin et al. (2016), patients who are positive to HbsAg and with DNA≥1000 IU/ml are at a high risk of reactivation of the virus.

The World Health Organization has made Hepatitis a major community health consent, by drafting strategies to deal with viral Hepatitis globally, with strategies to eliminate viral Hepatitis by 2030 (WHO, 2017). The Upper West Region has the highest prevalence of 18% within the West Africa sub-region (GNA, 2006).

Hepatitis B immune globulin (HBIG) which is used to prevent mother to child transmission is very expensive and therefore, rarely available and more over the logistics of storage is a major challenge in most health facilities. Antivirals should be considered for HBV infected mothers to reduce the perinatal transmission(Chotun et al., 2017). In 2015, only 9% of Hepatitis B virus-infected individuals had been tested where sub-Saharan Africa and out of that, only 8% were on treatment. Treatment for Hepatitis B infection should be made easily available and accessible to the general population (Aberra et al., 2017).

1.3 JUSTIFICATION

The double-stranded DNA virus is among viruses that cause severe liver infection. This virus can easily be spread from infected mother to unborn child, through infected

open wounds, unprotected sex, infected blood transfusion and other infected blood-contact related activities. The Hepatitis B virus is 50-100 more contagious than the human immunodeficiency virus (HIV) (Chernet et al., 2017).

Most infections of Hepatitis B usually occur during 22 weeks of gestation and seven days after birth and at this stage there are no symptoms, thereby leading to the development of chronic infection by children. Therefore, screening of pregnant women is very necessary (Etame Sone et al., 2017). It is very important that every pregnant woman must test for Hepatitis B regularly whether previously vaccinated or tested. This can be done during a prenatal visit. Pregnant women who are not screened prenatally and those involved in risky behavior should be tested on the day of admission for delivery at the hospital and maternity home (Kumar et al., 2012).

The prevalence of HBV can easily be estimated in a given population by an active screening of pregnant women for HbsAg. This will give dependent data to prevent mother to unborn child transmission (Eke et al., 2011). It is very important to know that geographical differences account for the differences in the seroprevalence and risk-related factors with HBV infection which may lead to designing suitable preventive measures for different settings (Umare et al., 2016).

Furthermore, Hepatitis B infection can be effectively managed through a reliable data on the prevalence of infections in the general population, mindful of mother to child transmission only if the mother is positive to HbsAg (Abongwa, et al., 2016). According to Adjei et al. (2016), newborn babies born to HBV infected mothers in the Eastern Region of Ghana were not given Hepatitis B immunoglobulin (HBIG) after the health facilities screened the pregnant women for HbsAg. It was only the routine

vaccines that were given the newborn babies whether the mother was positive or negative. Previous studies on Hepatitis B infection among pregnant women were done in southern parts of Ghana but there is no documented data for the upper west region.

The presence of HbsAg in blood is a hallmark of diagnosis of Hepatitis B virus infection. In regions where there is poor or lack of resources, conducting this test may not be readily available to the entire population that includes pregnant women. This practice may lead to pregnant women not knowing their status prior to labor (Siakwa et al., 2014). More importantly, given that the horizontal transmission largely accounts for the spread of the infection among infants, there is the need for further research in the northern parts of Ghana to provide evidence to guide and support policy formulation for the eradication of viral Hepatitis by 2030, in accordance with the World Health Organization's target. Majority of HBV transmission is from mother to child transmission. Therefore it is important that those positive to the HBV should be made aware of their status and let them understand the possibility of transmission of the virus to their unborn child (Han et al., 2017). Women in the reproductive age are a channel of infection and therefore they become chronic with the Hepatitis B virus (Abdi et al., 2015).

1.4 OBJECTIVES

1.4.1 GENERAL OBJECTIVE

The general objective of this study was to determine the prevalence and predictors of Hepatitis B virus among pregnant women attending antenatal care (ANC) in Wa municipality.

1.4.2 SPECIFIC OBJECTIVES

1. To determine the prevalence of HbsAg among pregnant women in Wa Municipality.
2. To assess the awareness of Hepatitis B transmission and prevention among pregnant women in Wa Municipality.
3. To determine the prevalence HbeAg among pregnant women in Wa Municipality.
4. To determine, HBcAb (Anti- HBc) HbeAb and HbsAb among pregnant women in Wa Municipality.

1.5 CONCEPTUAL FRAMEWORK OF HEPATITIS B

The framework explains the influence of various risk factors associated with Hepatitis B infection among pregnant women. The risk of one being infected is influenced directly or indirectly by the following factors: Medical interventions, Traditional practices, Biological factors, Risky behaviors, unawareness of HBV and irregular screening. It can be argued that the most important aspect of Hepatitis B transmission to pregnant women is through a medical intervention such as blood transfusion. If a woman has ever been transfused with blood which is not well screened (infected with Hepatitis B virus), then there is a likelihood of being infected through the blood transfusion.

It is known that risky behaviors such as having multi-sexual partners and intravenous drug usage puts one higher on the ladder of being infected with the Hepatitis B virus. For example a person is likely to be infected with Hepatitis B virus if he or she engages in unprotected sex with an infected person.

Moreover, if a person is not aware of the Hepatitis B virus mode of transmission and methods of prevention he or she may be engaged in a risk behavior, for example, have multiple sex partners. Traditional practitioners of female genital mutilation and tribal marks have the possibility of transmitting HBV to their clients if the instruments used are not well sterilized. If a pregnant woman is HbeAg positive, she has a high possibility of transmitting the virus to the child. More importantly, if there are irregular screenings at the facility level could miss out positive Hepatitis B surface antigen. This may also lead to the high prevalence of Hepatitis B in the community.

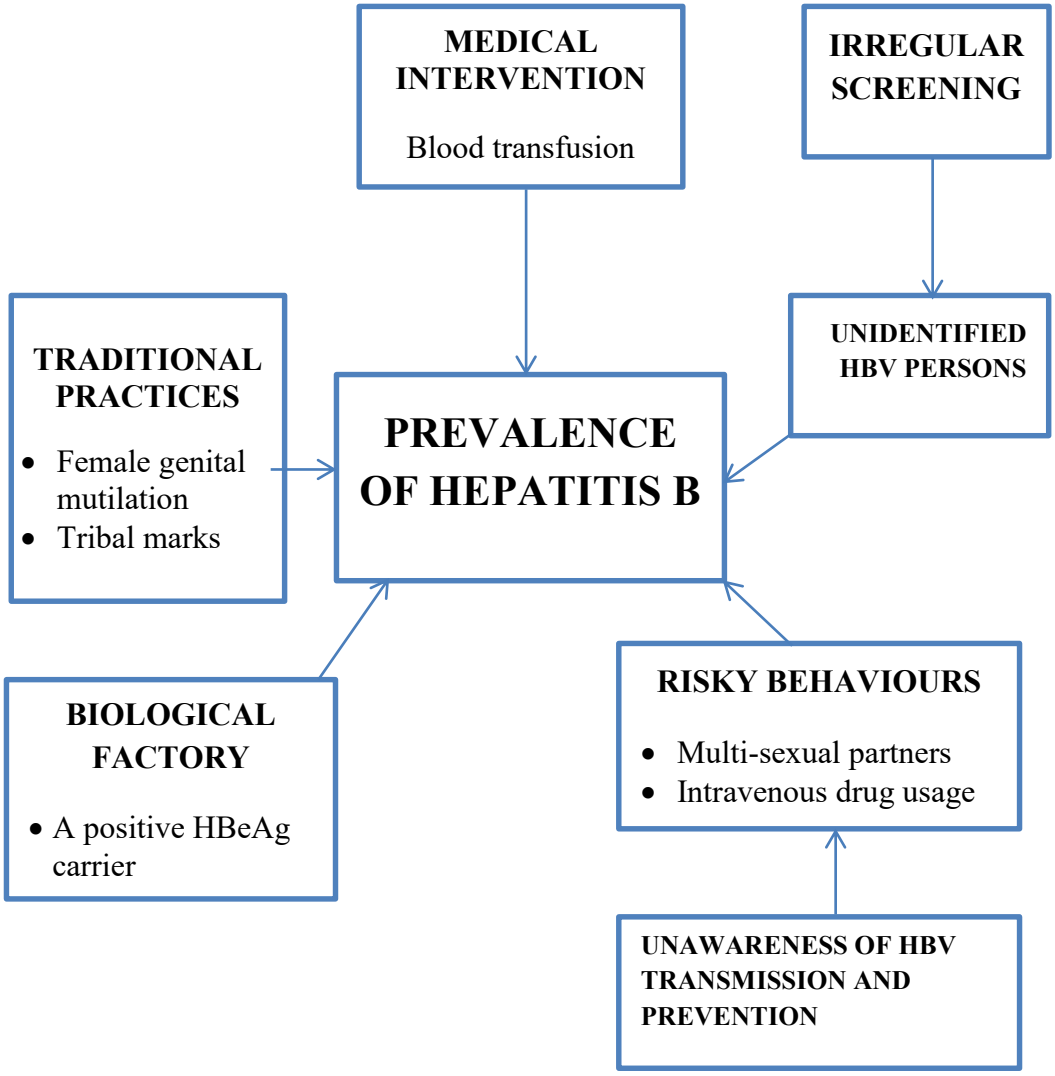

Figure 1.1: A conceptual framework on Hepatitis B virus

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 HEPATITIS B VIRUS

The Hepatitis B virus (HBV) is found in blood, sweat, and saliva of an infectious person. It can be transmitted through sperms, body fluid, and it can be transmitted during the perinatal period to newborn babies. Sharing needles, syringes, or other drug-injection equipment, and having unprotected sex increases the risk (Center for Disease control and Prevention, 2015) A person may experience yellowing of the eyes, loss of appetite, fever, dark urine, and abdominal discomfort. These symptoms may not appear for months after weeks of exposure to Hepatitis B virus (Kahn, 2017). For effective control of HBV, the focus should be on both pregnant women screening and people having unprotected sexual intercourse with multiple partners and coming from an HBV-endemic area. More importantly newborn babies born to positive mother (Van Der Veen et al., 2010).

2.2 SEROLOGICAL MARKERS

The Hepatitis B virus belongs to the hepadnaviridae family which is a hepatotropic agent with a DNA genome. It may infect its natural host (man) without pathological significances or cause a highly polymorphic range of liver disease from unapparent Hepatitis, to cirrhosis or hepatocellular carcinoma (Bonino et al., 1988). According to Cardona et al. (2011), the Hepatitis virus DNA can be present in the absence of HBV surface antigen and this is known as Occult Hepatitis B virus infection (OBI), which may lead to severe disease. It is estimated that more than 20% of OBI cases are seronegative for all the HBV markers (Torbenson and Thomas, 2002). In diagnosing OBI in liver tissue or in serum, there is no standard assay but the only reliable method

is the detection of HBV DNA by nested polymerase chain reaction(PCR) or real-time PCR (Makvandi, 2016).

In the diagnosis of chronic HBV infection there must be a presence of Hepatitis B surface (HbsAg) in blood for more than six (6) months, then it is chronic HBV infection. The Hepatitis B envelop antigen (HbeAg) in the blood indicate active viral replication and infectivity (Dunkelberg et al., 2016). In some stage of the natural course of infection, HbeAg may be cleared and antibodies to the Hepatitis B envelop antigen (anti-HBe) will arise immediately afterward. Furthermore, HbsAg can be undetected provided the host is able to clear the infection which will follow by IgG antibodies to the Hepatitis B surface antigen and core antigen (anti-HBs and anti-HBc IgG). A person can be HbsAg negative but positive for anti-HBs which means the person has either cleared an infection or has been vaccinated previously(Ifeorah et al., 2017).

In Ghana, the national Hepatitis B infection prevalence is 12.3% for pregnant women. The prevalence is higher in rural settings (13.3 %) compared to urban settings (12.2 %) (Ofori-Asenso & Agyeman, 2016). The presence of HbsAg is an indication of acute or chronic infection and prevalence, as well as endemicity of Hepatitis B infection. It can easily be identified as chronic by its high specificity, long serum persistence and low possibility (Ott et al., 2012). A study conducted by Frambo et al. (2014) have HbsAg in pregnancy to be 9.7% with the highest rate observed in age group15-19(20%). They also found that half of the women with positive HbsAg were in their third trimester and the majorities (64.7%) of women were multigravida.

It is important to provide genotype of the patient with HBV for identification of specific clinical associated with each genotype. It also helps one to determine the origin of the virus to evaluate the cause of HBV and to be able to monitor the stage and damage of the liver. The genotype can predict the forms of serological reactivity and multiplication of the virus (Attaullah et al., 2011). In a research conducted in Cameroon by Fomulu et al., (2013), indicate a prevalence of HbsAg to 7.7% among pregnant women and this makes them source of transmission of HBV infection that may go long way to affect the general population.

According to Ali et al., (2011), they are eight different type of genotype of HBV, that is A to H. Hepatitis B virus genotype exit and its prevalence differs with geographical location and ethnicity. The genotypes are distributed globally and locally. For instance Genotype A is found in Africa, Europe, and the Americas whereas genotypes B and C in south-east Asia. Genotype D is found in all continents whereas western Africa is a region for genotype E but can be found in the entire world following emigration from Africa. Genotype F and H originate from Central and South America while genotype G can be isolated in Europe and the United Kingdom (Sunbul, 2014). Popovici et al., (2018) found that one in each age group was positive to HbeAg, which made the prevalence of HbeAg to be 0.4%. It further indicated that more than half of the positive pregnant women were also positive to HbeAb making age not be significant with positive HbeAg. Furthermore, age group 20-24 years have the higher HbeAg prevalence of 54.5% among age groups with the overall prevalence of HbeAg been 36.7% (Getahun et al., 2016).

Table 2.1: Interpretation of Hepatitis B serologic test results source;

Dionne-Odum et al., 2016

Hepatitis B markers	Results	Interpretation
HbsAg HbcAb HbsAb	_ _ _	Susceptible
HbsAg HbcAb HbsAb	_ + +	Immune due to natural infection
HbsAg HbeAg HbsAb	+ + _	Virus replication and infectious
HbsAg HbcAb HbsAb	_ _ +	Immune due to Hepatitis B vaccination
HbsAg HbcAb HbsAb IgM HbcAb	+ + _ +	Acutely infected
HbsAg HbcAb HbsAb	+ + _	Chronically infected

IgM HbcAb	_	

2.3 PREVENTION

The WHO recommended that Hepatitis B vaccine should be part of routine immunization services for all nation to prevent transmission of HBV (EPI, 1992). According to Stevens et. al. (1992), the Hepatitis B vaccine has been suggested for high-risk individuals however, this has failed to control Hepatitis B virus (HBV) in many countries. Therefore universal immunization should be considered as a routine childhood vaccine. In this vein after ten years of vaccinating children, one-third of them will have anti-HBs titers below the accepted protective antibody level of 10 IU/L. Adults who have received Hepatitis B vaccination are protected even 18 years after receiving a primary series of infancy vaccinations, which may lead to a low rate of infection (Coffin et al., 2012). The vaccine is usually 3 or 4 shots over a 6-month period for adolescents and adults. Infants usually get their first dose at birth and complete the series at 6 months of age (Center for Disease control and Prevention, 2015).Newborn babies born to positive HbsAg mothers it is recommended that the Hepatitis B vaccine and Hepatitis B immunoglobulin should be administered to the newborn infants, to prevent Hepatitis B infection(Lee et al., 2010). Children born to mothers who do not know their Hepatitis serology (HbsAg) status should be given HBV vaccine immediately after born not exceeding 12 hours. The mother should immediately test for HbsAg (Dalgic, 2007). Pregnant women are willing to accept vaccination for themselves and their infants, provided they are educated about the

rationale and safety of it (Healy et al., 2015). According to Navabakhsh et al., (2011) , HBV vaccination can prevent 70%-95% of HBV infections in infants born to HbsAg and HbsAg-positive mothers, if only ordered to infants within 12-24 hours of their birth. Hepatitis B immune globulin is costly and not feasible to administrate universally in all the countries.

Mother to unborn child transmission can be prevented by expanding access to antenatal diagnostics, administering tenofovir to mothers during third trimester and vaccination all babies, born to mother who is positive HbsAg must receive the first dose delivered at birth. Therefore Vaccination is the basis for the prevention of HBV infection in the general population (O'Hara et al., 2017). In study carried out by Randriamahazo et al., (2015) in Madagascar in which out of one thousand and fifty pregnant women only four women (0.38%) had ever screened for Hepatitis B and received the Hepatitis B vaccine. Twenty women were positive for HbsAg representing 1.90%. Those tested positive for HbsAg had not been vaccinated.

2.4. MOST VULNERABLE POPULATION TO HEPATITIS B VIRUS INFECTION

Poverty, HIV infection, lack of education and infrastructure makes many populations in Africa, by low and middle-income countries vulnerable to the Hepatitis B virus (O'Hara et al., 2017). According to Ribeiro Barbosa et al., (2017), people on hemodialysis and those suffering from coagulation diseases, are most vulnerable to Hepatitis B. Chronic Hepatitis B is determined by the age at which one becomes infected with the virus.

Individuals who are infected with HIV are at having a high prevalence of HBV and HCV. This can be attributed to the common routes of transmission of a virus, which be through injecting drug use, infected blood transfusion and sexual intercourse among them (Ribeiro Barbosa et al., 2017). A study by Ndams et al., (2008), indicated that pregnant women who are in their third trimester were more likely to be infected with Hepatitis B virus than those in their second and first trimester.

A research by Adegbesan-Omilabu et al., (2015), indicated that pregnant women who are multigravida and those who siblings were previously infected by HBV are likely to be HbsAg positive. They went further to indicate the women with two or more lifetime sexual partners are four times more likely to be HbsAg positive. According to Fomulu et al., (2013), the following risk factors are associated with Hepatitis B infection history of abortion/stillbirth, history blood transfusion, history of surgery, history of scarification/tattoo, history of jaundice and contact with jaundice/Hepatitis B. They further indicated that pregnant women who have a history of jaundice and history contact with jaundice/Hepatitis B persons are more likely to be HbsAg positive. The levels of education help a major role in susceptibility to Hepatitis B infection.

A research by Souza et al., (2012), indicated that low level of education has an association with positive Hepatitis B markers (HbsAg positive 57%) and further indicated that this can as a result of low income, reflects lack of awareness about the prevention as well as poor access to health services. According to Knorr et al., (2008) age group below 30 years has a prevalence of 2.4% which is further decreased in women who are more than 30 years of age. A total of 81 positive to HbAg, there was no acute HBV infection but only chronic HBV infection. The prevalence of HBV is

higher in pregnant women from urban area 9.7% than rural area 3.5% with an age group 25-34 years having the highest among the age group (Abongwa et al., 2016). Occupation and history of blood transfusion were found to be statistically significant in relation to Hepatitis B virus infection among pregnant women (Abuelgasim & Baraka, 2015). A study by Onwuakor et al., (2014), indicated that seroprevalence of HbsAg amongst first trimesters is 11.1%, while primigravida, is 8.0%. It also further noticed that women with no education 37% of them were positive to HbsAg and those who multiple sexual partners were 25.0% positive to Hepatitis B surface antigen.

2.5 MANAGEMENT OF HEPATITIS B INFECTION

Treatment of those who are positive to HbsAg for more than six months is primarily to decrease the risk of developing a chronic liver disease associated complications. Studies have revealed that 15% to 40% of chronically infected people with HBV will develop cirrhosis in a lifetime and 2% to 5% developing hepatocellular carcinoma (HCC) annually (Fattovich et al., 2004). Therefore there is the need for eradication. The Current treatment options available now is that for the disease to cure the Hepatitis B virus need to be suppressed and this comes with several adverse effects. Before treatment should start the serum DNA and Alanine Aminotransferase (ALT) should be known for this will help indicate the severity of the disease (Tang, 2014).

The guidelines for treatment of Hepatitis B recommend that patient with inactive disease (HBV) does not need antiviral therapy but later in life may experience reactivation of the virus that can lead to injury to the liver and may need treatment. Therefore it is recommended that those with inactive disease should have a regular medical and laboratory assessment to assess whether there is the need for treatment (Spradling et al., 2014).

According to Lavanchy, (2004), Hepatitis B virus and its related liver disease account for one million die annually and out of that HCC is responsible for 320 000. Antiviral drugs are available for HBV infected individuals which may prevent the complication of the chronic liver disease. Therefore, it is important to identify infected individuals and monitor them(Janahi, 2014).

According to Lai et al., (1998), 97% of Hepatitis B Virus DNA level will be reduced after two (2) weeks of lamivudine. It is a cytosine analogue that acts as a nucleoside HBV reverse transcriptase inhibitor and thus is a strong replication inhibitor. This is further to demonstrate a significant reduction in the likelihood of mother-to-child transmission (MTCT) of HBV infection and is harmless for the mother and newborn (Dunkelbery et al., 2016). According to Wilson et al., (2016), Interferon(IFN) or Nucleus(t)ide(NUC)-based therapies or a combination of the two can be able to have functional cure after prolong treatment in some patient. It is estimated that 3-7% of patients after 48 weeks of treatment with pegylated IFN-α-base will lead to viral clearance and Hepatitis B surface antigen (HbsAg) disappearance.

They are a prophylactic treatment for infants born with a Hepatitis B surface antigen (HbsAg) positive mother and those who are unintentional percutaneous or per mucosal or sexual exposure to an HbsAg positive person by injecting (HBIG). This was reported by Center for disease control and prevention (CDC) 2015. When the Hepatitis B vaccine and Hepatitis B immune globulin is administered immediately after delivery, can prevent 90% of Hepatitis B infection from mother to baby (Andre, 1994). There are gaps on the current recommendation for managing HBV infected mother and there is also a failure to follow-up on HBV unprotected infants who may

have potential complications particularly liver cirrhosis and hematoma (Eke et al., 2016).

2.6. AWARENESS OF HEPATITIS B

The misconception about HBV transmission is still a major concern among the obstetric population, and there is the need for delivery of appropriate and correct information to improve further control of Hepatitis B infection pregnant women (Chan et al., 2011). A research conducted in Guangdong province in China by Han et al., (2017), indicated that 53.3%of pregnant women did not know that having unprotected sexual intercourse can lead to HBV transmission and 20% did not know that an infected mother could transmit HBV to an infant. Existing knowledge about Hepatitis B is limited, therefore the need for preventive clinical practice. In that vein, creating awareness of the disease among mothers may lead to improvement in the treatment and further prevent perinatal transmission of Hepatitis B(Chao et al., 2012).

Pregnant women and Health practitioner need knowledge on mother to child transmission of HBV for purchase and administrating of HBIG to newborns particular areas that lack resources. It is important to provide treatment for a mother who is reactive to HbsAg which include antiviral treatment (Cheng et al., 2015). Delay in diagnosis HBV related to the liver disease is due to a lack of knowledge which favors the spread of the virus. It was revealed that 70-80% Pregnant women in Hong Kong, Cameroon, Nigeria are not aware of Hepatitis B virus infection (Ngaira et al., 2016). Low level of knowledge and awareness about HBV with demographic factors such as low level of education, low socioeconomic status, young age and not having health insurance account for low screening rate among Asia- American (Van Der Veen et al., 2010). In endemic population lack of awareness of HBV, its risk factors, and its

consequences are recognized as major disincentives to adopting positive preventive behavior including immunization (Okonkwo et al., 2017).

2.7. MODE OF TRANSMISSION

The vertical transmission is also known as mother to child transmission (MTCT). The can be transmitted in the uterus which is term as intrauterine transmission while transmission occurring and after delivery is known as intrapartum transmission (Kumar et al., 2012).

The key route of transmission of HBV is through vertical transmission. It can be either through intrauterine infection, intrapartum infection or puerperal infection. It is very important to block this transmission by vaccinating the infant immediately after birth with HBV vaccine or anti-HBV immunoglobulin. Despite all these interventions, intrauterine infection is attributable to 5-10% infant HBV infection (Yu et al., 2013). A mother who is positive to HbsAg has a 90% risk of transmitting the virus to children while those who are negative have 10%–20% risk of passes it to their offspring (Navabakhsh et al., 2011). Administering of HBIG injection in small doses to positive HbsAg mothers during pregnancy can lead to a reduction in intrauterine infection. This will reduce the maternal HBV Deoxyribonucleic acid load and provide the newborn with passive immunity(Shi et al., 2010).

Horizontal HBV spread among children can hardly be recognizable and it appears very short. In the case of vertical HBV transmission from HbeAg positive mother may last for years while under other conditions such as horizontal transmission (Sarin et al., 2016). It is estimated that those that are chronically infected with HBV and are pregnant are 30% risk of transmission of Hepatitis B virus to an infant. This process is

possible regardless of whether the child has received HBIG or Hepatitis B vaccine (Dunkelberg et al., 2016). Perinatal transmission is high about 50% in endemic countries. Therefore implementation of standard procedures and intervention which target the prevention of MTCT of HBV infection is very crucial (Adjei et al., 2016).

Young children who acquired HBV through horizontal transmission are at high risk of chronic HBV. The environmental surface can be a good avenue for horizontal transmission of HBV to young children and some adults. A study from Alaska revealed that people and children who are positive to HbsAg can spread HBV through lunch table, on school walls, through contact with toys and through baby bottles (Nelson et al., 2016). A large proportion of HbsAg has been detected in breast milk making breastfeeding a major concern in postpartum HBV transmission. More importantly, it can be transmitted to the infant through abrasions around the mother's nipple (Kumar et al., 2012).

Most people spread the virus by percutaneous or mucosal exposure to infected blood and other body fluids with many forms of human transmission. It can also be detected in peripheral mononuclear cells, tissues of pancreas, spleen, kidney, and skin, faces, and body fluids like tears, urine, and vaginal secretion(Iferorah et al., 2017). Transmission may occur through a close family member or sibling who is infectious can also transmit the virus to a child via unrecognized close contact with infectious body fluids like saliva at concentrations 1000 to 10,000 times less than in blood (Coffin et al., 2012).

2.8. FACTORS ASSOCIATED WITH HEPATITIS B TRANSMISSION

Intravenous drug abusers, those who tattooed their body and pierced their ears and those who are sexually active both heterosexuals and homosexuals. These categories of people are at risk of acquiring Hepatitis B infection (Janahi, 2014). Exposure to body fluid with a high concentration of the virus is a risk factor for HBV infection. The risk factor among pregnant women depends on the cultural practices and beliefs. Other studies reveal the following risk factor level of education, history of blood transfusion, surgery, abortions, sexually transmitted infection, higher mean parity, early sexual debut, polygamy and higher numbers of sexual partners (Ngaira et al., 2016). Studies also revealed that poverty, literacy, low social standard, age, and parity can also influence the rate of transmission (Abongwa et al., 2016).

There is an association between the number of sexual partners and HBV infection. If a pregnant woman has two or more sexual partner she is 16 times likely to be infected with Hepatitis B virus. In the same light those who are having a history of piercing their ears than one were more likely to be infected with HBV than their counterpart (Umare et.al, 2016). Pregnant women less than 20 years are free of HBV but this cannot be said about women who are 40 years and greater with a prevalence of 13.8%. It is also high in pregnant women that are urban residential 4.6% compared to rural 3.4% (Bani et al., 2012).

2.9. COMPLICATIONS OF HEPATITIS B IN PREGNANCY

The high risks of maternal, fetal and neonatal complications are associated with viral Hepatitis during pregnancy. It can lead to chronic virus carriage in neonatal which may turn to liver cirrhosis and hepatocellular later in life. During pregnancy, it can induce premature labor and prematurity with its attendant effects (Molla, Munshea, &

Nibret, 2015). The Hepatitis B virus can injure the placenta barrier and thereby increases the risk of neonatal infection which may lead to toxoplasmosis, Rubella, Cytomegalovirus, Herpes Simplex (TORCH) infections (Abdi et al., 2015). Follicular fluid and ovaries can be infected with HBV if there is a high level of maternal HBV DNA. This can lead to 50% of embryos replication of the virus in 7% of mothers with undetectable levels of HBV DNA (Umar et al., 2013).

According to Sarin et al., (2016), indicated an estimated 2-6% of HbeAg positive while 8-10% HBeAg negative patient will develop cirrhosis annually. Advanced liver disease presentation and older age account for the high rate in HbeAg negative patient. Newborn babies whom the mother is HbsAg positive have a low Apgar score and therefore have the risk of intraventricular hemorrhage. The liver may fail to produce vitamin K due to Hepatitis B virus infection which can lead to intrapartum and post-partum hemorrhage (Eke et al., 2011). Studies have it that positive HbsAg pregnant women have reported hepatic exacerbations/fulminant hepatic failures. It is estimated that about 12.5-17% of women have Hepatitis flares with or without HbeAg seroconversion within the first months after delivery and also declined in Hepatitis B DNA level after pregnancy. Liver disease markers changes during pregnancy and after pregnancy. The ALT reduces during pregnancy and increase three times within 6 months after delivery (Kumar et al., 2012). Infertility can be caused by chronic HBV infection which usually occurs during in vitro fertilization and embryo transfer (Shi et al., 2014).

CHAPTER THREE

3.0. METHODOLOGY

3.1 STUDY DESIGN

An analytical cross-sectional and facility based study was conducted among pregnant women. A questionnaire was administered to gather key demographic data and awareness on transmission and prevention of Hepatitis B virus in the municipality.

3.2 PROFILE OF STUDY AREA AND BACKGROUND INFORMATION

The study was carried out in the Wa Municipality, which is the capital region of the Upper West Region (UWR), that is located up north of Ghana. This region was created in 1983 and was the last to be created. It estimated population is 123,744 (Ghana Statistical Service, 2014). The municipality shares common boundaries to the east with the Wa East District, to the south and west by Wechua and to the north by Nadowli. Out of the total of population of the Municipality, 54.8 percent are above 15 years and are economically active (GSS, 2014).

Climate

The Wa Municipality has two seasons, that is, the wet and dry seasons. The wet season begins in April and ends in October, while the dry season starts with winds from the Sahara Desert in November and end in March. It has between 840mm and 1400mm mean of rainfall annually.

The Economic activities

The economic structure of the Municipality is dominated by farming which is 30.2 percent. Mostly the people are involved in growing soya bean, millet, sorghum, maize, rice, groundnut cowpea and groundnut cultivated on a subsistence basis. Shea nuts (butyrospermum parkii), dawadawa (parkia biglobosa), and mango (mangifera

indica) are the economic trees in the municipality. Other key sectors of the economy are transport, tourism, communication, and energy (GSS, 2014).

Health Facilities

The Municipality has seven (7) Sub-municipalities namely: Bamahu, Busa, Charia, Cheringu, Dobile, Kambali and Wa Central sub-municipalities. Health facilities within the municipality are; one Hospital, seven Health Centers, five Private clinics, four Government Clinics and twenty-five Community-Based Health Planning and Services (CHPS) compounds.

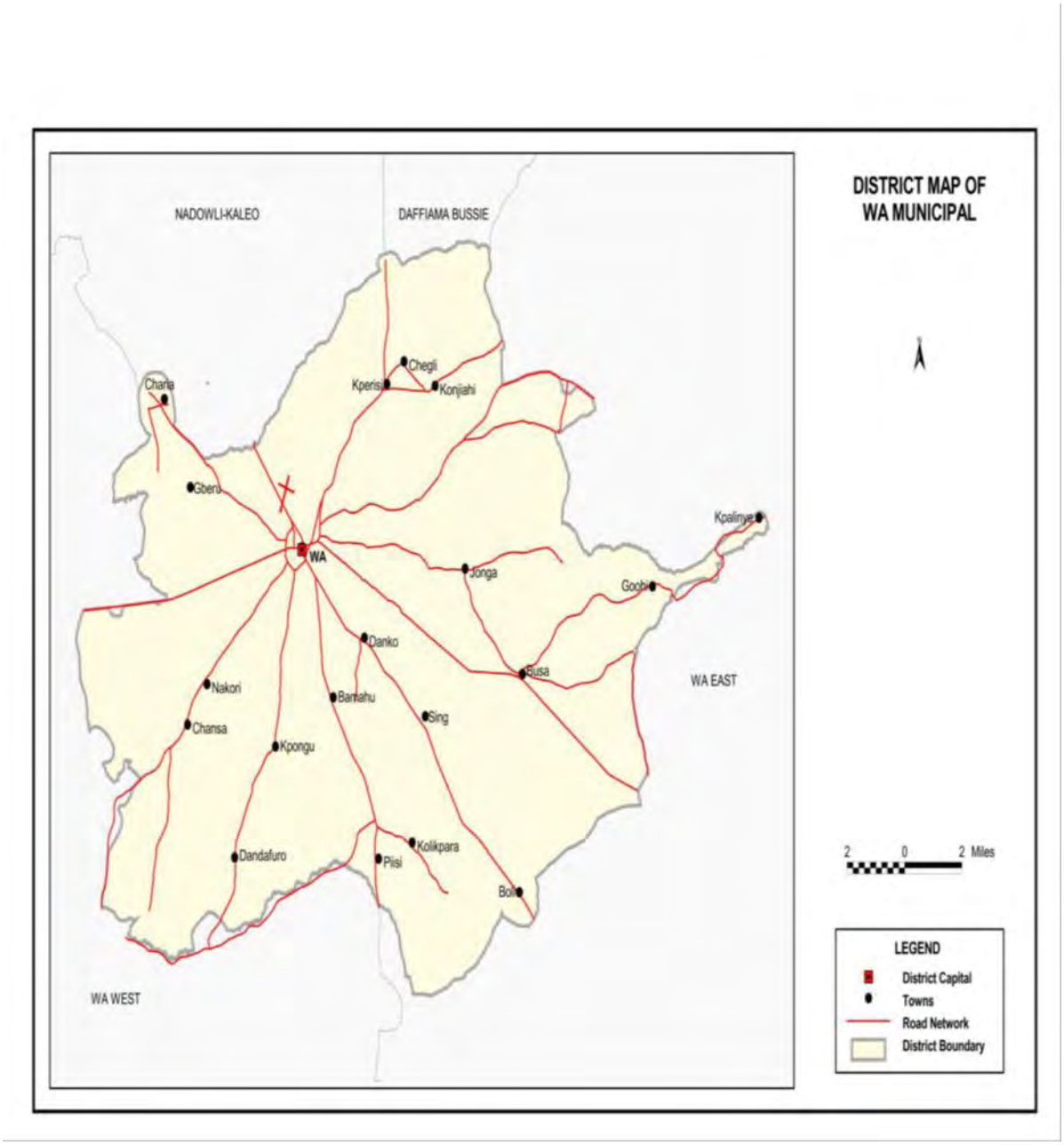

Figure 3.1: Map of Wa Municipality (GSS, 2014)

3.3 STUDY POPULATION

The study targeted pregnant women attending ANC in the municipality.

3.3.1 INCLUSION CRITERIA

Pregnant women who were attending antenatal services during the period of June 2018.

3.3.2 EXCLUSION CRITERIA

Pregnant women with emergency conditions requiring urgent intervention.

Pregnant women who did not agree to participate in the study.

3.4. SAMPLE SIZE DETERMINATION

This sample size was arrived at using the Cochram formula (1977)

$n=Z^2pq/d^2$

n is sample size

Z = 1.96 for p value of 0.05

d: distance on either side of mean in confidence interval (95% confidence interval) = 0.05

q=1-p

p: Prevalence/proportion in Ghana 12.3 by Ofori-Asenso & Agyeman, (2016).

q=1-0.123

q=0.877

$n=1.96^2\times0.123\times0.877/0.05^2$

$n=3.842\times0.108/0.0025$

n=0.415/0.0025

n=166

Estimating 10% of non-respondents representing 17 is then added to 166. Therefore the sample size was 183.

3.5 SAMPLING METHOD

Consecutive sampling was used for the selection of pregnant women attending the ANC. It is non-probability sampling in which one will enroll every single participant who meets the inclusion criteria until one reach desired number. All pregnant women attending ANC were taking through the outline and purpose of the study. Explanation of the inclusion and exclusion criteria was emphasized. Those who met the inclusion criteria were recruited till the desired sample size was achieved. The process was repeated every ANC day till the sample size was realized. The Regional Hospital was purposely selected due to its location, and more importantly, the fact that a substantial proportion of pregnant women attended antenatal care.

The municipality is made up of 7 sub-municipalities and each sub-municipality has one Health Centre. The Health Centre records more pregnant women than CHPS compounds in the various sub-municipalities. Three Health Centers which has higher attendants based on annual reports and which are not in the center of the municipality were selected. From the report, Charia has 1180, Bamahu 2896 Busa 1665 and regional hospital 13182 giving a total of 18,923. Proportionally 15% accounts for Bamahu, Charia 6% Busa 9% and regional hospital 70%. This translates into Bamahu 28, Charia 11, Busa 17, regional hospital 128 of pregnant women who gave their consents and participated in the study.

3.6. DATA COLLECTION TECHNIQUES/TOOLS

Information on the socio-demographic characteristics (age, education, occupation, etc.), obstetric characteristics (gestational age and parity) possible risk factors (e.g. sexual partner, and tribal marks,) was obtained through a questionnaire. Furthermore, a series of questions on Hepatitis B transmission and prevention was also obtained by questionnaire. After completing the questionnaire blood (3mls) was collected by venipuncture into an ethylenediaminetetraacetic acid (EDTA) tube. The laboratory technologist collected the blood through venipuncture. Pregnant women were comfortably seated with the arm placed in an extended position while they relaxed. The site for puncture was cleaned with an alcohol swab before the blood was taken, after which a clean plaster was used to cover site to avoid blood split. Both questionnaire administering and the collection of the blood were done in the health facility. The sample (blood) was then taken to the laboratory for the testing of HbsAg, HbeAg, HbcAb, HbeAb, and HbsAb.

3.7. BIOLOGICAL SPECIMEN COLLECTION

Blood was collected using standard laboratory procedures from participants by the Principal Investigator who is a Nurse and assisted by a laboratory technologist from Care Diagnostic Laboratory. Three (3) milliliters (mls) venous blood was collected via venipuncture from the antecubital fossa or dorsum of hand into a test tube. This is the minimum amount of blood required by the laboratory for their automated analyzers to perform the requested test. Participants' arm was placed in an extended position while she was relaxed. An appropriate vein was located. A tourniquet was applied 3-4 inches above the located vein. Before the blood is taken, the site was cleaned with a swab containing spirit (alcohol). In the collection of the specimen

(blood), five (5) mls of syringe and needle was used. The venous blood samples were stored at a temperature of 2°C to 8°C and transported in a vaccine carrier to Care diagnostic laboratory. Samples were analyzed within 8 hours after collection.

3.8. SEROLOGIC ASSAY

Three (3) ml each of venous blood was collected from the pregnant women and tested for Hepatitis B envelop Antibody (HbeAb), HbsAb and Hepatitis B Core Antibody (HbcAb) using Wondfo One Step HBV rapid immunochromatographic assay.

3.9 POTENTIAL RISKS

This study comes with the risk of pain associated with venipuncture procedure

3.10 LABORATORY PROCEDURE

The test kit and specimen were at room temperature (10^0C-30^0C) prior to testing. open the pouch at the notch and remove device (cassette). Place the cassette on a clean, flat surface. Label the cassette with specimen's identification number. Fill the plastic dropper with the specimen. Holding the dropper vertically, dispense 1 drop of specimen (about 40-50 µL for whole blood, 30-45 µL for serum/plasma) into the sample well making sure that there are no air bubbles. Then add 1 drop (about 35-50 µL) of Sample Diluent. Set up timer and read the results in 15 minutes. Positive results can be visible in as short as 1 minute.

3.11 INTERPRETATION OF RESULTS

Positive (+)

(1)For HbsAg, HbsAb, HbeAg.

It is only positive if a rose-pink band appears and it is visible in the control region and with the appropriate test region.

(2) For HbeAb and HbcAb

A rose-pink band is visible only in the control region. No color band appears in the appropriate test region.

Negative (-)

(1) For HbsAg, HbsAb, HbeAg

A rose-pink band is visible only the control region. No color band appears in the appropriate test region.

(2) For HbeAb and HbcAb

A rose-pink band is visible in the control region and the appropriate test region.

Invalid

No visible band at all or there is a visible band only in the test region but not in the control region.

3.12 SPECIMEN STORAGE AND PROTECTION

Specimens of blood were stored in a refrigerator between 2^0C and 8^0C for a maximum of seventy-two hours during the analysis period, to enable us to confirm inconsistent or abnormal results and thereafter were destroyed. Study survey forms (hard copy) were destroyed at the end of the research.

3.13 QUALITY CONTROL

To ensure a quality of data gathered, the selected Research Assistants were those who were fluent in the local dialects. These assistants were equipped with skills of administering questionnaires. Pre-testing was done ahead of the study at Bamahu health Centre in which ten women were selected at random and questionnaires

administered to them. The pre-testing allowed some questions to be better reframed. A laboratory technologist from Care Diagnostic Laboratory was responsible for obtaining blood samples. All samples collected at the close of each day (1.00pm), were sent to Care Diagnostic Laboratory. To avoid mix-ups with the coding of the samples, a simple code starting from one (1) to the last number of 183 was assigned to each sample as they were taken.

3.14 DATA ANALYSIS

All the information on the questionnaire was entered into a computer database using STATA/SE 15. Frequencies and percentages were used to represent the variables. Chart and tables were used to present the findings of the study. Chi-square and Fisher´s Exact Test were ran to find out the association between the variables.

The awareness of Hepatitis B transmission and prevention was assessed by grading according to correct responses from the mothers to the questions on awareness of Hepatitis B. Each awareness answer was graded as zero (0) for incorrectly or "Don't know" responses, while correct responses were scored one (1). An awareness summary score for the 9 questions asked was calculated from the total of correct answers. Mothers with marks equal to or above 4 were denoted as average and adequate awareness depending on the scores.

The relationship between the independent variables and the outcome variable (HBsAg) and HBV serological markers were tested using logistic regression. The p-value < 0.05 was considered statistically significant. Those which were significant were further tested for bivariate and multi logistic regression to see the strength of association.

3.15. LIMITATION OF THE STUDY

The study was carried out in four Health facilities in Wa municipality due to financial reasons. Therefore, this can affect the results by generalization.

A nonreactive result can occur if the quantity of HbsAg present in the specimen is below the detection limits of the assay, the HbsAg that are detected are not present during the stage of disease in which a sample is collected.

Blood sampling can be seen as unpleasant by some, and may have been a deterrent to study participation or inadequate blood that may affect the results.

3.16. ETHICAL CONSIDERATIONS / ISSUES

The ethical review Board of the Ghana Health Service reviewed and approved this study with approval Number GHS-ERC 029/01/18 which is attached in appendix three.

All data were coded. Only investigators of this study were privy to the data. Research information was purely for academic purposes. Soft copies were encrypted whilst hard copies were stored under lock and key.

The study objectives and procedures, as well as possible risks/ benefits associated with participating in the study, were carefully explained in English and the local language to the pregnant women before they are enrolled. A written informed consent was obtained from eligible women. Questionnaires were administered to those who agree to participate and satisfy the inclusion criteria. They were informed that they can stop at any point in time. Forms for each participant would be kept under lock and key.

A pretest voluntary counseling was done, permission and consent were sought from the mothers and if granted a questionnaire were administered to each participant. Well trained data collectors will translate the questionnaires into local languages to the best of the understanding of a mother in the presence of an independent witness where the recruited patient cannot read and write. Venipuncture was done by a Laboratory technologist for 3mls blood.

CHAPTER FOUR

4.0. RESULTS

4.1. SOCIODEMOGRAPHIC CHARACTERISTICS OF PREGNANT WOMEN

The mean age of study participants was 32 years, among these 37.2% (68/183) of the pregnant women were aged between 25 and 29 years, 23.0% (42/183) between 30 and 34 years with 5.5% (10/183) being a young age group that is 15 and 19 and 1.1% (2/183) being the older age group of 45 and 49. 92.1% (170/183) of pregnant women were married, six points one 6.0% (11/183) were single and 1.1% (2/183) were divorced. With regard to occupation 43.2% (79/183), were self-employed twenty-three point fifty 23.5% (43/183) were civil servants, 19.1% were jobless and 14.2% (26/183) were students. Most of the pregnant women had attained training college/university level that is 34.4% (63/183), 22.4% (41/183) had their education up to middle and junior high school. In addition to that 15.3% (28/183) had no formal education while 9.9% (18/183) had their education up to primary and 18.0% (33/183) up to secondary/SHS/vocational school. 73.2% (134/183) of pregnant women were Islam, 26.2% (48/183) were Christian while 0.6% (1/183) was a traditionalist. Furthermore, 61.2% (112/183) of the pregnant women were residing in urban while 38.8% (71/183) were rural.

Table 4.1: Socio-demographic characteristics of antenatal care attendants' women in Wa Municipality, June 2018

Variable	Frequency (%)
Age group (in Years)	
15 – 19	10 (5.46)
20 – 24	39 (21.31)
25 – 29	68 (37.16)
30 – 34	42 (22.95)
35 - 39	19 (10.38)
40 - 44	3 (1.64)
45 – 49	2 (1.09)
Marital Status	
Single	11 (6.01)
Married	170 (92.09)
Divorced	2 (1.09)
Occupation	
Civil servant	43 (23.50)
Jobless	35 (19.13)
Self employed	79 (43.17)
Student	26 (14.21)
Level of education	
No formal education	28 (15.30)
Primary	18 (9.85)
Middle/JHS	41 (22.40)
Secondary/SHS/Vocational	33 (18.03)
Training	63 (34.43)
college/University	
Parity	
Primipara	62 (33.88)
Multipara 2-4	95 (51.91)
Grand	2 (1.09)
Multipara>4	24 (13.11)
Stage of pregnancy(Gestation)	
First trimester	28 (15.30)
Secondary trimester	72 (39.34)
Third trimester	79 (43.17)
Religious	
Islam	134 (73.22)
Christianity	48 (26.23)
Traditionalist	1 (0.55)
Area of residence	
Urban	112 (61.20)
rural	71 (38.80)

4.2. SEROLOGICAL RESULTS

Out of the 183 sera examined, 20.2% (37/183) [95% (CI) 15.0-26.7] were positive for HbsAg and 7.1% (13/183) [95% (CI) 4.1-11.9] were positive for HbeAg while 18.6% (34/183) [95% (CI) 13.5-24.9] were positive to HbcAb. Figure 3 shows a distribution of Hepatitis B markers among pregnant women attending ANC in the Wa Municipality.

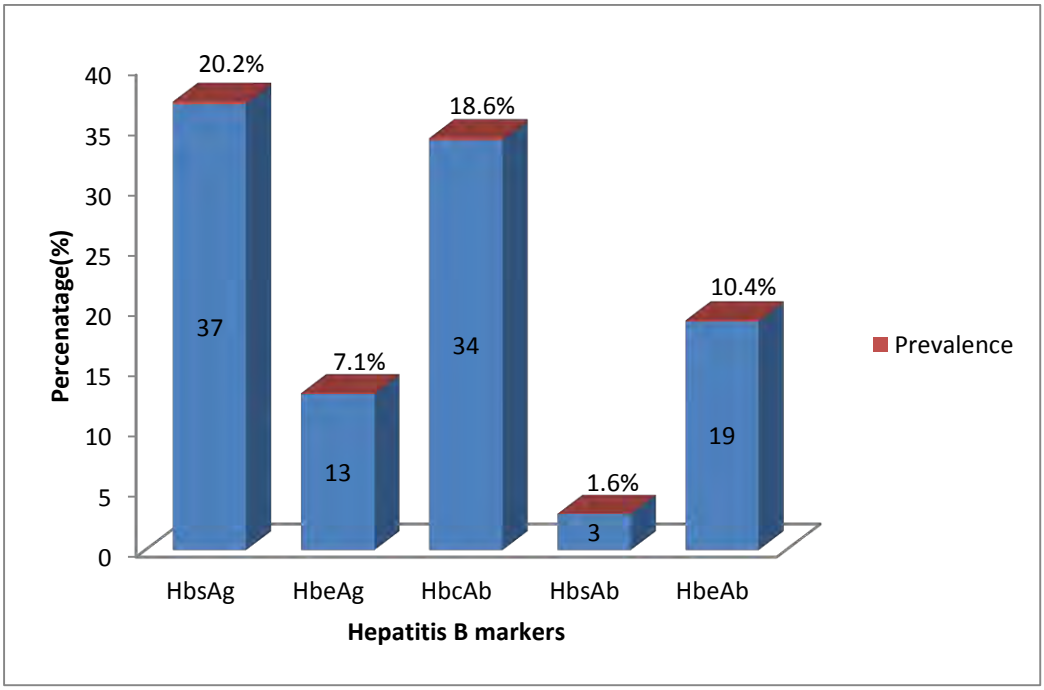

Figure 4.1: Distribution of Hepatitis B markers among pregnant attending ANC in Wa Municipality.

4.3. AWARENESS OF HEPATITIS B VIRUS

Table 4.2 shows awareness of Hepatitis B transmission and prevention among pregnant women in the Wa municipality during the period of the study. Most of the pregnant women 89.1% (163/183) were aware of Hepatitis B. 56.8% (104/183) knew that unprotected sex can transmit HBV. About 55.7% (102/183) indicated that Hepatitis B can be transmitted through kissing and only 21.9% (40/183) indicated that it can be acquired through sharing of sharp objects. 51.4% (94/183) indicated one can be infected through infected blood. In addition, 70.5% (129/183) indicated that Hepatitis B can be cured, while 26.8% (49/183) indicated that it cannot be cured. Majority of pregnant women 79.8% (146/183) knew that taking the Hepatitis B vaccine can prevent one from getting the virus.

More importantly, 57.9% (106/183) of women indicated that they had information of Hepatitis B from health workers, 20.8% (38/183) from radio/TV, 6.0% (11/183) from friends, 3.3% (6/183) and 6.0% (11/183) from other sources.

Awareness of HBV was assessed by administering questions on transmission and prevention of HBV. One was assigned to every correct answer and zero to the wrong answer. Scores 1 to 3 were considered limited while scores within 3 to 6 were considered average. Scores 7 to 9 were considered adequate and acceptable. Using the previously assigned scoring system the awareness of HBV was obtained as indicated in Table 4.2.below Limited awareness 7.7% (14/183), average 78.7% (144/183) and adequate awareness 13.7% (25/183). The underlined is part of the methods

Table 4.2: Awareness of Hepatitis B among pregnant women in the Wa Municipality.

Awareness questions	Yes (%)	No (%)	Don't know (%)
Ever heard of Hepatitis B	163(89.1)	20(10.9)	0
Hepatitis B can be transmitted through unsterilized needles, blades and other sharp material	65 (35.5)	118(64.5)	0
Hepatitis B can be transmitted by infected blood and blood products?	94(51.4)	89(48.6)	0
Hepatitis B can be transmitted through kissing?	102(55.7)	81(44.3)	0
Hepatitis B can affect any person?	138(75.4)	35(19.1)	10 (5.5)
Hepatitis B can be prevented by vaccination.	146(79.8)	30(16.4)	7(3.8)
Hepatitis B is transmitted through unsafe sex?	104(56.8)	79(43.2)	0
Hepatitis B can be cured?	129(70.5)	49(26.8)	5(2.7)
Hepatitis B can be transmitted from infected mother to unborn child	40(21.9)	143(78.1)	0

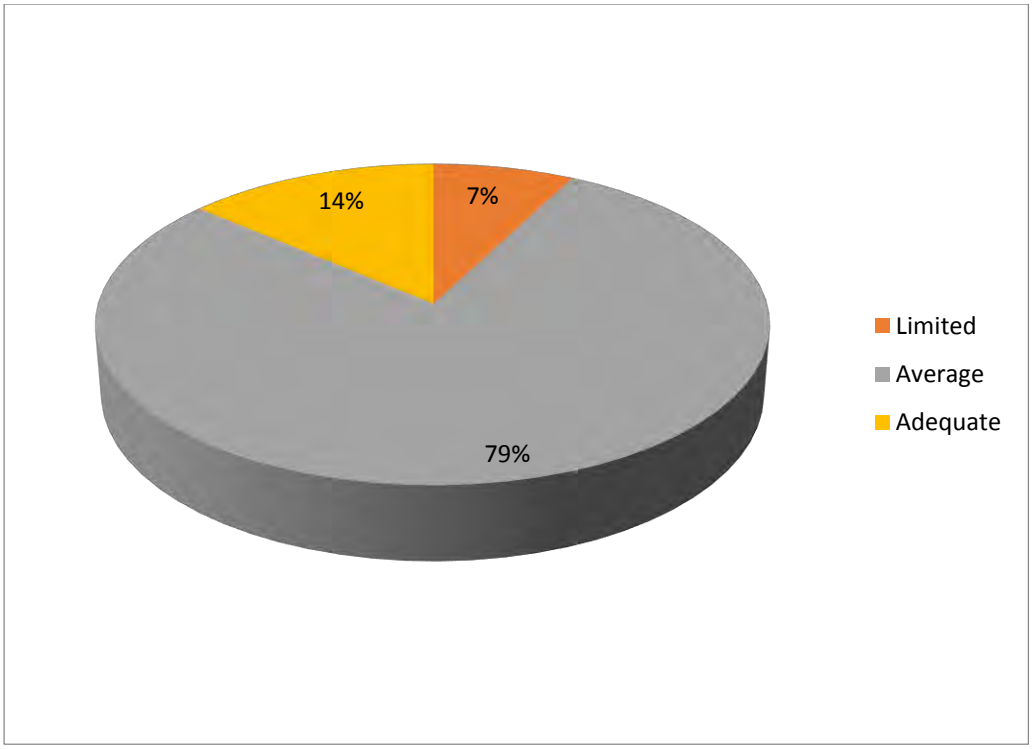

Figure 4.2: Level of awareness of pregnant women in the Wa Municipality on Hepatitis B transmission and prevention

4.4. PREVALENCE OF HbsAg

Table 4.3 shows sociodemographic characteristics and risk factors for HbsAg. In the age group of the pregnant women age 20-24 and 25-29 were all having 29.7% (11/37) which was the majority while age 15-19 was 2.7% (1/37). The Chi-square did not show any statistically significant difference between the different age group because p=0.261 which greater than 0.05.

Furthermore, blood transfusion 16.2% (6/37), tribal marks 48.7% (18/37), tattoo 13.5% (5/37), pierce ear more than one 43.2% (16/37) all have their P value greater than 0.05. Type of marital relationship has polygamous 51.4% (19/37) and 37.8% (14/37) (p=0.001) which is statistically significant.

Table 4.3: Socio-demographic characteristics, and other associated risk factors for HbsAg, HbeAg, and HbcAb.

Variable	HbsAg (%)	p-value	HbeAg positive (%)	p-value	HBcAb (%)	p-value
Age						
15-19	2.7		0.0		2.9	
20 -24	29.7		53.9		29.4	
25- 29	29.7	0.26	7.7	0.00*	32.4	0.20
30-34	18.9		15.4		14.7	
35-39	13.5		7.7		14.7	
40- 44	5.4		15.4		5.9	
Occupation						
Civil servant	10.8		7.7		8.8	
Jobless	21.6	0.19	23.1	0.43	20.6	0.10
Self-employed	48.7		61.5		50.0	
Student	18.9		7.7		20.6	
Marital Status						
Single	13.5		23.1		14.7	
Married	86.5	0.09	76.9	0.06	85.3	0.07
Divorce	0.0		0.0		0.0	
Number of pregnancies						
Primipara	35.1		38.5		35.3	
Multipara2-4	46.0	0.59	46.2	0.81	44.1	0.80
Multipara>4	18.9		15.4		20.6	
Duration of pregnancy						
First trimester	16.2	0.52	23.1	0.12	14.7	
Secondary trimester	48.7		61.5		47.1	0.74
Third trimester	35.1		15.4		38.2	
Level of education						
No formal education	21.6		15.4		20.6	
Primary	10.8		15.4		11.8	
Middle/JHS	24.3	0.69	38.5	0.38	23.5	0.80
Secondary/SHS/Vocational	13.5		15.4		14.7	
Training college/University	29.7		15.4		29.4	
Tribal marks	48.7	0.27	53.9	1.00	47.1	0.25
Blood transfusion	16.2	0.51	7.7	1.00	17.7	0.48
Tattoo	13.5	0.79	15.4	0.67	11.8	1.00
Pierced ears more than once	43.2	0.85	53.9	0.39	47.1	0.56
Family history	7.7	0.47	7.7	0.47	17.7	0.82
Area of residence						
Urban	56.8	0.57	69.2	0.77	58.8	0.85
rural	43.2		30.8		41.2	
Type of Martial relationship						
Polygamous	51.4	0.00*	46.2	0.04*	41.2	0.00*
monogamous	37.8		45.2		47.1	
Previous received Hepatitis B immunization	13.5	0.09	23.1	1.00	11.8	0.07

Fisher exact was used for P-value, *P-value less than .0.05

4.5. HbeAg PREVALENCE

The table shows 4.3 shows socio-demographic characteristics and risk factors for HbeAg prevalence in which age group 20-24 having the highest that is 53.9% (7/13) while 25-29 and 35-39 having the lowest 7.7% (1/13) with a P value of 0.002. Polygamous 46.2% (6/13) and monogamous 46.2% (6/13) with a P value of 0.038 which is statistically significant.

4.6. PREVALENCE OF HbcAb

HbcAb among pregnant women attending ANC on the month of June 2018 is shown in table 4.3. The age group 25-29 had the highest at 32.4% (11/34) and age group 15-19 had the lowest which is 2.9% (1/34) with p=0.201. Furthermore, those in polygamous marital relationship recorded 41.2% (14/34), monogamous 47.1% (16/34) and with a p<0.01 which is statistically significant. Single 14.7% (5/34) and married 85.3% (29/34) with a p=0.066.

Table 4.4 Interpretation of results from study

Hepatitis B markers	Results	Interpretation
HbsAg HbcAb HbsAb	146 149 180	86.5% are susceptible to Hepatitis B infection
HbsAg HbcAb HbsAb	146 34 3	33.3% are Immune due to natural infection

HbsAg HbeAg HbsAb	37 13 3	9.7% Virus replication and infectious
HbsAg HbcAb HbsAb	146 149 3	54.3% are immune due to Hepatitis B vaccination

Table 4.5 Socio-demographic characteristics, and other associated risk factors for HbsAb and HbeAb

Variable	**HbsAb (%)**	p-value	**HbeAb (%)**	p-value
Age				
15-19	0.0		5.3	
20 -24	33.3		26.3	
25- 29	33.3	0.99	42.1	0.77
30-34	33.3		15.8	
35-39	0.0		5.3	
40- 44	0.0		5.3	
Occupation				
Civil servant	33.3		10.5	
Jobless	33.3	0.47	15.8	0.11
Self-employed	0.0		42.1	
Student	33.3		31.6	
Marital Status				
Single	0.0		5.3	
Married	100	0.89	94.7	0.88
Divorce	0.0		0.0	
Number of pregnancies				
Primipara	33.3		31.6	
Multipara2-4	66.7	0.91	57.9	0.92
Multipara>4	0.0		10.5	
Duration of pregnancy				
First trimester	33.3	0.46	26.3	
Secondary trimester	66.7		31.6	0.48
Third trimester	0.0		42.1	
Level of education				
No formal education	0.0		10.5	
Primary	0.0		15.8	
Middle/JHS	33.3	0.66	21.0	0.71
Secondary/SHS/Vocational	0.0		10.5	

Training college/University	66.7		42.1	
Tribal marks	33.3	0.41	42.1	0.17
Blood transfusion	33.3	0.51	10.5	0.77
Tattoo	0.0	0.51	5.3	0.31
Pierced ears more than once	66.7	0.37	42.1	0.96
Type of Martial relationship				
Polygamous	33.3	0.82	41.2	0.05
monogamous	66.7		58.2	
Previous received Hepatitis B immunization	33.3	0.92	10.5	0.23

Fisher exact was used for P-value, *P-value less than .0.05

Table 4.6 shows logistic regression analyses of variable of Hepatitis B markers among pregnant women attending antenatal care in Wa Municipality. Polygamous martial relationship with an odds ratio of 4.61 which indicated that in a polygamous martial relationship is four times more likely to be HbsAg positive than monogamous. It has a ($p<0.01$).

Multiple logistic regression analyses for HbeAg with variables of age group and type of marital relationship. Age group 20-24 has Adjusted Odds Ratio (AOR) of Hepatitis envelop Antigen of 0.18 with a p=0.22 while 35-39 has odds of HbeAg of 0.04 with a p=0.05. From the above table age, 25-29 has odds of HbeAg of 0.01 with a p=0.001 and age group 30-34 has odds of HbeAg of 0.04 with a p=0.04. A polygamous martial relationship has odds of HbeAg of 4.62 with a p=0.03.

Table 4.6 shows logistic regression analyses of positive HbcAb and type of martial relationship. A polygamous marital relationship has an odds ratio of 5.618 meaning people in that relationship is five times more likely to have positive HbcAb than one who is not. It has a ($p< 0.01$).

Table 4.6: Logistic regression of variable of Hepatitis B markers among pregnant women attending antenatal care in Wa Municipality

Variable	HbsAg			HbeAg						HbcAb		
Age	COR	95%CI	p-value	COR	95% CI	p-value	AOR	95% CI	p-value	COR	95%CI	p-val
15-19							1					
20-24				0.01	0.09 -1.38	0.09	0.18	0.01 -2.77	0.22			
25-29				0.01	0.00 -0.17	0.00	0.01	0.00 -0.33	0.00			
30-34				0.03	0.00 -0.41	0.01	0.04	0.00 -0.82	0.04			
35-39				0.03	0.00 -0.64	0.03	0.04	0.00 -0.94	0.05			
Type of marital Monogamous							1					
Polygamous	4.61	1.99-10.72	0.00	4.89	1.46-16.31	0.01	4.62	1.17 - 18.25	0.03	5.62	2.37-13.34	0.00

CHAPTER FIVE

5.0 DISCUSSION

5.1. PREVALENCE OF HbsAg

A 20.22% seroprevalence of HBV infections among pregnant women was reported in this study. This rate is relatively high compared to similar studies in Ghana and Cameroon which reported the prevalence of 16.7% and 9.7% respectively among pregnant women (Frambo et al., 2014; Völker et al., 2017). This difference could be due to location. This study employed a consecutive sample and was carried out in four health facilities in the municipality, while in those studies a single Centre pilot study was carried out. People living in the urban area have a higher prevalence of HbsAg 56.8% (21/37) and this is similar to study by (Kirbak et al., 2017) in the Republic of South Sudan that revealed 64.60% and Abongwa et al., (2016) 9.7% in Cameroon. This similarity is due to the multi facilities (urban and rural) used by this current study and the previous studies.

Furthermore, the prevalence of HbsAg in the age group 20-24 and 25-29 each having 29.7% (11/37) which was the highest and this corresponds to the previous study by Umare et al., (2016) and (Utoo, 2013). These findings can be due to the fact that at this age group they are sexually active thereby increasing the chance of contracting the infection. This is in contrast with the study by Knorr et al., (2008) in Germany that indicates that ages below 30 years are 2.4% likely to be positive to HbsAg and this can be due to the country been developed. Age group 15-19 has the lowest that is 2.7% (1/37) but this contradicts a similar by Bani, Mahfouz, et al., (2012) in Saudi Arabia. This could be due to the introduction of Hepatitis B vaccine into EPI schedule in 2002 by Ghana Health Service as one of the components of the pentavalent

vaccine. Therefore those 16 years and above will not have benefit directly by having the vaccine, hence the age differences. There was no significant statistical association between age group and HbsAg positivity in this study. However, these results disagree with a study by Luuse et al., (2017) where they found a statistically significant association between age group and HbsAg positivity. This may be due to differences in the mean ages. This study has 32 years whereas the previous study has 25 years as their mean age.

In relation to occupation there is no relationship between occupation and Hepatitis B infection, but these findings are not in agreement with a similar study by Abuelgasim & Baraka (2015) in Sudan that indicates an association between occupation and Hepatitis B infection. These differences can be due to a majority of the respondent 48.7% in this study was self-employed and 21.6% of the women having no job.

With regards to educational level of the women who were positive to HbsAg were those with high education level 67.56% and followed by low-level education with 32.44%. There is no statistically significant difference between education and positive HbsAg in this study. These findings contrast with the similar study by Souza et al., (2012) in Brazil which has a low level of education being 57.0% and found education statistically significant to positive HbsAg. This difference perhaps could be due to the difference in the level of education of the women at the time of the study.

This study revealed that out of the one hundred and eighty-three women only 26.8% (49/183) had received Hepatitis B vaccine before the screening, and out of 49, five (10.2%) were positive to HbsAg which is not statistically significant in this study. This result is parallel to a study in Madagascar by Randriamahazo et al., (2015) which

have it that none of the women were positive for HbsAg have ever received Hepatitis B vaccination. The type of vaccine and the method of storage of the vaccine could account for the different outcomes.

Pregnant women who are in the polygamous martial relationship are five times more likely to be positive to HbsAg than those who are in a monogamous marital relationship. This result is in agreement with a similar study conducted by Umare et.al., (2016) in Ethiopia, Ngaira et al., (2016) in Kenya and Adegbesan-Omilabu et al., (2015) in Nigeria. Furthermore, this study revealed that women in second trimester 25.0% (18/37) are positive to Hepatitis B virus infection followed by third trimester 16.5% (13/37) and the first trimester 21.4% (6/37) with no significant association between gestation and Hepatitis B infection. This did not tally with a finding by Ndams et al., (2006) in Nigeria that indicated an association between gestation and Hepatitis B prevalence among women. The differences could be due to the sample size and one health facility used in the previous study with the sample a size of 261 while this current study has a sample size of 183.

Risk factors for HBV infection in this study reveal that there is no association between blood transfusion, tribal marks, piercing ears more than one, tattooed and Hepatitis B infection. this was also agreed by a similar study by Metaferia et al., (2016) in Ethiopia. However, it is a contrast to the previous study in Cameroon by Fomulu et al., (2013), Janahi (2014), and Abongwa et al., (2016) that revealed that there is a relationship between blood transfusion, tattooed and Hepatitis B infection. This difference may be due to geographical variations, and cultural and behavioral modification.

Lastly, multigravidas' mothers were 46.0% with no association between multigravida and Hepatitis B infection. This finding did not tally with findings of researches by Frambo et al., (2014) and Adegbesan-Omilabu et al., (2015) which indicate that multigravidas were a significant risk of HBV infection. Culture and religious difference among the women could account for the differences.in the results.

5.2. AWARENESS OF HEPATITIS B TRANSMISSION AND PREVENTION

In this study awareness of HBV transmission and prevention among pregnant women was 78.7% which is similar study conducted in Nigeria and Cameroon by Ngaira et al., (2016) that has 70-80% and Frambo et al., (2014) in Cameroon that indicated a high level of awareness of HBV. This probably is because of lack of formal education among women in the previous study compared to the current study that has 74.9% ranging from (middle level to tertiary level) has been educated. This study reveals that the majority (56.8%) of women know that the Hepatitis B virus can be transmitted through unprotected sexual intercourse and 78.1% did not know it can be transmitted from mother to infant. However, this contradicts a similar study conducted in China by Han et al., (2017) that observed that 53.3% of pregnant women were not aware that unprotected sexual intercourse can transmit the Hepatitis B virus and 20% did not know an infected mother can transmit the virus to their children. This difference can be due to lack of formal education available on Hepatitis B virus among the respondents.

5.3. PREVALENCE OF HbeAg

The seroprevalence of HbeAg was 7.10% (13/183) in this study, however, similar studies conducted in Volta region by Luuse et al., (2017) indicted HbeAg of 40% and

Adegbesan-Omilabu et al., (2015) 36.4% in Nigeria. This difference could be due to the type of equipment and reagent used for testing.

Moreover, the age group 20-24 has the higher which is 53.85% which is in line with a similar study in Island by Getahun et al., (2016) with 54.5%. Contrast with this findings is a study in Taiwan that indicate age group less than or equal to 20 having the higher 54.3% by Lin et al., (2008). The age group and positive HbeAg are statistically significantly associated in this study that is in line with a study in Cameroon by Ngaira et al., (2016). This revealed that age group 25-29, 30-34 and 35-39 are more protective of been infectious (positive HbeAg) than 15-19 and 40-44 age group. This result contradicts a similar result that observed no significant association between HbeAg positive and age group by Popovici et al., (2018) in Romania.

5.4 PREVALENCE OF HbsAb AND HbeAb

Although the HbeAb prevalence observed in this study was 10.4% it was not statically significant for different age groups with 25-29 age groups recording the higher. This results is parallel to a study by Aba and Aminu (2016) in Nigeria which observed that about 51.6% of the women had developed the envelop antibody (anti-HBe). The presence of anti-HBe correlates to a decreased infectivity as anti-HBe replaces HBeAg in the resolution of the disease. With regards to educational level there is no significant association with HbeAb.

In the case of HbsAb this research recorded 1.6% which is lower compare to a study by Angounda et al. (2015) in Congo which recorded 13.6% of Hepatitis B surface antibody. It is produced in response to hepatitis B surface antigen (HbsAg). Anti-HBs appears after convalescence from acute infection and lasts for many years.

CHAPTER SIX

6.0 CONCLUSION AND RECOMENDATION

6.1. CONCLUSION

The HbsAg, HbeAg, and HBcAb prevalence rate among pregnant women in this study was high. A 20.22% prevalence of HbsAg, 7.10% for HbeAg and 18.58% for HbcAb in a population of pregnant women attending ANC were recorded in this study.

There was lower HbsAg positive among age below 20 years; means the introduction of the vaccination program by Ghana Health Service has really reduced Hepatitis B in this age group. The occurrence of HBV infection in the type of marital (polygamous) is four times more likely than a monogamous marital relationship.

Furthermore, the study indicates that risk factors were not significant to Hepatitis B virus infection.

More importantly, this study indicates an association between age and positive HbeAg which increases the risk of mother to child transmission of the disease to the unborn child. Therefore babies becoming chronic carriers of HBV infection which will further lead to an increase in the virus among the general population.

6.2. RECOMMENDATION

- This study recommends that for future studies the sample size should be large and that other serological markers such as viral load and liver function test should be done to know the stage of the liver and to quantify virus in the Liver.
- Furthermore, Ghana Health Service should make a recommendation to the National Health Insurance Scheme to include Hepatitis B profile for all pregnant women who are attending antenatal care.
- More importantly, the study recommends that there should be at least three-time screening of pregnant women during pregnancy to identify HbsAg positive mother for immediately administering the birth dose and Hepatitis B immunoglobulin to children born to these women.
- Moreover, Ghana Health Service should make Hepatitis B immunoglobulin available and accessible in health facilities for immediately administrating after birth, in order that infected mothers will not transmit HBV to their children.
- Finally, the study recommends that the mode of transmission and methods of prevention of HBV should be included in the daily health talk at antenatal care clinics and at durbars to raise the awareness of mothers and fathers to prevent the spread of Hepatitis B in the Municipality.

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APPENDICES

APPENDIX ONE

CONSENT FORM

SCHOOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF GHANA

Title: A cross sectional study on the prevalence and predictors of Hepatitis B infection among pregnant women attending antenatal care in the Wa municipality, upper west of Ghana.

Principal Investigator: Awiah Anebakwo Emmanuel

Qualification: BSc Nurse Practitioner

Address: Box LG13, School of public Health, College of Health Sciences, University of Ghana,Legon.Tel.0244170544/0205791124.

General information about the Research

A structured questionnaire was administered to pregnant women to collect key demographic data and awareness on transmission and prevention of Hepatitis B virus. After completing the questionnaire then blood (3mls) was collected by venipuncture into an EDTA tube. The plasma of collected samples was tested for presence of HbsAg using a viable Hepatitis B surface Antigen test strip. Further testes like HbeAg ,HbsAb, HbeAb and HbcAb were also carry out.

Possible risk and discomfort

The risk or discomfort of blood collection include bruising or swelling at the puncture site, accidental blood spillage, damage to underlying tissue and infection at the puncture site. The risks of any serious complication occurring is very low. These risks will be avoided by ensuring strict hygienic practices by cleaning skin with alcohol swabs before blood is taken; using single use disposable needles; using experienced persons for taking blood samples; removing tourniquet immediately after entering the vein; using clean dressing/plaster to cover the puncture site when needle is removed from vein; ensuring puncture site is away from vital/ important tissue; and also ensuring great care to prevent accidental spillage, I will be given medical care by the researcher (Nurse Practitioner) in this Health facility in case any of the above risk is encounter. Mothers would be counseled on the psychological risk and anxiety associated with knowing Hepatitis status. This would be done by the researcher and the midwife on duty before and after the test.

Possible Benefits

There will be a direct benefit to the mothers as they will have the opportunity to update their Hepatitis B profile ,outcome of the study can be used to plan interventional measures in solving the issues identified .It will also be an opportunity to refer mothers who are positive to Hepatitis B with complications to hospital for further management.

Confidentiality

All data were coded. Only investigators of this study were privy to the data. Research information was purely for academic purposes. Soft copies were encrypted whilst hard copies were stored under lock and key.

Compensation

The pregnant women who consented to participate in the study were not given any monetary compensation.

My right to refuse or withdraw

I have the right to take part in this research or not without losing any benefit. I may stop participating in this research any time I wish.

Contact information:

If I have any questions I may ask that now or later, I may contact Emmanuel Anebakwo Awiah at Municipal Health Directorate on (0244170544), Dr. Judith Koryo Stephens of the School of Public Health on (0244285224) and Hannah Frimpong of the Ghana Health Service Ethical Review Committee on (0507041225).

I have read the above information/ it has been read and well translated to me in my local language in presence of a witness. I have had the opportunity to ask questions about it and any questions that I have asked have been answered to my satisfaction. I consent voluntary to participate as a subject in this study and understand that I have the right to withdraw from the study at any time.

Signed by:……

Code Number: ……..

Date: ……..

Place……

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

…… **Signature……**

APPENDIX TWO

STUDY QUESTIONNAIRE

My name is Emmanuel Anebakwo Awiah from the School of Public Health, University of Ghana. We are asking for your help in carrying out an important scientific study on Prevalence and predictors of Hepatitis B among pregnant women.

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

Do feel free to skip any question in the form or stop at any point of the interview/procedure. Please do you have any questions about the study? Thank you for agreeing to participate in this important research project.

A: General Information

Participants code……..

Contact information……

Name of interviewer …….

Date of interview ……

Place of interview……..

NUMBER	QUESTIONS	RESPONSE
1	How old were you at your last birthday?	
2	What is your occupation?	
3	What is your marital status?	
4	What is your religion?	
5	What is the highest level of educational institution you Completed?	
6	Number of pregnancies (Parity)	
7	At what stage is your pregnancy?	
	Hepatitis B testing (Please do not disclose Hepatitis B status)	
8	Have you ever tested for Hepatitis B? ( ). Yes or ( ).No	
	Hepatitis B awareness	
9	Have you ever heard of Hepatitis B virus? ( ). Yes, ( ) No	
10	If yes, from which source?	
11	Can Hepatitis B be transmitted through unsterilized needles, blades and other sharp material. ( ) Yes ( ) No ( ) I don't know	
12	Can Hepatitis B be transmitted by contaminated blood and blood products? ( ) Yes ( ) No ( ) I don't know	
13	Can Hepatitis B be transmitted through kissing? ( ) Yes ( ) No ( ) I don't know	
14	Is Hepatitis B transmitted through unsafe sex? ( ) Yes ( ) No ( ) I don't know	

15	Can Hepatitis B be transmitted from infected mother to unborn child? ( ) Yes ( ) No ( ) I don't know	
16	Can Hepatitis B be cure ( ) Yes ( ) No ( ) I don't know	
17	Can vaccination prevent one from getting Hepatitis B infection? ( ) Yes ( ) No ( ) I don't know	
18	Can Hepatitis B affect any person ( ) Yes ( ) No ( ) I don't know	
	Risk factors	
19	Have you ever injected drugs not prescribed by a Doctor even if only once? ( ) Yes ( ) No	
20	Did you ever receive blood transfusion? ( ) Yes ( ) No	
21	Do you have tribal marks? ( ) Yes ( ) No	
22	Have you ever pierced your ears more than once? ( ) Yes ( ) No	
23	Have you ever tattooed your body? ( ) Yes ( ) No	
24	Do you know anyone (family member) who is infected with Hepatitis B or has died of it? (Jaundice)	
25	How many wives does your husband have	
	Results of the Test	
26	HbsAg ( ) Positive ( ) Negative	
27	HbeAg ( ) Positive ( ) Negative	
28	HbcAb ( ) Positive ( )Negative	
29	HbsAb ( ) Positive ( ) Negative	
30	HbeAb	

	( )Positive ( ) Negative	
31	Have you vaccinated against Hepatitis B ( )Yes ( ) No	
32	 Place of residence	