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**DETERMINANTS OF HEPATITIS B VACCINATION AMONG WOMEN
ATTENDING CHILD WELFARE CLINICS IN TARKWA-NSUAEM**

BY

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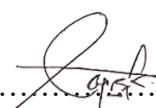
THIS THESIS / DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA,
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Declaration

I Athanasius Kwaku Apraku Ayete Labi declare this work to be my own original study done under supervision. Any reference to other studies has been duly acknowledged. I also declare that this work, either in part or whole, has not been presented to this or another institution for the award of a degree.

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ABSTRACT

Introduction: Hepatitis B is an infection of major public health concern with serious chronic sequela potentially preventable with the right resources and strategies. Apart childhood immunization, at-risk adult populations are encouraged to be immunised to curtail the morbidity and mortality effects. Despite the administration of birth dose vaccine and immunoglobulin, there still exists some risk of contracting HBV and developing chronic hepatitis B. This research sought to identify factors associated with vaccination among post-delivery women to inform policies and strategies to help eliminate hepatitis among expectant and post-delivery mothers.

Objective: The study sort to determine the prevalence and factors associated with hepatitis B vaccination amongst women attending child-welfare services in Tarkwa-Nsuaem Municipality.

Methods: This was a quantitative cross sectional analytical study conducted in Tarkwa-Nsuaem involving women attending CWCs. Questionnaires were administered to a total of 423 women selected from 11 health facilities and data collected was analysed using Stata/IC 16.1. Appropriate measures of centrality and dispersion were calculated for numerical data. Univariate and multivariate logistic regression models were employed in addition to the descriptive statistics to determine associations and predictors of the hepatitis B vaccination.

Results: Nearly all (92.2%) respondents had ever tested for Hepatitis B (self-report) with a positive result of 11.4%. About 29.1% of the respondents indicated that they had had at least a dose of Hepatitis vaccination yet only 10.6% had completed (self-report) their vaccination (3doses). More than half (64.1%) and greater than three quarters (79.1%) of CWC attendants had good knowledge and attitude to hepatitis B respectively. Hepatitis B vaccination was significantly higher by 6.80 times among women who had had tertiary education as compared to those who had had no formal education. Similarly, a unit increase in the number of CWC visits significantly increased the odds of complete hepatitis B vaccination by 14%. There was a 79%

reduction in the odds of complete vaccination by CWC attendants when they were attended to by CHN as compared to midwives/nurses.

Conclusion: A high prevalence of hepatitis B infection was recorded among women attending CWCs in Tarkwa-Nsuaem Municipality. Two-thirds of mothers were unvaccinated with only a tenth having completed vaccination. Maternal educational level, the cadre of health care provider (HCP) and number of visits to CWC greatly influenced a woman's full Hepatitis B vaccination.



Dedication

This work is dedicated to Hime Nina Fatimah Bintu without whose support this work would not be complete. I also dedicate it to Natalie and Nikita, a promise fulfilled.



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Blessed be the name of the Lord henceforth and forevermore!

My deepest gratitude to Dr Enos, your patience is unparalleled, your devotion to your student and your work is out of this world.

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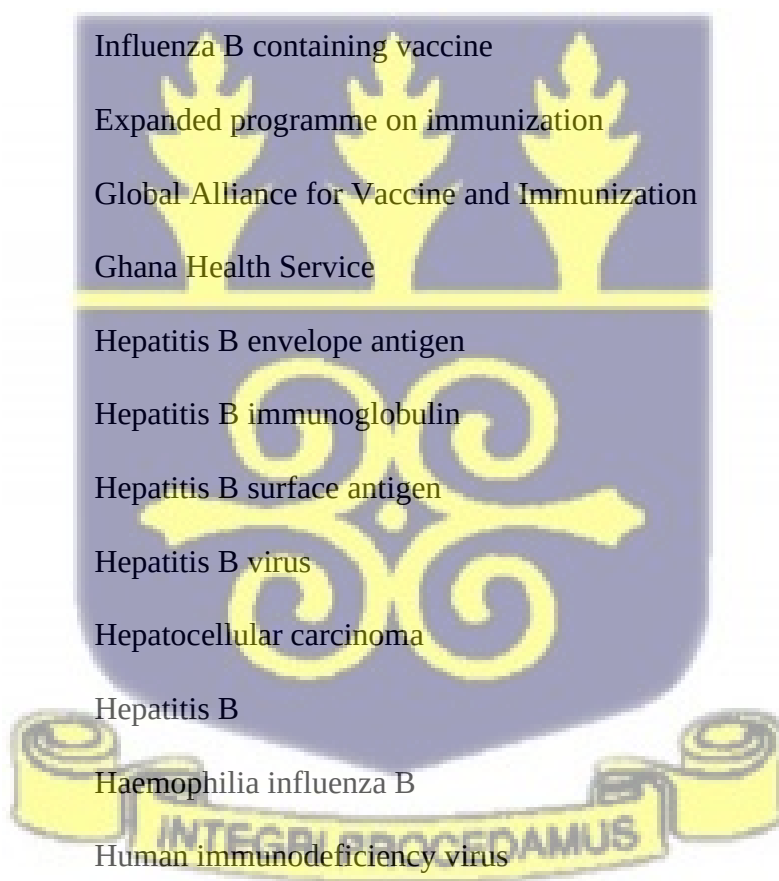
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LIST OF ABBREVIATIONS

ANC	Antenatal care
CDC	Centres for Disease Control and Prevention
CHN	Community Health Nurse
CHPS	Community-based Health Planning and Services
CLD	Chronic Liver Disease
CWC	Child Welfare Clinic
DNA	Deoxyribonucleic Acid
DPT	Diphtheria, Pertussis, Tetanus
DPT-HepB-Hib	Diphtheria, Pertussis, Tetanus, Hepatitis B & Haemophilia
	Influenza B containing vaccine
EPI	Expanded programme on immunization
GAVI	Global Alliance for Vaccine and Immunization
GHSS	Ghana Health Service
HBeAg	Hepatitis B envelope antigen
HBIG	Hepatitis B immunoglobulin
HBsAg	Hepatitis B surface antigen
HBV	Hepatitis B virus
HCC	Hepatocellular carcinoma
Hep B	Hepatitis B
HiB	Haemophilia influenza B
HIV	Human immunodeficiency virus
HVC	Hepatitis C Virus
IU	International Units
MOH	Ministry of Health



MTCT	Mother to child transmission
PMTCT	Prevention of mother to child transmission
PNC	Post-natal care
RBD	Replacement Blood Donors
SSA	South Saharan Africa
TBA	Traditional Birth Attendant
UN	United Nations
UNICEF	United Nations International Children's Emergency Fund
VBD	Voluntary blood donors
WHO	World Health Organisation



CHAPTER ONE

INTRODUCTION

1.1 Background

Hepatitis B Virus (HBV) is the cause of the inflammatory condition of the liver known as Hepatitis B (Hep B). This is an infection of major of public health concern due to three main reasons. Firstly, it is a disease of burden in parts of Africa and Asia with prevalence estimates exceeding 15 percent (A Schweitzer et al., 2013). Secondly, Hep B disease can have a chronic serious sequela causing approximately a million deaths every year (Zekri et al., 2007). Thirdly, this disease is potentially preventable with the right resources and strategies.

Hep B, which is a blood borne infection, can be transmitted through exposure to infected body fluids either sexually, percutaneous, or damaged mucosa. Hepatitis infection has a predilection for the liver cells (hepatocytes). Post infection by HBV, a cellular immune response is activated with progressive degradation of the hepatocytes. Hepatocyte destruction induces acute, fulminant, or chronic carrier status, and this eventually leads to liver cirrhosis and hepatocellular carcinoma (HCC).

Persons at risk of chronic Hep B are those acquiring the infection at an early age. This is because infected immuno-competent adults can eliminate the virus from their blood within six months and make a full recovery (Rehermann & Bertoletti, 2015). However, nearly all perinatal infections result in chronic sequela. Also, between one fifth and more than half of children aged one to five years become chronically infected, while less than ten percent of older children and adults get chronic infections (WHO, 2014).

Prevention of HBV infections and its sequelae is best achieved through immunization with the HBV vaccine. Two forms of vaccines are available in Ghana for immunization against HBV. The monovalent vaccine is used in adult vaccination, and this is given as three doses of 0.5 ml of vaccine at zero, one and six months respectively. The second formulation comes as the

pentavalent form DPT-HepB-Hib, for the immunisation of new-borns and contains antigens such as **D**iphtheria, **P**ertussis, **T**etanus, and **H**aemophilia influenza type **b** (MOH-Ghana, 2010).

Despite the importance of immunization of HBV among high-risk groups for prevention purposes, very little data exists on the prevalence, knowledge, and vaccination uptake among these groups. The focus of the current HBV immunization programme seems to be on the vaccination of new-borns with lack of structured vaccination plan for other at-risk groups (MOH-Ghana, 2010). However, it is important to note that that sixty percent of HBV infections acquired peripartum by pregnant women will be transmitted to their offspring (Levy & Koren, 1991). Furthermore, there is still a six percent risk of chronic infection among infants, born to HBsAg/HBeAg-positive mothers, who have received the birth dose vaccine plus hepatitis B Immunoglobulin (HBIG) (Nelson et al., 2016).

Antenatal, post-natal and child welfare services are great avenues to offer holistic primary and specialised healthcare services, including vaccination, to mothers and high-risk pregnant individuals. A study on the factors associated with vaccination among post-natal women will expand the existing knowledge and provide a basis for advocacy for the vaccination among pregnant and postnatal mothers as well as other high-risk adults attending these services.

1.2 Problem Statement

According to WHO estimates, more than 2 billion people are infected with HBV (WHO, 2017), with an additional 248 million people having chronic hep B disease (A Schweitzer et al., 2013). A study, between 1990 and 2013, of the global burden of disease estimated that more than 600,000 deaths were caused by hep B resulting in an age-standardised death rate of 5.9 per 100,000 population globally (Naghavi et al., 2015).

Epidemiological studies show that hepatitis B prevalence (measured as Hep B surface Antigen [HBsAg] positive) is highest in the Sub-Saharan African and Western Pacific regions, with prevalence estimates exceeding fifteen percent (Schweitzer et al., 2013). In Ghana, between 2015

and 2019, Hep B prevalence was estimated at less than one percent in children under five, approximately fifteen percent in the adolescent population and close to ten percent in adults (Abesig et al., 2020).

The age at infection affects the likelihood of progress to chronic Hep B in those who are susceptible. Nearly all prenatal infections (90%) result in chronic illness decreasing to ten percent in older children and adults (WHO, 2014). Chronic HBV infection leads to cirrhosis and liver carcinoma in some fifteen to twenty five percent of infected persons (Aparna Schweitzer et al., 2015).

Although one of the most effective methods of preventing HBV infection is neonatal and infant vaccination, globally, vaccination of priority adult population group is one of the five key strategic areas for hepatitis b prevention. In this setting, all at-risk adults who have not completed their vaccine series are considered at risk and should be offered vaccination. Global recommendation for adult vaccination against HBV is without any established scheduled vaccination programs. Hence, vaccination of so-called ‘ordinary adults’ (non-high risk) is by self-referral or self-request (self-vaccination). Women of reproductive ages, as well as pregnant women, have not yet been identified (classified) as at-risk population but they make up the majority of contact with new-borns. Ghana is identified among the highly endemic regions for hep B (Ofori-Asenso & Agyeman, 2016) for which adult vaccination is recommended (CDC, 2019). It is important to note that that sixty percent of HBV infections acquired peripartum by pregnant women will be transmitted to their offspring (Levy & Koren, 1991). Furthermore, there is still a six percent risk of chronic infection among infants, born to HBsAg/HBeAg-positive mothers, who have received the birth dose vaccine plus hepatitis B Immunoglobulin (HBIG) (Nelson et al., 2016). Thus, complete HBV vaccine status in all adults especially pregnant and lactating mothers is key to eliminate the potential to contract and transmit hep B disease to new-borns. HBV vaccine is recommended for pregnant women at high risk (CDC, 2016) as HBV

vaccine is safe and effective at preventing hep B (seroconversion 90 – 100%). There is however scanty literature on the proportion of post deliver mothers who have vaccinated against hep B. There is also paucity of information regarding the factors that affect hep B vaccination status among post-delivery mothers in Ghana.

This research sought to identify factors associated with vaccination among post-delivery women to inform policies and strategies to prevent hepatitis among expectant and post-delivery mothers.

1.3 Justification

The World Health Assembly in 2016 endorsed a call for the elimination of viral hepatitis as a public health threat by 2030. That is the reduction in new infections by ninety percent and mortality by sixty five percent (Breakwell et al., 2017 ; WHO, 2017). Vaccination is known to be the single most effective method strategy to reducing the prevalence of hep B, impacting significantly on global endemicity rates. Furthermore, there is still a six percent risk of chronic infection even with the administration of birth dose vaccine plus hepatitis B Immunoglobulin (HBIG) to infants born to HBsAg/HBeAg-positive mothers (Nelson et al., 2016). Thus, one of the best strategies to prevent the possibility of vertical and early neonatal infections and reduce Hep B chronicity with its adverse outcomes, is to immunise women of reproductive ages and the established infant vaccinations. There is scanty information on the incidence or disease progression of hep B during pregnancy and post-delivery. Also, mothers are not classified as at-risk group (CDC, 2019) for hep B. However, it is clear that there is a high risk of chronic hep B among infants born to hep B mothers (Gentile & Borgia, 2014) even when those infants received birth dose HBIG (Nelson et al., 2016). Thus, understanding the factors that influence vaccination in post-delivery mothers will help plan strategies to improve vaccination uptake and confer immunity to this special group. This will reduce the prevalence of hep B among pregnant and post-delivery mothers and also reduce the risk of chronic Hep B among their offspring.

1.4 Conceptual Framework

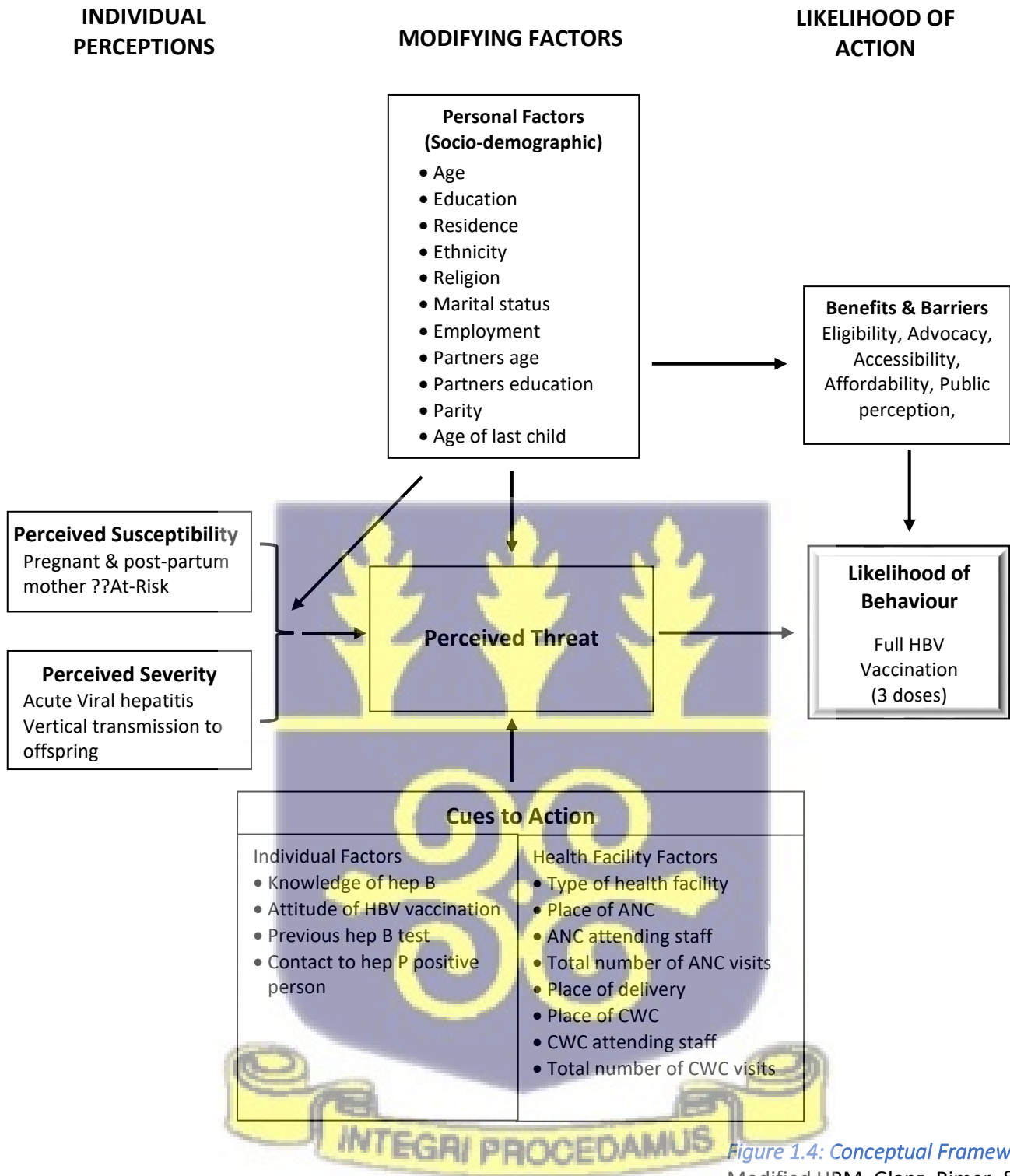


Figure 1.4: Conceptual Framework
Modified HBM, Glanz, Rimer, & Lewis, 2002

The Health Belief Model (HBM), one of the most widely used theories of health behaviour, asserts that six constructs—risk susceptibility, risk severity, benefits to action, barriers to action, self-efficacy, and cues to action—predict health behaviour (Glanz et al., 2002). In other words,

they could aid in predicting the motivations underlying people's decisions to protect, prevent, or control against certain diseases or ailments.

In our context, the likelihood of contracting hep B was known as the perceived susceptibility, while the perception of the disease's intensity and its effects was known as the perceived severity. Together with other factors, they made up the perceived threat of Hep B. Considering the socio-demographic factors, we could argue that the older an individual, the greater the likelihood that the person had had time to start and complete a vaccination series. Educational level was also seen to influence greatly vaccination practices. Ethnicity and residence could have influences on accessibility to health facilities, hence vaccines, as well as public perception on vaccination. Marital status and employment could shed light on social support structures that may influence one's willingness and ability to vaccinated. Parity and age of last child was seen to possibly offer insight into the opportunities for vaccination through contact with the health system and health care providers, thus opportunity for education and access to vaccines

The above personal factors could also influence the perceived barriers and benefits of getting HBV vaccine. Here the positive outcome of getting the vaccine such as HBV vaccine protects me and my loved ones (baby, partner) was seen as the perceived benefit. The barriers included the time, emotional and financial costs of repeating the said action 3 time to complete the dose. Continual advocacy may improve adherence and continuation of the vaccination process. Also, when the vaccine is readily available with adequate resource persons there will be few missed opportunities to vaccinate those interested.

The cues to action were the triggers that could start the decision-making process to accept the need for HBV vaccination. These were either internal (individual) factors or external (health facility) factors. Under individual factors, we consider issues such as a previous hepatitis B test. This is offered routinely at ANC thus a possible link to hepatitis B education. Improved hepatitis B knowledge and attitude may encourage the mother vaccinate. Health facility factors that may

influence vaccination includes the type of health facility be it a CHPS compound, health centre or hospital. Also, the staff that attends to the client at each of these visits can also be argued to be important factor. This is because there is evidence that the quality of care improves with increasing cadre of facility and health staff. Accessibility to the vaccine may be related to where the person chooses to attend clinic (whether government or private facility) as well as the cost of vaccination since that adult vaccination is not offered for free and is at the request and affordability of the individual.

It is assumed that any health intervention widely available, affordable, and known to be very beneficial with minimal risks to an individual should be well patronaged.

1.5 research questions

The study was guided by the following questions:

- I. What is the prevalence of hepatitis B vaccination among women attending child-welfare clinic in Tarkwa-Nsuaem Municipality?
- II. What is the knowledge of hepatitis B among women attending child-welfare clinic in Tarkwa-Nsuaem Municipality?
- III. What factors influence hepatitis B vaccination among women attending child-welfare clinic in Tarkwa-Nsuaem Municipality?

1.6 Objectives

1.6.1 General Objectives

- To determine the prevalence and factors associated with hepatitis B vaccination among women attending child-welfare clinics in the Tarkwa-Nsuaem Municipality

1.6.2 Specific Objectives

1. To determine the prevalence and assess the completeness of hepatitis B vaccination among women attending child-welfare clinics in Tarkwa-Nsuaem Municipality.

2. To determine the level of knowledge of hepatitis B among women attending child-welfare clinics in Tarkwa-Nsuaem Municipality.
3. To determine the factors associated with hepatitis B vaccination among women attending child-welfare clinics in Tarkwa-Nsuaem Municipality.



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Most individuals with chronic hepatitis B and C are unaware of their infection status and therefore do not get the necessary treatment, care, and interventions they need to keep the infections from spreading (Spearman et al., 2017). As such, WHO set an ambitious goal to end viral hepatitis as a public health threat. The global strategy, set for 2020, was to reduce all HBV and HCV new infections by 90 percent. They also wanted to reduce all deaths associated with hepatitis B&C by 65 percent and have 80 percent of all people with HBV and HCV infections, who are eligible for treatment, on treatment around the world (Burton et al., 2012).

2.2 Hepatitis B Virus

HBV, a member of the *hepadnaviridae* family is a tiny DNA virus with retrovirus-like characteristics. As shown in the diagram below, the genome of the infectious HBV viron (Dane particle) is a partly double-stranded circular DNA virus (Lee, 1997). The discovery of the hepatitis

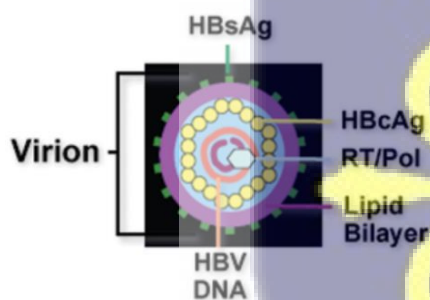


Figure 16.2: A schematic drawing of Dane particle with various features.

B surface antigen (HBsAg) made HBV diagnosis much easier. Similarly, breakthroughs in molecular biology have made it possible to do simple and effective tests for HBV infection, such as the hepatitis B profile to detect viral variations, viral load quantification, hepatitis B genotyping, and anti-HBs quantification to establish immunogenicity. HBV infection is a leading cause of liver cirrhosis and end-stage liver disease, accounting for more than half of all occurrences of hepatocellular carcinoma (HCC) worldwide (Vento et al., 2018). The burden of disease has been reduced by screening at-risk people for HBV, vaccinating those who have not been exposed, and treating those who are chronically infected.

2.3 Prevalence of HBV Infection

HBV infection was found to be present in 3.5 percent of the global population in 2015. The proportion of people living with chronic HBV infection among those born before the hepatitis B vaccine became available is still significant. Africa (6.1%) and Western Pacific (6.2%) regions have the greatest prevalence rates (WHO, 2017). There may be as many as 65 million women of childbearing age who are chronically infected and could pass HBV to their children, assuming women of childbearing age makes up 25.3% of the world's population (WHO, 2017). In Ghana, the countrywide prevalence of HBV was 12.3%, as measured by HBsAg seropositivity (Ofori-Asenso & Agyeman, 2016). HBV prevalence was 10.8% among voluntary blood donors (VBD), 12.7% in replacement blood donors (RBD) and in pregnant women 13.1% (Ofori-Asenso & Agyeman, 2016). Rural areas had a higher prevalence of HBV infection, and the highest HBV infection prevalence rates were found in people aged 16 to 39 years (Ofori-Asenso & Agyeman, 2016).

2.4 Transmission

As with all blood borne infections, HBV is transmitted from person to person through contact with blood, blood products and serous body fluids. The most efficient route of transmission is through blood because of the high titres of viral particles (Aspinall et al., 2011). Wound exudates, vaginal fluid and semen has also been found to contain viral particles (Lee, 1997). This means that transmission may be vertical, from infected mother to her child (perinatal), or horizontal, through contact with an infected person's body fluids. Viral particles found on some surfaces have been found to be highly infective even after seven days outside the body.

2.4.1 Perinatal Transmission

In endemic areas of hep B, the most common spread of HBV is vertical or from child-to-child (Chen, 2010; Liang, 2009). Perinatal transmission of HBV is assumed in the presence of HBsAg or HBV-DNA in a children between the ages of six and twelve months born to infected mothers

(Gentile & Borgia, 2014). The three probable perinatal routes of HBV transmission include transplacental transmission, natal transmission during delivery and during care of the new-born or through breast milk after birth. Perinatal transmission is prevalent in endemic locations while in-utero transmission is extremely rare (Navabakhsh et al., 2011).

The serologic marker for HBV DNA with high viral levels is the Hep B 'e' antigen (HBeAg). For most women with the presence of the HBeAg, transplacental transmission is almost certain but it can also occur in mothers with extremely high levels of HBV DNA exceeding 200,000 IU/ml (Nelson et al., 2016). These mothers have an almost 100% transmission rate to their offspring when the infant does not receive vaccination or immunization at birth.

The risk of chronic HBV infection in susceptible individuals decreases with increasing age at infection. As many as 90 percent of prenatal infections result in chronic infection, and 20-60 percent of infants and children aged 1-5 years are chronically infected, as well as 5-10 percent of older children and adults (Navabakhsh et al., 2011).

2.4.2 Horizontal Transmission

Horizontal HBV transmission in young children has a significant risk of progression to chronic HBV. According to a Senegalese study, 50% of toddlers who were horizontally infected before the age of two became chronically sick (Nelson et al., 2016). Persistence of infectious HBV on ambient surfaces may facilitate horizontal transmission in young children and certain adults. A study in Alaska (prior to HBV DBA testing) where environmental sampling was done in households where HBsAg-positive persons lived discovered HBsAg on walls, toys, baby bottles, and school lunch room table tops (Nelson et al., 2016). People with Chronic HBV can spread the virus to surfaces around them through cuts, sores, or scratches. This can then infect other people with open wounds who touch these surfaces. Injection drug usage, tattoos, scarification techniques, unsterile injections from healthcare encounters, and other high-risk health care

facilities such as renal dialysis units and emergency rooms can all result in horizontal transmission (Liang, 2009).

Horizontal transmission can be prevented via education, infection control procedures and immunization of hep B household contacts and other people at considerable risk.

2.5 High Risk Adults

Adults at risk for infection include those who are sexually exposed and those who are exposed to blood and other infectious fluids through the skin or mucosa. Sexually active persons who aren't in a mutually monogamous long-term relationship, sex partners of HBsAg-positive people, those seeking STI evaluation or treatment, and men who have sex with men are all at risk of sexual exposure. Percutaneous exposure is a risk for recent or current injection drug users, household contacts of HBsAg-positive people, residents and staff of developmentally disabled facilities, healthcare and public safety officers with reasonable anticipated risk of exposure to blood and infected body fluids, and people with end stage renal diseases including pre-dialysis (CDC, 2019; WHO, 2014).

2.6 chronic Infection

Some new infections can progress to chronic infections, while others resolve spontaneously. Children have the highest risk of developing chronic HBV infection. Some individuals may have up to 30 years of HBV infection before showing signs or symptoms of the disease. People are unaware of their condition unless they are tested and diagnosed despite the liver experiencing concealed inflammation (Nelson et al., 2016). Individuals with chronic HBV are more likely to progress to hepatocellular carcinoma from silent liver disease. The Natural history of HBV infections shows that 10 to 33% of individuals with persistent infection will develop chronic hepatitis, and 20 to 50% of these develop liver cirrhosis (Blankson et al., 2005). HCC is a very aggressive malignancy with few treatment choices, which is commonly the case in resource-poor

areas like Africa (Howell et al, 2014). HBV-related liver cancer is highest in SSA (Nelson et al., 2016).

2.7 Expanded Programme on Immunization and Adult Vaccination.

In 1992, the World Health Assembly approved WHO's goal of incorporating universal hep B vaccination in infant vaccination programmes in highly endemic countries (greater than 8% prevalence). Consequently, over the last two decades, hep B infection prevention in the general population has been a national priority in most countries including Ghana. As a result, the Ghanaian government, in collaboration with the Global Alliance for Vaccine and Immunization (GAVI) programme and with support of other health development partners, introduced the Hepatitis B and Pentavalent vaccines in the country in January 2002. This was done in order to broaden the scope of its vaccine delivery to include hepatitis and influenza (Breakwell et al., 2017).

A complete adult vaccination programme (one that covers all adults) is not cost-effective as most infections are asymptomatic and rarely leads to chronic infection (Stevens et al., 2017). However, to eliminate the disease completely, people who are at higher risk, including those with chronic liver disease, people who are immunocompromised, seronegative sexual partners of those with HBV infection and homosexuals must be vaccinated. In several health facilities across the country, hepatitis B vaccines are accessible on demand. The adult immunisation procedure in Ghana is a 3dose 0.5ml of vaccine given at 0, 1 and 6 months (MOH, 2016).

2.8 Prevention of Mother-To-Child Transmission (PMTCT).

The use of birth dose hep B vaccine and hep B immunoglobulin (HBIG) has been adopted by many countries as a method for preventing vertical transmission of the virus. As many as 90% of chronic HBV cases can be prevented in infants born to HBeAg-positive mothers and practically all HBeAg negative mothers. After receiving the birth dose and two additional hep B vaccines (Stevens et al., 2017).

The risk of transmission can be reduced to less than 5% (WHO, 2015) with the administration of HBIG at birth to infants whose mothers are HBsAg-positive. These infants should also receive the single or recombinant vaccine after birth (CDC, 1991). In spite of all these efforts, infants born to HBsAg/HBeAg-positive still have a 6% risk of the becoming HBsAg positive (Nelson et al., 2016).

There is the need for HBsAg and anti-HBs serologic testing for infants born to HBsAg-positive mothers between the ages of 9 and 12 months (1-2months after final vaccine dose) to help identify non-responders and revaccinate them as soon as possible (CDC, 2015).

All unvaccinated children and adolescents under 19years of age should receive the hep B vaccine series according to the hep B catch-up schedule. This will help break the intergenerational transmission from mother-to-child, one child to the next and from the public to the child.

There exists, however, a significant gap in vaccine coverage. As of 2015, only 77% of the infants received the full 3doses of hep B vaccine in Africa (WHO-UNICEF, 2020). Administering the birth dose vaccine for HBV in sub-Saharan Africa presents significant logistical barriers such as the cost, the safety and difficulty of administering in the context of home births. There are other issues that relate to unsafe vaccine storage. This includes dealing with the cold chain during transportation, appropriate refrigeration, and the security of stored vaccines.

2.9 Knowledge of HBV and Attitude Towards Vaccination

2.9.1 Knowledge

There has been much research in an attempt to find out the level of awareness of hepatitis B and how many people have a favourable attitude concerning vaccination. A cross-sectional study of health science and medical students in Ethiopia found that incoming medical students are unaware of the transmission routes and preventative methods for Hepatitis B (Mesfin & Kibret, 2013). A comparable study in Ghana found that although most of the nursing students were aware of HBV, their knowledge on transmission and methods of prevention were incomplete

(Aniaku et al., 2019). A different survey among undergraduate public health students in Ghana found that most students had moderate awareness of HBV infection. They also had high knowledge on vaccination as the most preventive measure against HBV infection. Participants' understanding of the mode of transmission, on the other hand, was unsatisfactory (Osei et al., 2019).

Among pregnant women, there is a lack of, or even incorrect understanding about HBV infection as shown by some studies. According to a research article published in 2012 by Chan et al., there is a lack of understanding on HBV infection with stigmatization in minority populations in endemic regions (Han et al., 2017). The Average pregnant woman in Ningo-Prampram had poor knowledge on HBV infection and its spread (Kwadzokpui et al., 2020). A similar finding in Kintampo North District showed that 50% of pregnant attendants had poor Knowledge (Abdulai et al., 2016). Also pregnant women attending Komfo Anokye Teaching Hospital were not sure how HBV was transmitted (Cheng et al., 2015).

There is a huge deficit when it comes to educating the public about HBV transmission and prevention with a lot of capacity for improvement.

2.9.2 Hepatitis B Testing and Vaccination in Pregnancy

During pregnancy, women in Ghana are screened for HBsAg (MOH, 2016) (Ofori-Asenso & Agyeman, 2016) to identify those who have the infection and WHO recommends it in countries where HBsAg prevalence is 2% or higher. Screening in pregnancy is preferably at contact or during the first trimester. Those found not to be immune to HBV should be offered vaccination as this has been found to be completely safe during pregnancy (CDC, 2019; Groom et al., 2018; Levy & Koren, 1991) though this is not practised in Ghana (MOH, 2016). Furthermore, women who screen HBsAg-positive should have follow-up testing, counselling, and medical management. This should be followed up with additional screening, vaccination, and identification of possibly infected partners, siblings, and children are possible. This allows for the identification

of HBV infection clusters and thus break HBV infection cycles across families. This sheds light on the importance of knowing partner HBV status and that of caregivers.

Several studies have been conducted in Ghana to look at the prevalence of HBV in pregnant women with different reported rates ranging as low as 2.4 percent (Luuse et al., 2017) to as high as 16.7 percent (Völker et al., 2017), depending on locality and facility tested (Cho & Bonsu, 2012; Ephraim et al., 2015; Kwadzokpui et al., 2020). There is however a paucity of data on the rate of HBV testing in women attending ANC or Child welfare services in Ghana. There is also little or no data on HBV vaccination of pregnant women in Ghana.



CHAPTER THREE

METHODOLOGY

3.0 Introduction

This section details the methods used in the study. It includes information about study design, study population, the study area, variables to be studied, the sample size, the data collection procedures, data analysis and some ethical considerations.

3.1 Study Design

This was a quantitative cross sectional analytical study using pre-designed questionnaires administered to women attending CWC.

3.2 Study Area

The study was conducted in Tarkwa-Nsuaem Municipal District. This is in the eastern part of the Western Region and is one of the fourteen districts of the region with Tarkwa as its capital town. The district has Wassa Amenfi East District as its northern boundary, Ahanta West District as the southern border, Nzema East Municipal as the west border and Mpohor Wassa East as the eastern border. The municipality has a total land area of 2354 km². It has most of Ghana's richest natural resources.

The subdistricts of interest include Nsuaem, Simpa, Dompim, Benso, Esuoso, Iduaprim, New Atoabo, Tarkwa and Nsuta.

3.3 Study Population

The study population comprised all mothers attending child welfare clinic (CWC) in Tarkwa Nsuaem Municipality of the Western Region of Ghana. The study population was made up of all women of reproductive ages anywhere from first day post-delivery to five years post-delivery.

3.4 Sample Size

The proportion of women of reproductive age fully vaccinated against HBV was unknown and the proportion of mothers attending child welfare services who are fully vaccinated for HBV was also unknown. Hence a prevalence of 0.5 was assumed. Using a standard score (**z**) of 1.96 at 95% confidence interval level and a 5% allowable margin of error (**e**) with the formula

$$n = \frac{z^2 p(1 - p)}{e^2},$$

where **n** is the minimum sample size required and **p** – the proportion of postpartum mothers vaccinated for hep B. With this, the minimum number of study participants to be enrolled was 385. A minimum 10% of the sample size (39) was added to make room for at most 10% withdrawal and non-response, which increased the sample size to **423**.

3.5 Sampling Technique

Using multistage proportionate sampling, some facilities were selected, and study participants chosen by consecutive sampling from these facilities. There were on average 43 facilities in the municipality that offered child welfare services (January 2022 data). These comprised 4 hospitals, 9 health centres and 32 CHPS Compounds. Using proportions that made 1:2:8. Thus one hospital, two health centres and eight CHPS (a total of eleven facilities) were randomly selected (ballot sampling) as data collection centres. The sample size from each stratum (**sn**) was calculated as follows; **sn** = [(total number attended strata facilities of interest / Total number of attendances from all facilities) x Sample size]. Then the sample per stratum facility was divided by the proportion of interest (1:2:8) to get the sample size for each individual facility respectively. E.g., health centre stratum sample;

$$sn = \left[\frac{(H_1 + H_2 + H_3 + H_4)}{\text{total attendance}} \right] \times 423$$

Where **H₁** was the total attendance from hospital 1, **H₂** is total attendance from hospital 2 respectively; **423** denoted the required sample size, total attendance was the summary attendance

from all health facilities in the municipality. Hence $(sn / 4)$ gave the sample required from the one selected hospital stratum.

The total summary attendance for a month (January 2022) was 7215 clients. The hospitals contributed a total of 1436 clients thus using the formula above, we were to sample 84 participants from the hospital strata. Likewise, the health centres contributed 2404 clients and the expected sample from that stratum was to be 141 participants (71 participants from each of the 2 health centres of interest). Likewise, the CHPS strata contributed 3375 clients and thus 198 participants were to be selected from that stratum (25 participants from each of the 8 CHPS of interest).

3.6 Inclusion and Exclusion Criteria

3.6.1 Inclusion Criteria

All mothers attending child welfare service at the facility of interest and consented to be part of the study.

3.6.2 Exclusion Criteria

All mothers attending child welfare services at the facility of interest who had a contraindication for hepatitis B vaccination, was severely ill or could not consent to be part of the study.

3.7 Variables

3.7.1 Outcome Variable

- Full hepatitis B vaccination



3.7.2 Predictor Variables

Socio-demographic Factors

- Age
- Education
- Residence
- Ethnicity
- Religion
- Marital status
- Employment
- Partners age
- Partners education
- Parity
- Age of last child

Individual Factors

- Previous hepatitis B test
- Knowledge of hep B
- Attitude to hepatitis B vaccination

Health Facility Factors

- Type of health facility
- Place of ANC / CWC
- ANC / CWC attending staff
- Total number of ANC / CWC visits
- Place of delivery

3.8 Data Collection Tool

A close ended structured questionnaire was used to collect data from the participants (Appendix C)

3.8.1 Data Collection Procedure

Questionnaires were administered by the primary researcher and assistants at eleven facilities of interest at the child-welfare clinics. Clients who met the eligibility criteria and consented to be part of the study were enrolled. Study participants were chosen by consecutive sampling from each facility. With this method, every client meeting the criteria of inclusion was selected until the required sample size was achieved per facility. From the one chosen hospital facility, 79 clients were interviewed, a total of 142 clients from the two chosen health centres and a total of 178 clients from the eight chosen CHPS facilities.

All information on hepatitis B Vaccine and Hepatitis B immunoglobulin for the child were verified from the child ANC/PNC booklet or vaccination records.

All covid protocols were observed by the research team and participants.

3.8.2 Quality Control

Data was checked daily to ensure that the collected information was acute and in full. Data was filed and secured under lock and key by principal investigator.

3.8.3 Pre-testing of Questionnaire

The questionnaire was pre-tested at Tarkwa Mine Hospital in Tarkwa, as participants from this facility had similar characteristics to the population of interest. Pretesting was done to evaluate if respondents clearly understand the research questions with necessary modification made prior to the actual study. These were not included in the final analysis.

3.9 Data Processing and Analysis

Data collected was analysed using Stata/IC 16.1. Appropriate measures of centrality (mean / median) and dispersion (Standard deviation / range) were calculated for numerical data and summarised in tabular form. Categorical data were summarised as frequency distribution tables. Univariate and multivariate logistic regression models were employed in addition to the descriptive statistics to find associations and predictors of the outcome variable – full hepatitis B vaccination. Odds ratio as well as 95% confidence intervals (CI) were calculated. Using univariate analysis, each of the potential predictors were examined to see its bearing on the outcome variable if any. To account for potential confounders, multiple regression analysis was run on predictor variables that showed a significant association ($p < 0.05$) with the outcome variable in the univariate analysis.

The total number of correct answers to 16 items on knowledge of HBV was used as a composite assessment of mothers' knowledge. A value of one was given for each correct answer and zero

for every piece of incorrect knowledge. A score of 12 to 16 represented good knowledge, a score of 8 to 11 represented moderate knowledge and a score of less than 8 represented poor knowledge. The total number of correct answers to 13 items on attitude to Hep B vaccination was used as a composite assessment of mothers' attitude. A value of one was given for each correct answer and zero for every piece of incorrect answer. A score of 10 to 13 represented good attitude and a score of less than 10 indicated poor attitude.

All reported Positive test results were verified from ANC/PNC booklet or vaccination card except for adult hepatitis B vaccination doses.

3.10 Ethical Considerations

To carry out this study, ethical approval was from the Ghana Health Service Ethics Review Committee (GHSERC). However, additional permission was sought from the head of each facility where participants were interviewed.

Also, participants' consent was sought before inclusion in the study and confidentiality of all information was assured. Participants could withdraw their participation at any time prior to data analysis and dissemination of results. No participants withdrew their consent prior to data analysis. Participants were not required to pay anything nor obtain any form of reward for this process. Participants were assured that their refusal to participate in the study would not affect their level of care at any time in this or in any other Ghana Health Service facility they visited. The benefit of participation was to provide information that would help design more robust health intervention for women and nursing mothers regarding hepatitis B.

3.11 COVID 19 Protocols

- All research team members wore face masks and always ensured adherence to all other covid protocols.

- All study participants were advised to do hand washing with soap under running water or sanitise their hands with alcohol-based rub hand prior to entering the health facility for post-natal service.
- Participants were advised to wear face masks to and from the health facility. All participants without face masks were provided some at no cost to the participants.
- Social distancing was always ensured except for physical examinations as part of clinic activities.

3.12 Funding

The study was solely funded by the principal investigator and was a requirement for the partial fulfilment for the award of Master of Public Health Degree.



CHAPTER FOUR

RESULTS

4.0 Introduction

This chapter presents the results of the study in accordance with the stated objectives. It is presented in several subsections detailing the demographic characteristics of the study participants, the prevalence of hepatitis B in the nursing mothers, the proportion of women who are vaccinated and the knowledge and attitude of the participants to vaccination. The last section details the association of the studied factors with complete vaccination of hepatitis B (3 doses).

4.1 Socio-Demographic Characteristic of Study Participants

The descriptive statistics of women attending child-welfare clinics in the Tarkwa-Nsuaem Municipality is shown in table 4.1 below. The mean age of respondents was 29.2 years $\pm$ 6.4SD. Twenty six percent (105/398) of the respondents belonged to the Wassa ethnic group. Majority of the women (81.9%) were Christians. Nearly eighty four percent (333/393) of the respondents had had some form of formal education. Also, seventy six percent (302/398) of respondents were employed. Majority of the women (62.6%) were married with their partners having had an average age of 34.9 years $\pm$ 6.3SD. Out of the 283 women who were either married or cohabiting, majority (85.2%) had partners who had had some form of formal education. The average household income of respondents was GH¢ 1054.6 $\pm$ 1205.0SD. The most frequent parity was 1 (39%) with more than 77% of the study population (285/367) having up to 3 children.

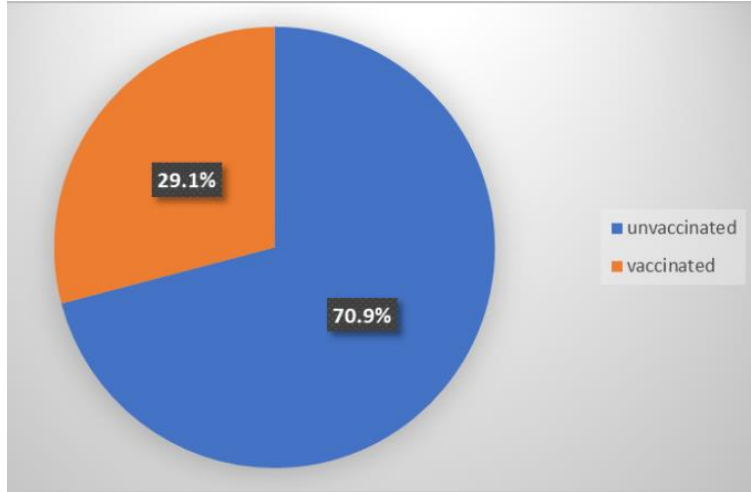


Table 4. 1: Socio-demographic characteristics of study participants (*n* = 399)

Variable	Frequency (n)	Percent (%)
Age of respondents (M ± SD)	29.2 years ± 6.4	
Educational Level		
None	60	15.3
Primary	145	36.9
Secondary	125	31.8
Tertiary	63	16.0
Ethnicity		
Aowin	3	0.8
Fante	93	23.5
Nzema	40	10.1
Other	145	36.7
Sefwi	9	2.3
Wassa	105	26.6
Religion		
Christian	326	82.7
Muslim	65	16.5
Traditional	2	0.5
Other	1	0.3
Marital Status		
Cohabiting	34	8.63
Divorced	6	1.52
Married	249	63.2
Single	100	25.4
Widowed	5	1.3
Parity (M ± SD)		
		2.5 ± 1.6
Employment Status		
Employed fulltime	55	14.2
Employed part-time	25	6.4
Self employed	222	57.2
Student	23	5.9
Unemployed	63	16.2
Partner's Age (M ± SD)		
		34.9 years ± 6.3
Partner's Educational Level (n = 283)		
None	42	14.8
Primary	75	26.5
Secondary	100	35.3
Tertiary	66	23.3
Average household income (GHS)		
		1054.6 ± 1205.0

4.2 Prevalence of Hepatitis B Vaccination Among Women Attending CWC

The proportion of women who self-reported to have received at least 1 dose of hepatitis B vaccine was 29.1% (pr = 29.1%, 95% CI = 24.7% - 33.9%). However, the proportion of women who



self-reported to have complete vaccination (3 doses) as shown in figure 4.2 was **10.6%** (pr = 10.6%; 95% CI = 7.71% - 14.0%).

Figure 4. 2 A: Proportion of women attending CWC who were vaccinated

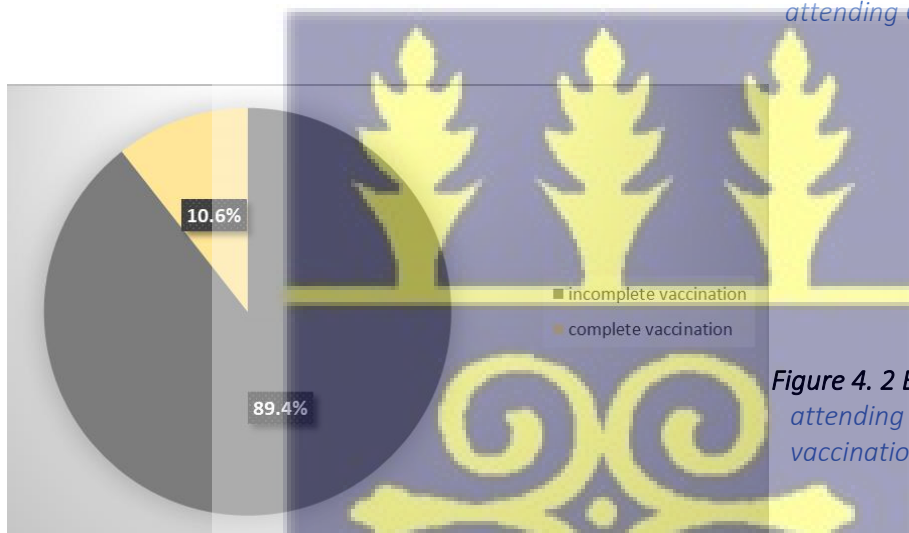


Figure 4. 2 B: Proportion of women attending CWC with complete vaccination (3 doses)

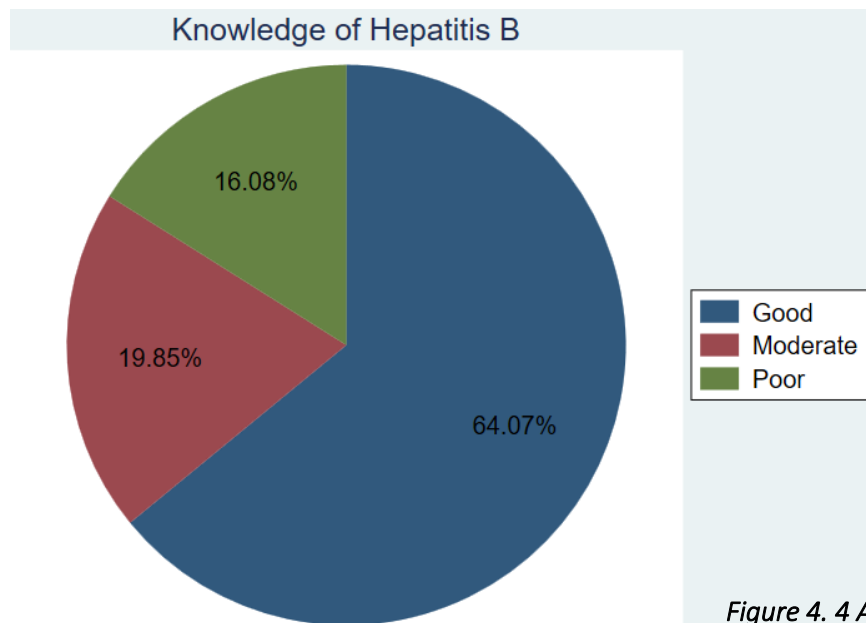
4.3 Status of Hepatitis B

From the table 4.3 below, majority of the respondents (92.2%) self-reported to have ever tested for hepatitis B but with the result of 11.4% being positive (ANC book Verification). Out of the 42 respondents who tested positive, 78.6% and 85.7% indicated that their child received hepatitis B immunoglobulin and hepatitis B vaccine at birth respectively. About 29.1% of respondents indicated that they had had at least a dose of hepatitis B vaccination. However, 70.2% of the mothers who attend child welfare clinics, who had not completed their vaccination, indicated their intent to complete their vaccination.

Table 4. 3: Status of Hepatitis B

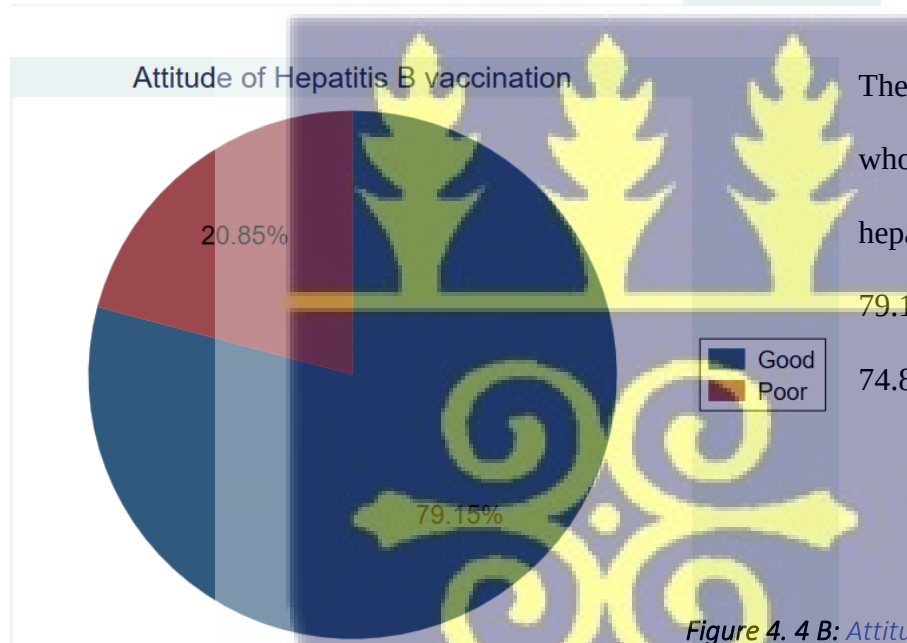
Variables	Frequency (n)	Percent (%)
Previous Hepatitis B test		
No	22	5.5
Yes	367	92.2
Unknown	9	2.3
Hepatitis B results (n = 367)		
Negative	325	88.6
Positive	42	11.4
Child received Hepatitis B immunoglobulin at birth (n = 42)		
No	4	9.5
Yes	33	78.6
Unknown	5	11.9
Child received Hepatitis B vaccine at birth (n = 42)		
No	2	4.8
Yes	36	85.7
Unknown	4	9.5
Previous Hepatitis B positive contact		
No	156	44.6
Yes	25	7.1
Unknown	169	48.3
Number of positive contacts (n = 25)		
One	13	52.0
Two	8	32.0
Three	1	4.0
Four	3	12.0
Hepatitis B vaccination doses		
1 dose	30	7.5
2 doses	44	11.0
3 doses	42	10.6
None	282	70.9
Intention to complete vaccination		
No	106	29.8
Yes	250	70.2

4.4 Knowledge of Hepatitis B and Attitude to Hepatitis B Vaccination



The proportion of women who had good knowledge of Hepatitis B was 64.1% (pr = 64.1%, 95% CI = 57.1% - 68.9%).

Figure 4. 4 A: *knowledge of hepatitis B*



The proportion of women who had good attitude to hepatitis b vaccination was 79.1% (pr = 79.1%, 95% CI = 74.8% - 83.0%).

Figure 4. 4 B: *Attitude to hepatitis B vaccination*

4.5 Socio-demographic Factors Associated with Hepatitis B Vaccination

Results from a chi-squared analysis of socio-demographic factors associated with complete hepatitis B vaccination is shown below in table 4.5. The educational level of women attending child welfare clinics ($p < 0.001$), parity ($p = 0.019$) and age of current child ($p=0.007$) were the factors significantly associated with complete hepatitis B vaccination.

Table 4. 5: Socio-demographic factors associated with hepatitis B vaccination (n = 399)

Variables	Hepatitis B vaccination		χ^2
	Complete (n = 42)	Incomplete (n = 356)	p-value
Age of respondents	28.2 ± 5.7	29.3 ± 6.5	0.316
Ethnicity			*0.085
Aowin	0(0.0)	6(100.0)	
Fante	14(15.1)	79(85.9)	
Nzema	8(20.0)	32(80.0)	
Sefwi	1(11.1)	8(88.9)	
Wassa	10(9.5)	95(90.5)	
Other	9(6.2)	136(93.8)	
Religion			0.309
Christians	32(9.8)	294(90.2)	
Non-Christians	10(13.9)	62(86.1)	
Educational level			0.000*
None	4(6.2)	61(93.8)	
Primary	13(9.0)	132(91.0)	
Secondary	5(4.0)	120(96.0)	
Tertiary	20(31.7)	43(68.3)	
Employment status			0.960
Employed	32(10.6)	270(89.4)	
Unemployed	10(10.4)	86(89.6)	
Married status			0.756
Married/cohabiting	29(10.3)	254(89.7)	
Unmarried	13(11.3)	102(88.7)	
Partner's age	34.3 ± 5.3	34.9 ± 6.4	0.625
Partners educational level			*0.157
None	3(7.1)	39(92.9)	
Primary	6(8.0)	69(92.0)	
Secondary	8(8.0)	92(92.0)	
Tertiary	12(18.2)	54(81.8)	
Parity	1.8 ± 1.0	2.4 ± 1.6	0.019*
Age of current child	17.9 ± 14.1	11.9 ± 13.8	0.007*

*Statistically significant (p <0.05)

*Fisher's exact

4.6 Individual Factors Associated with Hepatitis B Vaccination

From table 4.6 below, none of the factors; knowledge, attitude and previous hepatitis B test were significantly associated with hepatitis B vaccination.

Table 4. 6: Individual factors associated with hepatitis B vaccination (*n* = 399)

Variables	Hepatitis B vaccination		χ^2
	Complete (n = 42)	Incomplete (n = 356)	p-value
Overall knowledge of Hepatitis B vaccination			0.065
Good	33(12.9)	222(87.1)	
Moderate	3(3.8)	76(96.2)	
Poor	6(9.4)	58(90.6)	
Overall attitude towards Hepatitis B vaccination			0.761
Good	34(10.8)	281(89.2)	
Poor	8(9.6)	75(90.4)	
Previous Hepatitis B test			*0.248
No	0(0)	17(100)	
Unknown	0(0)	9(100)	
Yes	42(12)	295(81)	
*Statistically significant ($p < 0.05$)			+ Fisher's exact

4.7 Health Facility Factors Associated with Hepatitis B Vaccination

Child welfare clinic attending staff ($p = 0.012$) and number of child welfare clinic visits ($p < 0.001$) were the health facility factors found to be significantly associated with complete hepatitis B vaccination after a chi-square analysis (Table 4.7).

Table 4. 7: Health facility factors associated with hepatitis B vaccination (*n* = 399)

Variables	Hepatitis B vaccination		χ^2
	Complete (n = 42)	Incomplete (n = 356)	p-value
Number of ANC visits			0.615
< 8 visits	25(10.0)	226(90.0)	
≥ 8 visits	17(11.6)	130(88.4)	
Type of delivery facility			*0.199
Private	5(17.9)	23(82.1)	
Government	37(10.0)	333(90.0)	

Type of child welfare clinic			⁺ 0.203
Private	3(20.0)	12(80.0)	
Government	39(10.2)	344(89.8)	
Child welfare clinic attending staff			0.012*
Community health nurse	31(9.0)	313(91.0)	
Nurse/midwife	11(20.4)	43(79.6)	
Number of CWC visits	7.9 ± 4.2	5.7 ± 3.7	0.000*
*Statistically significant (p <0.05)	+ Fisher's exact		

4.8 Statistically Significant Factors Associated with Hepatitis B Vaccination

Results from a multiple logistic regression of factors associated with complete hepatitis B vaccination is shown in table 4.8 below. The odds of being fully vaccinated against hepatitis B was significantly 7.09 times higher among women who had had tertiary education as compared to those who had had no formal education (cOR = 7.09; 95% CI = 2.26 – 22.23; p = 0.001). However, after adjusting for other factors (parity, age of current child, child welfare clinic attending staff and number of child welfare clinics visits), the odds of being completely vaccinated against Hepatitis B was significantly 6.80 times higher among women who had had tertiary education compared to those who had no formal education (aOR = 6.80; 95% CI = 1.19 – 24.21; p = 0.003).

A unit increase in the number of children born significantly reduced the odds of complete hepatitis B vaccination by 27% (cOR = 0.73; 95% CI = 0.55 – 0.95; p = 0.022). However, this association was found not to be statistically significant after adjusting for all other factors.

A one month increase in the age of respondents' current child significantly increased the odds of complete Hepatitis B vaccination by 2% (cOR = 1.02; 95% CI = 1.01 – 1.04; p = 0.010). After adjusting for all other factors, this association was found not to be statistically significant.

Respondents who were attended to by community health nurses at child welfare clinics had 61% lower odds of being completely vaccinated against hepatitis B as compared to those who were attended to by nurses / midwives (cOR = 0.39; 95% CI = 0.18 – 0.83; p = 0.014). After adjusting

for all other factors, the odds of respondents who were attended to by community health nurses at child welfare clinics being completely vaccinated against Hepatitis B was significantly reduced by 79% as compared to those who were attended to by nurses/midwives (aOR = 0.21; 95% CI = 0.08 – 0.51; $p = 0.001$).

A unit increase in the number of child welfare clinic visits significantly increased the odds of complete hepatitis B vaccination by 15% (cOR = 1.15; 95% CI = 1.06 – 1.25; $p = 0.001$). After adjusting for all other factors, a unit increase in the number of child welfare clinic visits significantly increased the odds of complete hepatitis B vaccination by 14% (aOR = 1.14; 95% CI = 1.03 – 1.27; $p = 0.010$).

Table 4. 8: Statistically significant factors associated with hepatitis B vaccination

Variables	cOR (95% CI)	p-value	aOR (95% CI)	p-value
Educational level				
None	1.00		1.00	
Primary	1.50(0.47 - 4.80)	0.492	1.50(0.42 - 5.32)	0.528
Secondary	0.64(0.16 - 2.45)	0.510	0.51(0.12 - 2.17)	0.365
Tertiary	7.09(2.26 - 22.23)	0.001*	6.80(1.91 - 24.21)	0.003*
Parity	0.73(0.55 - 0.95)	0.022*	0.74(0.54 - 1.01)	0.055
Age of current child	1.02(1.01 - 1.04)	0.010*	1.01(0.98 - 1.03)	0.699
CWC attending staff				
Nurse/midwife	1.00		1.00	
Community health nurse	0.39(0.18 - 0.83)	0.014*	0.21(0.08 - 0.51)	0.001*
Number of CWC visits	1.15(1.06 - 1.25)	0.001*	1.14(1.03 - 1.27)	0.010*

*Statistically significant ($p < 0.05$)



CHAPTER FIVE

DISCUSSION

5.0 Introduction

This chapter compares the findings of this study with other similar studies from literature.

5.1 Prevalence of Hepatitis B Among Women Attending CWC

The results of this study show that 92.2% of respondents self-reported to have ever tested for Hepatitis B with the positive result of 11.4%. This is higher than the reported 6.1% in the adult African population (WHO, 2017) and higher than the reported 4.7% in the pregnant Ethiopian population (Kebede et al., 2018). Other studies done in pregnant women in Ghana also reports rates as low as 2.4 percent (Luuse et al., 2017) and 6.0% (Antuamwine et al., 2022). The study findings is however consistent with other studies that quote a countrywide prevalence of 12.3 % (Ofori-Asenso & Agyeman, 2016), 10.6% in women in the Eastern Region of Ghana (Cho et al., 2012) and 10.9% among postpartum women in selected hospitals in Tamale (Sefah, 2019) but lower than the measured 16.7% (Völker et al., 2017) among rural pregnant women in 2012 as measured by HBsAg seropositivity.

The study also revealed a birth dose vaccination prevalence of 78.6%, higher than the two thirds (60%) prevalence rate reported in another study done in the Eastern Region (Hambridge et al., 2019) and slightly above that reported from selected hospitals in Tamale at 68.1% (Sefah, 2019). The highest country prevalence of birth dose hepatitis B vaccination is in Algeria at a reported rate of 99% and the lowest in Cote d'Ivoire at 9% (WHO-UNICEF, 2020). It is interesting to note that Nigeria had a prevalence of 23% (Moturi et al., 2018) but no reported rates were found for Ghana. Additionally, immunization with HBIG at birth prevalence was found to be 85.7%, consistent with the study from Tamale with an estimated prevalence of 82.6% (Sefah, 2019).

5.2 Prevalence of hepatitis B vaccination in Women Attending CWC

About 29.1% of the respondents indicated that they had had at least one dose of hepatitis B vaccination. Only 10.6% had completed their hepatitis vaccination (3 doses).

A report by the CDC of a 2017 study showed at least 34.3% adult (19-49yrs) complete vaccine coverage for hepatitis B in the United States (Haber & Schillie, 2021).

A study of vaccination history in undergraduate students of public health in Ghana showed at least 44.2 % and 30.5% (Osei et al., 2019) of studied sample had partial and full vaccination for hepatitis B respectively. A similar study among health workers in a referral hospital in Accra found 53.4 % partial vaccination and 42.2% complete hepatitis B vaccination status (Akosua Ansa et al., 2019). Another study among nursing training students in Ho, Ghana showed a complete hepatitis B vaccination status of 49.4% (Aniaku et al., 2019). These vary greatly for this study's prevalence of 29.1% and 10.6% partial versus complete vaccination respectively.

Studies in China show that the pooled hepatitis vaccine coverage rate for adults for the years 2011-2022 was 26.3% (Bai et al., 2022). Similarly, hepatitis B vaccine uptake in pregnant Chinese women was of 33% (Chan et al., 2009), much higher than the reported 10.6% of this study.

5.3 Knowledge and Attitude to Hepatitis Vaccination

The proportion of women who had good knowledge of Hepatitis B was 64.1% (pr = 64.1%, 95% CI = 57.1% - 68.9%). Similarly, the proportion of women who had good attitude to Hepatitis B vaccination was 79.1% (pr = 79.1%, 95% CI = 74.8% - 83.0%). Detailed analyses of knowledge and attitude to Hepatitis B was beyond the scope of this study. However, the findings of this study contrasted other reported local studies. In a Ningo-Prampram District study, pregnant women exhibited poor knowledge on HBV infection and how it is spread (Kwadzokpui et al., 2020). Another survey conducted in the Kintampo North District to assess pregnant women's knowledge regarding HBV infection indicated that over 50% of the respondents were not aware

of HBV (Abdulai et al., 2016). Among pregnant attendants of Komfo Anokye teaching Hospital, Kumasi, women had limited knowledge of HBV (Cheng et al., 2015).

5.4 Factors Associated with Hepatitis B Vaccination

After adjusting for other factors (parity, age of current child, child welfare clinic attending staff and number of child welfare clinics visits), the odds of being completely vaccinated against Hepatitis B was significantly 6.80 times higher among women who had had tertiary education compared to those who had no formal education. It is not surprising that respondents with higher education to the tertiary level have higher odds of completing their hep B vaccination as opposed to those who were not educated. These tertiary level clients with or without health education on the need to complete their vaccinations could read and write and could understand the need to complete their vaccinations to achieve maximum health benefits of the vaccination process. On other hand, persons who are not educated or have no formal education require the services of health professionals to imbibe in them the need to complete their vaccination and with subsequent home visits to reinforce the education given. There was, however, no corresponding association with spousal education level. Several research publications support the findings of higher maternal education associated with increased vaccination uptake (Forshaw et al., 2017; Kibreab et al., 2020; Özer et al., 2018). It is also comparable to migrant Chinese vaccination behaviour, which was greater among the more educated than the less educated (Liu et al., 2016). These findings could possibly be linked to the study that found a positive association between maternal education level and health knowledge (Greenaway et al., 2012).

Research among Nigerian tertiary hospital personnel found a relationship between good hepatitis B knowledge and full hepatitis B vaccination (Adekanle et al., 2015). Similar outcomes were seen in a study of nursing students in Ho (Aniaku et al., 2019). However, there was no statistical significance between full hepatitis B vaccination and good hepatitis B knowledge and attitude for this study. An interesting study among Nigerian health workers revealed good hepatitis B

knowledge but poor hepatitis B vaccine knowledge and poor vaccine status (Dayyab et al., 2020). Considering these findings, more research into the specifics of the relationships between hepatitis knowledge and vaccine uptake is needed.

After adjusting for all other factors, the odds of respondents who were attended to by community health nurses (CHN's) at child welfare clinics being completely vaccinated against Hepatitis B was significantly reduced by 79% as compared to those who were attended to by nurses/midwives (aOR = 0.21; 95% CI = 0.08 – 0.51; p = 0.001). If participants who were attended to by CHN's have lower odds of completing their vaccination as opposed to nurses and midwives, there's a need to investigate the variations in service delivery between CHN's and midwives with regards to health education and delivery of vaccination services. Because surprisingly, CHN's are responsible for mass vaccinations. They receive specialized training in growth monitoring, observation of children under five, breastfeeding, immunization, and family planning. Another reason why respondents attended to by CHN's may have lower odds of completing their hep B vaccination could be that nurses and midwives may have tertiary level education, that is to the degree level, as opposed to CHN's who have just diploma. This level of skilled training by the nurses and midwives could account for variation amongst the respondents of this study. There is therefore the need for CHN's to receive some specialized training or receive training on education and how to get clients to improve uptake of vaccination services provided at the child welfare clinics. This may require targeted education to improve health worker knowledge and hopefully improve health knowledge by clients.

After adjusting for all other factors, a unit increase in the number of child welfare clinic visits significantly increased the odds of complete hepatitis B vaccination by 14% (aOR = 1.14; 95% CI = 1.03 – 1.27; p = 0.010). The expanded program on immunization remains a focal point of opportunity for vaccination and so it's not surprising that the number of clinic visits was found in the study to increase the odds of completing of hep B vaccination among respondents. This

could be a positive effect on the cues to action as well as enhance the perceived benefits to hep B vaccination. It also gives access to people who have missed opportunities for vaccination. There is therefore the need to encourage CWC visits among respondents to ensure that they take full advantage of vaccination opportunities at the child welfare clinics.

The disparities from other findings that may suggest otherwise or may not have found any associations between the variables of interest and the outcome may results from differences in sample size across the various studies or how some variables were measured in the various studies. It could also be attributable to geographical and anthropological differences in the makeup of respondents hence these disparities in the findings in this study as compared to other studies.



CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.0 Introduction

This chapter is presented in three subsections. Section one presents the conclusion of the study, section two presents the study limitations, and the last section three presents the recommendation from the study.

6.1 Conclusion

Generally, most women attending CWCs had ever tested for Hepatitis B, yet two-thirds were unvaccinated with only about a tenth having completed vaccination (3 doses). Maternal educational level, the cadre of health care provider and number of visits to CWC greatly influenced a woman's complete Hepatitis B vaccination (3 doses). Even though most women had good knowledge and attitude about hepatitis B vaccination, high prevalence of hepatitis B infection was recorded among them. Unfortunately, there still exist children of HBsAg/HBeAg-positive women who neither received the HBIG and / or birth dose vaccine.

6.2 Limitation

There are some limitations to this study. The first limitation is that the results might potentially be skewed due to the way the questionnaire was structured and the sincerity with which respondents answered. Secondly, recall bias may have been introduced as respondents had to self-report their hepatitis B status from recollection. lastly, since this study focused on women who visited Child Welfare Clinics in the Tarkwa-Nsuaem municipality, the results gained from it cannot be applied to other women who do not attend CWCs. The findings, however, may be applied to other towns with comparable features to Tarkwa-Nsuaem. Despite these limitations, the study's internal and external validity were not compromised.

6.3 Recommendations

1. All cadre of Health Care Providers should be adequately trained with targeted information on Hepatitis B infection and vaccination to inform and positively influence patients that they attend to.
2. At birth, hepatitis B immunoglobulin and /or vaccination must be made available to all children born to HBsAg/HBeAg-positive mothers to improve coverage to 100%.
3. Government should make provision for Hepatitis B vaccine for negative but high-risk mothers at Antenatal and/or Child Welfare Clinics.



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APPENDIX A : PARTICIPANT INFORMATION

Participants' Information Sheet

STUDY TITLE: “Determinants of hepatitis B vaccination among women attending child-welfare clinics in Tarkwa-Nsuaem Municipality.”

Please I am Dr. Ayete Labi K. A. Athanasius (MGCS, MD), a graduate student at University of Ghana, Legon. I currently work at Tarkwa Mine Hospital, Goldfields and I am the Obstetric and Gynaecologist specialist at the facility. I can normally be reached on 024 045 2009 or at athnalabi@gmail.com. My address is Box LG 274 Legon, Accra.

Hepatitis B is one of the health conditions of interest in Ghana and the world, especially among pregnant mothers and their children. My study is to identify some of the factors that influence an individual to be vaccinated against hepatitis B or not. We will be interviewing close to 400 people for this research.

You are not required to pay anything or obtain any form of reward for this process. We only ask for two things from you: your time and your honesty.

Your participation will give information that will help design more robust health intervention for women and nursing mothers as regarding hepatitis B.

This is purely a voluntary exercise, and your participation is sought by your own volition. You can quit at any point of the process without it affecting your care today or at subsequent visits. Your refusal to participate will not affect your care today both at this and any other Ghana Healthcare Facility you visit.

This interview will take up to 10 minutes of your time.

All information given will be anonymous and will not be shared with anyone who is not part of the study process.

The results of this exercise will be communicated to the University of Ghana, where I am currently studying. We will also communicate the findings to the Ghana Health Service, to the facility where you attend clinic, as well as to you, the individual during your next visit when the results are ready.

Please feel free to contact, at any time, the following groups of people below with questions concerning this research or further inquiries:

Principle Investigator:

Athanasius Ayete Labi

Tel: 024 045 2009

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Collaborator:

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GHS ERC Administrator:

Nana Abena Apatu

Tel: 050 353 9896

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A copy of this sheet plus your consent form will be given to you to keep as evidence of your willingness to participate if you so desire.

Please indicate your willingness to participate by signing the consent form attached if you wish to proceed and thank you for your time if you wish to decline.



APPENDIX B: CONSENT FORM

Consent for Participation

STUDY TITLE: Determinants of hepatitis B vaccination among women attending child-welfare clinics in Tarkwa-Nsuaem Municipality.

PARTICIPANTS' STATEMENT

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

I voluntarily agree to be part of this research.

Name of Participant:

Participants' Signature:OR Thumb Print:

Date:

INTERPRETER'S STATEMENT

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

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

Name of Interpreter:

Signature of Interpreter: OR Thumb Print:

Date:

Contact Details

STATEMENT OF WITNESS

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

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

Name:

Signature: OR Thumb Print:

Date:

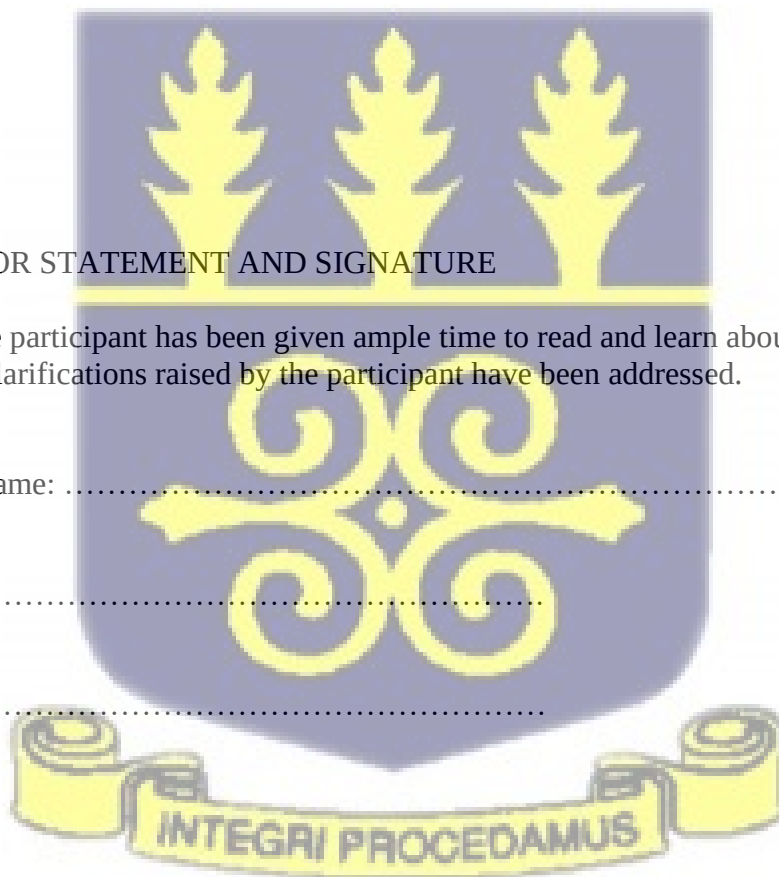
INVESTIGATOR STATEMENT AND SIGNATURE

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

Researcher's Name:

Signature

Date:



APPENDIX C: QUESTIONNAIRE

Questionnaire

STUDY TITLE: Determinants of hepatitis B vaccination among women attending child-welfare clinics in Tarkwa-Nsuaem Municipality.

Code:		Date of interview:		
No	Question	Coding Category	No.	Skip
SOCIO-DEMOGRAPHY				
1	Date of birth	Day:	1-31	
		Month:	1-12	
		Year:	1-2022	
	Age (<i>in years</i>)		1-2022	
2	Address:			
3	Ethnicity	Nzema	1	
		Wassa	2	
		Sefwi	3	
		Aowin	4	
		Fante	5	
		Other	6	
4	Religion	Christian:	1	
		Muslim:	2	
		Traditional:	3	
		Other:	4	
5	Educational Level	None	1	
		Primary	2	
		Secondary	3	
		Tertiary	4	
6	Occupation			
7	Current employment status	Unemployed	1	
		Employed fulltime	2	
		Employed Part-time	3	
		Self Employed	4	
		Student	5	
8	Marital Status	Single	1	To 12
		Divorced	2	
		Widowed	3	
		Married	4	
		Cohabiting	5	
SPOUSES INFORMATION				
9	Partner's date of birth	Day:	1-31	
		Month:	1-12	
		Year:	1-2022	
	Partner's Age (<i>in years</i>)		1-2022	

10	Partner's Occupation				
11	Partner's Educational Level	None	1		
		Primary	2		
		Secondary	3		
		Tertiary	4		
12	Average household income				
ANTENATAL / POSTNATAL INFORMATION					
13	Parity	1-20			
14	Date of Birth of Current Child	Day:	1-31		
		Month:	1-12		
		Year:	2015 - 2022		
		Age of current child (<i>in months</i>)	0-60		
15	Place of most ANC Visit Private: Government:	None		To 18	
		CHPS compound			
		Health centre			
		Polyclinic			
		Hospital			
Other:					
16	Staff who attended to you at ANC	Doctor	1		
		Nurse/Midwife	2		
		CHN	3		
		Other	4		
17	Total number of ANC visits (<i>Please circle</i>)	1 2 3 4 5 6 7 ≥8	1-8		
18	Place of delivery Private: Government:	CHPS compound			
		Health centre			
		Polyclinic			
		Hospital			
		Other:			
19	Place of most CWC Visits Private: Government:	CHPS compound			
		Health centre			
		Polyclinic			
		Hospital			
		Other:			
20	Staff who attended to you at CWC	Doctor	1		
		Nurse/Midwife	2		
		CHN	3		
		Other	4		
21	Total number of CWC visits	1 2 3 4 5 6 7 ≥8	1-8		
HEPATITIS B INFORMATION: Verify where possible from vaccine card or ANC/PNC book					
22	Previous hepatitis B test (<i>HBsAg</i>)	No	1	To 26	
		Yes	2		
		Unknown	3		
23	<i>If yes, result (if Positive please verify)</i>	Negative	1	To 26	
		Positive	2		

24	<i>If Positive to Q 23</i> Did your child receive HBIG at birth	No	1	
		Yes (please verify)	2	
		Unknown	3	
25	<i>If yes to Q 23</i> Did you child receive HBV vaccine at birth	No	1	
		Yes (please verify)	2	
		Unknown	3	
26	Previous Hepatitis B positive contact	No	1	To 28
		Yes	2	
		Unknown	3	To 28
27	<i>If yes number of positive contacts</i>	1 2 3 ≥ 4	1-4	
28	Hepatitis B vaccination	None	1	
		1 dose	2	
		2 doses	3	
		3 doses	4	
29	Intention to Vaccinate (If less than 3 doses)	No	1	
		Yes	2	

Information on Knowledge and Attitude towards Hepatitis B vaccination

KNOWLEDGE ON HEPATITIS B		Yes	No	Not sure
30	Have you heard of hepatitis B?			
31	Hepatitis B is caused by a virus			
32	Hepatitis B can affect people of every age			
33	Hepatitis B can be transmitted through blood and blood products			
34	Hepatitis B can be transmitted through unprotected sexual intercourse			
35	Hepatitis B can be transmitted from mother to child			
36	Hepatitis B can be transmitted through the use of unsafe needles or sharps like blade			
37	An individual can be infected by both Hepatitis B and HIV			
38	Hepatitis B is an infection of the liver			
39	Hepatitis B infection can lead to liver cancer			

40	Hepatitis B infection can lead to cirrhosis (scarred liver)			
41	A person can be infected with hepatitis B and not have any symptoms of the disease			
52	Hepatitis B can be prevented			
43	There is a vaccine for hepatitis B			
44	Hepatitis B vaccine can be given to pregnant and lactating women			
45	There is treatment for hepatitis B			
	ATTITUDE ON HEPATITIS VACCINATION	Yes	No	Not sure
46	Vaccination protects my family members			
47	Hepatitis B is a serious disease			
48	Hepatitis vaccine is effective in preventing the disease			
49	the risk of death among vaccinated persons is reduced compared to the non-vaccinated			
50	I am willing to be screened for hepatitis B during post-natal care visit (blood test)			
51	I am willing to take your baby back to the clinic to test his/her HBV status a few times during the 1st year after birth			
52	I am willing to let my baby receive HBV vaccine			
53	If I have HBV infection, I am willing to take drugs that are known not to harm your baby during lactation period to prevent transmitting HBV to your baby?			
54	I am worried about its adverse effects			
55	I am afraid of infection after vaccination			
56	It is not effective in disease protection			
57	I am not at high risk of contracting HBV			
58	The vaccine is not available			

