PREVALENCE AND FACTORS ASSOCIATED WITH HEPATITIS B VIRUS INFECTION AMONG PREGNANT WOMEN IN SELECTED SECONDARY HEALTH FACILITIES IN IBADAN

BY

OSHUNDELE, BUNMI RUTH

B.M.L.S (LAUTECH)

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CERTIFICATION

We certify that this project by Oshundele, Bunmi Ruth of the Department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, University of Ibadan, was carried out under our guidance and supervision.

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SUPERVISOR

DR. IKEOLA A. ADEOYE

MB.Ch.B (Ife), MPH, FMCPH

Department of Epidemiology and Medical Statistics

Faculty of Public Health, College of Medicine

University of Ibadan, Nigeria.

.....

SUPERVISOR

DR. OYINDAMOLA B. YUSUF

B.Sc (Stat), M.Sc (Epid & Med Stat), P.hD (Med. Stat). Ibadan.

Department of Epidemiology and Medical Statistics

Faculty of Public Health, College of Medicine

University of Ibadan, Nigeria.

DEDICATION

To God Almighty, the creator of all things, the God who has never failed me.

The God who planned the time and season for my favour during the course of this programme, and gave me strength and enablement beyond my imagination.

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ABSTRACT

BACKGROUND: Hepatitis B virus infection is a major public health problem being the most severe form of viral hepatitis. Major route of hepatitis B virus (HBV) transmission in developing countries is from mother to child. Immunoprophylaxis with hepatitis B immunoglobulin and hepatitis B vaccination within 12 hours of birth is recommended for newborns of HBV positive mothers, to reduce the rate of HBV transmission. In spite of this, routine antenatal screening for hepatitis B virus among pregnant women is not yet practiced in many hospitals in Ibadan. Most studies on hepatitis B virus infection have focused on other subgroups of at risk individuals, information on the prevalence of hepatitis B virus infection among pregnant women attending secondary health facilities in Ibadan is scanty. This study was designed to determine the prevalence and factors associated with hepatitis B virus infection among pregnant women in selected secondary health facilities in Ibadan.

METHODOLOGY: This was a hospital - based cross sectional study of 370 pregnant women at first antenatal visit at Adeoyo Maternity Teaching Hospital Yemetu and Jericho Specialist hospital, Ibadan. A total sample of women was taken within a period of one month (1st to 31st December, 2014). A pre-tested, semi structured, interviewer -administered questionnaire was administered to obtain information on the social demographic characteristics, obstetric and risk perception associated with hepatitis B virus infection, awareness on hepatitis B virus, screening, vaccination and knowledge on Hepatitis B virus infection (total score obtainable was 11, score above 6 or equal to 6 was categorized as good knowledge). Hepatitis B surface antigen (HBsAg) screening was carried out, using in vitro diagnostic strip. HIV- HBV co infection was determined. Data analyses were carried out using univariate, chi-square, and binary logistic regression at 5% level of significance.

RESULT: Mean age of the study participants was 28.75 ± 5.2lyrs. Majority (87.0%) were married, 18.4% were in polygamous relationships, 50.5% had secondary education, 49.7% were business women /traders and 92.2% were Yorubas. More than half of the respondents were multigravida (58.4%), majority had one sexual partner (98.1%) and 7.2% had history of blood transfusion. The prevalence of hepatitis B virus was 9.5%. The HIV-HBV co infection was 0.8%. The level of awareness of hepatitis B virus was 24.6%, screening was 26.0%, vaccination was 28.6%, and 35.2% of those that have heard of HBV had good knowledge of hepatitis B virus infection. Only 12.2% had been screened for HBV and 6% had received HBV vaccine. Polygamous relationships (OR = 13.280, 95% CI = 2.678 - 65.853) and ethnicity (OR = 0.054, 95% CI = 0.003- 0.969) were found to be risk factors for hepatitis B virus infection.

CONCLUSION: Hepatitis B virus prevalence was high, implying that Ibadan is an area of high HBV endemicity. Pregnant women should be screened routinely for hepatitis B virus in all health facilities, to enable identification and prophylaxis for infants of HBV positive mothers. Health interventions especially information, education, communication should be targeted at women of reproductive age, especially those in polygamous relationships.

Key words: Hepatitis B virus, pregnant women

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LIST OF ABBREVIATIONS

HBV =Hepatitis B Virus

HAV=Hepatitis A Virus

HDV= Hepatitis D Virus

HEV= Hepatitis E Virus

HCV= Hepatitis C Virus

HBsAg = Hepatitis B surface Antigen

HBeAg = Hepatitis B envelope Antigen.

HCC = Hepatocellular Carcinoma

HIV = Human Immunodeficiency Virus

NIH = National Institute of health

HBIG = Hepatitis B Immune Globulin

CMV=Cytomegalovirus

DNA =Deoxyribonucleic Acid

WHO = World Health Organisation

HSV= Herpes Simplex Virus

NIH =National Institutes of Health

HAART = Highly Active Anti-Retroviral Therapy

CMV = Cytomegalovirus

LIST OF ABBREVIATIONS

Anti-HBs = Hepatitis B Surface Antibody

Anti-HBc =Hepatitis B Core Antibody

HBcAg = Hepatitis B Core Antigen

HBeAb = Hepatitis B Envelope Antibody

STD = Sexually Transmitted Disease

STI= Sexually Transmitted Infection

EDTA= Ethylene Diamine Tetra Acetic Acid

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Hepatitis B infection is a major public health problem being the most severe form of viral hepatitis. Hepatitis B is a viral infection which causes both acute and chronic liver diseases, both of which can be potentially life-threatening. Acute and chronic hepatitis B virus infections are detected by the presence of Hepatitis B virus serologic markers such as Hepatitis B surface antigen (HBsAg). Chronic hepatitis B virus infection is the presence of hepatitis B surface Antigen for more than 6 months. World Health Organization estimate that two billion people worldwide have serologic evidence of past or present hepatitis B virus (HBV) infection, and more than 360 million are chronically infected and at risk for HBV-related liver disease (WHO, 2009). Globally approximately one third of all cases of cirrhosis and half of all cases of hepatocellular carcinoma can be attributed to chronic HBV infection. It is also estimated that there are 240 million HBV carriers in the world, of whom roughly 600,000 die annually from HBV-related liver disease (Ott et al., 2012).

Hepatitis B virus (HBV) infection varies widely worldwide from high (greater than 8 %) in Africa, Asia and the Western Pacific, to intermediate (2 - 7.9 %) in Southern and Eastern Europe, and low (lesser than 2 %) in Western Europe, North America and Australia (Elizabeth and Ramsey, 2011). Africa is considered a region of high endemicity, it has the second largest number of chronic carriers after Asia. HBV is estimated to be responsible for 500,000–700,000 deaths each year (WHO, 2004). Across the African continent, hepatitis B surface antigen (HBsAg) positivity is estimated at 8-20% (Apurva and Jordan, 2007). Nigeria is one of the countries with the highest incidence. Studies done in Nigeria have shown that the hepatitis B virus prevalence rate, ranges from 9 to 39% (Emechebe et al., 2009; Owolabi and Ojo, 2008; Harry et al., 1994; Aganga et al., 1999; Akani et al., 2005; Agbede et al., 2007; Luka et al., 2008; Forbi et al., 2008; Ejele et al., 2004 and 25.7%; Bello, 2000). Also studies across Nigeria have shown varying prevalence of HBV/HIV co-infection from 9.2% to as high as 70. 5. % (Lesi et al., 2007).

Individuals at risk for HBV infection include those co infected with hepatitis C virus or human immunodeficiency virus, people with history of sexually transmitted infections, hemodialysis patient, people with multiple sexual partners, people or parent's of people born in regions with high HBV endemicity, people not vaccinated against HBV as an infant, intravenous drugs users, infants born to infected mothers, sex partners of infected persons, men who have sex with men, people with occupational exposure to blood or blood-contaminated body fluids, and travelers to countries with intermediate or high prevalence of HBV infection (CDC, 2008). Women who are of reproductive age are at high risk of infection, as pregnant women generally have depressed immunity and thus are source of infection to their unborn child, as perinatal transmission is the most common mode of HBV transmission worldwide (Tran, 2009). Previous studies have reported association of HBV in pregnancy with adverse pregnancy outcomes like increased risk for preterm birth, low birth weight, premature rupture of membranes, gestational diabetes and congenital abnormalities have been indicated among pregnant women positive to hepatitis B virus (Connell et al., 2011; Reddick et al., 2011; Tse et al., 2005;)

Babies born to HBV infected pregnant women are at high risk of HBV infection and its complications later in life, unless adequate treatment is provided. Perinatal transmission of HBV occurs in utero or through exposure to blood and blood contaminated fluids at or around birth. Perinatal transmission of HBV from carrier mothers to their babies is the most important factor in determining the prevalence of the infection in high endemic areas. Vertical transmission of hepatitis B virus causes neonatal hepatitis B virus infection, which can have serious effects on the neonate, resulting in complications later in life (Ugbebor et al., 2011). Most HBV infections have been found to occur within the first five years of life in highly endemic regions through perinatal and horizontal transmission and approximately 25% of infected infants will die of HBV related chronic liver disease in adulthood (Thio et al., 2002) as differences in the age at which infection with hepatitis B virus (HBV) occur is largely related to the wide range in HBV carrier rate in different parts of the world, and inversely related to the risk of chronic infection. It has been reported that chronic HBV infection occurs among 90% of infants who acquire infection at birth, 20% to 50% of children infected at 1 to 5yrs develop chronic HBV infection, while only

6% or less of persons infected above 5yrs and in adulthood develop chronic HBV infection (Wasley et al., 2008; CDC, 2003).

In Nigeria, HBV is reported to be the most common cause of liver disease and previous studies has suggested that large numbers of pregnant women and children are exposed to HBV over the past years (Musa et al., 2015). Socio-economic and living condition of most Nigerians has been found to encourage transmission of HBV and it has been reported that most of the control measures against HBV are poorly observed in Nigeria (Sirisena, 2002).

Common modes of transmission are shared by Human immuno-deficiency virus (HIV) and Hepatitis B Virus (HBV) this includes blood borne and the vertical routes. Studies across Nigeria have shown varying prevalence of HBV/HIV co-infection from 9.2% to as high as 70.5% (Oliver et al., 2014). HBV co-infection with HIV has been found to worsen Hepatitis B virus infection and progression (Petrovic, 2007) and is associated with accelerated progression to cirrhosis and thus a higher mortality. Furthermore, individuals co-infected with Hepatitis B and C are at risk of hepatoxicity associated with the use of antiretroviral drugs (Thio et al., 2002). It has been recommended that HIV positive pregnant women should be screened for HBV and assisted to access care targeted at preventing morbidity and vertical transmission (Adesina et al., 2010).

1.2 STATEMENT OF PROBLEM

There has been an intensive effort targeted at achieving Millenium Development Goals (MDG 4 & 5) which focus on child and maternal health. Hepatitis B virus has been found to be 50 to 100 times more infectious than HIV and 10 times more infectious than hepatitis C virus (HCV). it can survive outside the body for at least 7 days and can still cause infection during these period (WHO. 2009). Many carriers do not realize they are infected with the virus, thus it is referred to as a "silent killer" (Samuel et al., 2004). Hepatitis B virus (HBV) infection is estimated to be the cause of 30% of cirrhosis and 53% of liver cancer in the world (Perz et al., 2006).

Chronic infection with hepatitis B virus is the most common cause of hepatocellular carcinoma (HCC), accounting for 50% of hepatocellular carcinoma cases worldwide and up to 80% of cases in high HBV endemic regions (Bosch et al., 2004), with the highest rates of hepatocellular carcinoma occuring in Southeast Asia and sub-Saharan Africa and an incidence greater than 50

per 100, 000 population (Hou et al., 2005). The global distribution of hepatocellular carcinoma; the sixth most common cancer and the third most common cause of cancer death in the world (Ferlay et al., 2008) correlate with the geographic prevalence of chronic carriers of HBV worldwide (Elizabeth and Ramsey, 2011). Projections have shown that HBV-related hepatocellular carcinoma incidence will increase for at least two decades due to the high prevalence of chronic HBV infection throughout the world (Lavanchy, 2005). In Nigeria, HBV infection has been reported as hyperendemic, and may be the highest in Sub-Sahara Africa (Musa et al., 2015).

Unlike in adult, where approximately 90% resolve HBV infection, majority of young children will fail to resolve the infection, and 90% of infected infant develop chronic subclinical disease in later childhood or adulthood (Wasley et al., 2008), thus many neonates born to HBV positive mothers develop chronic HBV infection, which may results in serious health problems later on in life. Neonatal chronic infection with HBV has been reported as an important viral reservoir in areas with high endemicity (Wasley et al., 2008).

Although different studies have been carried out on Hepatitis B virus infection among pregnant women in different parts of Nigeria such as those by (Olokoba et al., 2007; Ugbebor et al., 2011; Mbaawuaga et al., 2008; Majolagbe et al., 2014). In Ibadan, most studies on hepatitis B virus infection have focus on other subgroups of individuals in the population, such studies (Ola et al., 2008 ; Olubuyide et al., 1997; Okonko et al., 2012; Otegbayo et al., 2003) had reported the prevalence of HBV among butchers, doctors, children and blood donors respectively, the few available studies among pregnant women were in private facility, tertiary facility and among HIV positive pregnant women (Okonko and Udeze, 2011; Adewumi et al., 2015; Adesina et al., 2010), there is a need to know the prevalence of HBV among apparently healthy pregnant women in secondary health facilities in Ibadan as it has been reported that poverty and ignorance directly or indirectly impact negatively on spread of HBV infection (Nwokediuko, 2010).

Routine screening of pregnant women for Hepatitis B virus could be used as a reliable indicator of its prevalence in the general population and to identify infants at risk, serving as a useful tool in the prevention of mother to child transmission (Ahize et al., 2011). In spite of this, routine

antenatal screening for HBV among all pregnant women is not yet practiced in most hospitals in Ibadan.

1.3 JUSTIFICATION

In more than a decade the number of new infections with HBV have increased, and HBV prevalence has been shown to be hyper endemic among women, as studies have revealed that large numbers of pregnant women and children were exposed to HBV, there is therefore a need to prevent new infections in Nigeria (Musa et al., 2015).

Perinatal transmission of HBV most often occurs during the birth process (Colin et al, 2006) and this has been an important mode of maintaining chronic infection of HBV in endemic areas such as Nigeria. Perinatal exposure to HBV is the route of transmission most likely to result in chronic HBV infection, as the risk of developing chronic HBV infection is strongly associated with the age of HBV exposure (Heather and Tram, 2014). The high rate of vertical transmission of HBV causes fetal and neonatal hepatitis which can have serious effects on the neonate, leading to impaired mental and physical health later in life (Ugbebor et al., 2011).

It is recommended that infants of mothers who are positive for hepatitis B surface antigen should receive hepatitis B immune globulin and hepatitis B vaccination within 12 hours of birth (WHO 2010; ACOG, 2007). The Centers for Disease Control and Prevention's Advisory Committee on Immunization Practices also recommended in 2005 that delivery hospitals should implement policies and procedures designed to identify and administer prophylaxis to infants at increased risk of perinatal HBV transmission (CDC, 2006), as prophylaxis is 85 to 95 percent effective in reducing the acquisition of perinatal infection, thus reducing chronic carrier of the virus and preventing HBV infection both in the present and the future.

In recent times, so much emphasis has been on HIV infection among pregnant women, with little attention on HBV infection, despite the knowledge that both viruses share common route of transmission. Sentinel surveillance of HIV infection is carried out using HIV in pregnancy as a marker, but this is not done for HBV infection in spite of the availability of HBV vaccines and immunoglobulin to prevent HBV infection.

Interventions to stop vertical transmission can only be applied when the status of the pregnant woman is known, hence this study intends to form evidence for formulation of health policies and programs to address the need for routine screening of all pregnant women for HBV, to enable preventive measures for neonates born to HBV positive mothers.

1.4 OBJECTIVES OF THE STUDY

Broad Objective

To determine the prevalence and factors associated with Hepatitis B virus (HBV) infection among pregnant women in selected secondary health facilities in Ibadan.

Specific Objectives

1. To estimate the prevalence of Hepatitis B virus infection among pregnant women.

2. To estimate the prevalence of HIV-HBV co-infection among pregnant women.

3. To assess the awareness on hepatitis B virus, screening and vaccination among pregnant women.

4. To evaluate the knowledge on Hepatitis B virus infection among pregnant women.

5. To identify the factors associated with Hepatitis B virus infection among pregnant women.

1.5 RESESARCH QUESTIONS

1. What is the prevalence of Hepatitis B virus infection (HBV) pregnant women?

2. What is the prevalence of HIV- HBV co infection amoing pregnant women?

3. What is the level of awareness on hepatitis B virus, screening and vaccination among pregnant women?

4. What is the level of knowledge on hepatitis B virus infection among pregnant women?

5. What are the factors associated with Hepatitis B virus infection among pregnant women?

CHAPTER TWO

LITERATURE REVIEW

Hepatitis is the inflammation of the liver which is characterized by the presence of inflammatory cells in the tissue of the liver, including the irritation or swelling of liver cells from any cause. The causes of hepatitis are viruses, drugs, alcohol abuse or toxins in the environment. It can also develop from other things, such as fat buildup in the liver (called fatty liver hepatitis), trauma, or an autoimmune liver disease; in which a person's body makes antibodies that attack the liver (autoimmune hepatitis), these forms of hepatitis can cause the same symptoms and liver inflammation that result from viral hepatitis, but are not contagious.

2.1 VIRAL HEPATITIS

Viral infection is the most common cause of hepatitis. There are five main hepatitis viruses, these are; types A, B, C, D and E. These five types are of greatest concern because of the burden of illness and death they cause and the potential to cause outbreaks and epidemics. They all have the ability to infect the liver and cause liver inflammation. In particular, types B and C lead to chronic disease in hundreds of millions of people and, together, are the most common cause of liver cirrhosis and cancer (Mohammed et al., 2003; WHO, 2000). Although less commonly other viruses that cause hepatitis are Epstein-Barr virus, varic ella virus , the herpes simplex virus (HSV), and cytomegalovirus (CMV).

2.2 TYPES OF VIRAL HEPATITIS

2.2.1 Hepatitis A virus

Hepatitis A virus is usually spread by consumption of food or water contaminated with faeces containing the virus, contact with household members, sharing toys at daycare centers, and eating raw shellfish taken from polluted waters. It is the least dangerous form of hepatitis as it most times resolves on its own and does not lead to chronic inflammation of the liver. However, HAV infections can also be severe and life threatening, infecting most people in areas of the world with poor sanitation. Safe and effective vaccines are available to prevent HAV.

2.2.2 Hepatitis B virus

Hepatitis B virus is spread by contact with infected blood and blood products, semen and some other body fluids, unprotected sexual intercourse with an infected person, contaminated injections during medical procedures and injection drug use, skin perforation with unsterilized needles and mother to child transmission at the time of birth. It also poses a risk to healthcare workers who sustain accidental needle stick injuries while caring for infected-HBV patients. Hepatitis B virus is transmitted when body fluids from a person infected with the virus enters the body of someone who is not infected (CDC, 2010). Hepatitis can be acute (inflammation of the liver that lasts less than six months) or chronic (inflammation of the liver that lasts for more than six months). Some persons when infected with hepatitis B virus get better, while others become carriers. Carriers can transmit the disease to others even when their own symptoms have disappeared. Those who cannot fight off the virus will develop chronic hepatitis B virus infection. Like carriers, those with chronic hepatitis B virus infection are able to pass the virus. The incubation period for acute hepatitis B virus infection ranges from 45 to 160 days with an average of 120 days. The hepatitis B virus can survive outside the body for at least 7 days and it can still cause infection during this time, if it enters the body of a person who is not protected by the vaccine (WHO, 2009). The virus may be detected 30 to 60 days after infection and persists for variable periods of time. Safe and effective vaccines are available to prevent HBV.

2.2.3 Hepatitis C virus

The two most common exposures associated with transmission of HCV are blood transfusion and injection drug use. This may happen through transfusions of HCV-contaminated blood and blood products, contaminated injections during medical procedures, and through injection drug use. In comparison to hepatitis B, sexual transmission and vertical transmission is also possible but the risk of acquiring HCV through sexual contact is low. In hepatitis C virus infection, unlike in infection with HBV, liver cancer risk is only increased in people with cirrhosis and only about 10–30% of those infected develop cirrhosis over 30 years (Rosen, 2011) while excessive alcohol intake also increases the risk of developing cirrhosis 100-fold (Mueller et al., 2009). The average incubation period of hepatitis C virus is 45 days, but can range from 14 to 180 days. There is no vaccine for HCV.

2.2.4 Hepatitis D virus

Infection with hepatitis D virus occurs in people infected with hepatitis B virus and tends to make the disease more severe. Infection is through contact with infected blood, unprotected sex, and perforation of the skin with infected needles. It can spread from mother to child and through sex. Infections can only occur in those who are infected with HBV, as it requires the presence of HBV to replicate (Abbas and Afzal, 2013). The dual infection of HDV and HBV can result in a more serious disease and worse outcome. Hepatitis B vaccines provide protection from HDV infection.

2.2.5 Hepatitis E virus

The virus is usually spread through consumption of contaminated water or food. Infection is also possible through anal-oral sex. It does not lead to chronic hepatitis but is considered slightly more dangerous than hepatitis A virus, as it can cause severe disease and death in pregnant women (Berto et al., 2012). HEV is a common cause of hepatitis outbreaks in developing parts of the world and is increasingly recognized as an important cause of disease in developed countries. In pregnancy, mortality due to HEV is high and intrauterine infection is common (Berto et al., 2012). Safe and effective vaccines to prevent HEV infection have been developed but they are not widely available.

2.2.6 Hepatitis G virus

Infection with hepatitis G virus usually occurs without any symptoms and when there are symptoms, they are very mild. In developed countries, 1-5% of healthy blood donors are viraemic at the time of blood donation, while developing countries has higher prevalence with up to 20% of blood donors being viraemic in some studies (Bhattarai and Stapleton, 2012). Although HGV infection is common and may persist for decades, most healthy individuals clear viraemia within two years of infection (Bhattarai and Stapleton, 2012).

2.3 HISTORY OF HEPATITIS B VIRUS

Epidemic jaundice was described by Hippocrates in the 5th century BCE. The first recorded cases of "serum hepatitis", were thought to be those that followed the administration of smallpox vaccine containing human lymph to shipyard workers in Germany in 1883, when some of the vaccinated workers became ill with jaundice and were diagnosed as suffering from serum hepatitis.. However understanding about hepatitis B virus came in 1963 through discovery of an antigen that detected the presence of hepatitis B virus (HBV) in blood samples by Dr Baruch Blumberg. This was at a time when he was researching the genetics of disease susceptibility while he was working at the National Institutes of Health (NIH). He discovered the Australia antigen (later known to be hepatitis B surface antigen, or HBsAg) in the blood of Australian aboriginal people, which was officially recognized in 1967 (Blumberg et al, 1967).

2.4 EPIDEMIOLOGY OF HEPATITIS B VIRUS

2.4.1 Global epidemioloy of hepatitis B virus according to WHO regions

HBV in America

The WHO Americas region is comprised of the countries of North America, Central America and South America. The prevalence of hepatitis B virus in the Americas region includes areas with low prevalence rates (United States and Canada) and areas of significantly higher prevalence (Mexico, Central America and South America).

Age-adjusted prevalence of past and present hepatitis B virus infection in the United States was reported to be 4.8% from data collected between 1996 and 2006, while the prevalence of active chronic HBV infection was 0.3%, or about 730,000 total infected persons (Wasley et al., 2010). Before hepatitis B vaccines were licensed in 1982, an estimated 200,000-300,000 person became infected with HBV in the United States each year, with rates of infection peaking in the mid-1980s (Armstrong et al., 2001). However, the incidence has declined since the initiation of increased vaccine coverage in 1991, targeting prenatal screening of pregnant women and universal vaccination of infants, adolescents and adults at risk for HBV, thus estimate according

to (CDC, 2010) were 13,000 for acute clinical cases and 43,000 for newly infected patients in the year 2007, which shows significant lesser figures than pre-vaccination prevalence rates. In Canada the prevalence of hepatitis B virus is low with about 0.5-1.0% depending on the population However HBV is considered to be highly prevalent in the region of Mexico, Central America and South America with variability among and within each country. The estimated prevalence ranges from 0.5-8.0%, with the total number of carriers approaching 11 million (Tanaka, 2000).

HBV in Europe

In this region the prevalence of HBV is heterogeneous with rates ranging from less than 0.1% to as high as 12% (Custer et al., 2004). Three types of epidemiological patterns are found in Europe. The first pattern occurs in Northern Europe (Scandinavian countries and the United Kingdom) and is generally characterized by a low HBsAg carrier rate of less than 0.1%, the second pattern exists in most Western European countries, where the carrier rate ranges between 0.1% and 0.5% while the final pattern can be found in Southern Europe (countries bordering the Mediterranean Sea) and Eastern Europe where the carrier rates in some parts can be greater than 8% (Magdzik, 2000).

HBV in the Eastern Mediterranean

This region extends from the countries of North Africa through the Middle East to Pakistan. The estimated prevalence in this region ranges from 1-10%, making it a region of intermediate to high endemicity (Custer et al., 2004).

HBV in South-East Asia

This region is considered to be of intermediate to high endemicity with prevalence rates ranging from 1-10% (Custer et al., 2004).This region comprised of Bangladesh, Bhutan, North Korea, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand and Timor-Leste.

HBV in the Western Pacific

The Western Pacific and South-East Asia regions are the largest and most populous of the six WHO regions. The Western Pacific region consist of Australia, Brunei Darussalam, Cambodia, China, Cook Islands, Fiji, Japan, Kiribati, Lao People's Democratic Republic, Malaysia,

Marshall Islands, Mongolia, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Philippines, South Korea, Samoa, Singapore, Solomon Islands, Tonga, Tuvalu, Vanuatu and Vietnam. This region has the highest rates of hepatitis B virus in the world, comprising more than 75% of the world's estimated 350 million carriers (Gust, 1996). The prevalence of HBsAg in the Western Pacific region ranges from less than 1% to 30%.

HBV in Africa

This region covers all of Sub-Saharan Africa and Algeria. Africa has the second largest number of chronic carriers after Asia and is considered a region of high endemicity, with between 70% and 95% of the adult population showing evidence of past exposure to HBV infection and the estimated HBsAg seroprevalence ranges from 6-20% with most infections occuring during infancy or childhood. The significant difference in HBV carrier rate in these areas could be attributed to poor hygiene and greater chances of HBV transmission through skin abrasions, insect bites, use of contaminated needles, tribal scarification and ear piercing using contaminated equipment. Western Africa has the highest rates of endemicity within Africa, with as many as 95% of the adult population displaying markers of past HBV exposure (Elizabeth and Ramsey, 2011).

2.4.2 Epidemiology of chronic carriers of hepatitis B virus according to endemicity

The prevalence of chronic HBV infection worldwide could be categorized as high, intermediate and low endemicity, this varies greatly in different parts of the world as the age at the time of infection is associated with endemicity of the infection.

High endemicity

In these areas at least 8% of the populations are HBV chronic carriers, these includes developing regions with large population such as South East Asia, China, Sub-Saharan Africa and the Amazon Basin. In these areas, 70–95% of the population shows past or present serological evidence of HBV infection. Most infections occur during infancy and childhood. There is little

evidence of acute disease related to HBV, since most infections in children are asymptomatic, but the rates of chronic liver disease and liver cancer in adults are high (Alter, 2003).

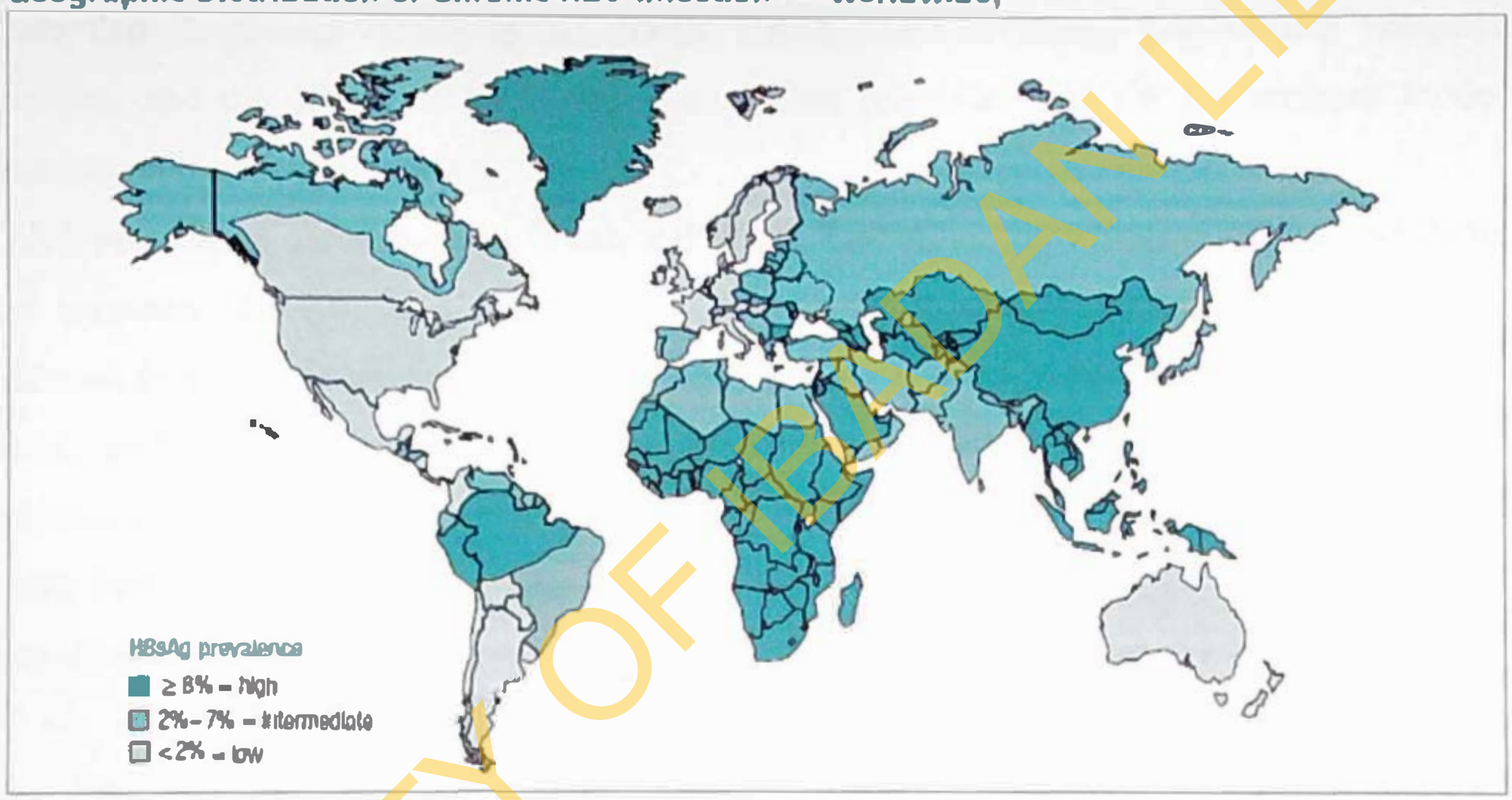
Intermediate endemicity

Hepatitis B virus is moderately endemic in part of Eastern and Southern Europe, the Middle East, Japan, and part of South America. Between 10–60% of the population have evidence of infection, and 2-7% are chronic carriers with the high rates of chronic infection being maintained mostly by infections occurring in infants and children. Acute disease related to HBV is common in these areas because many infections occur in adolescents and adults; however in these areas, mixed patterns of transmission exist, including infant, early childhood and adult transmission (Jinlin et al., 2005).

Low endemicity

Most developed areas have low endemicity of HBV such as North America, Northern and Western Europe and Australia. In these regions, HBV infects 5–7% of the population, and only 0.5–2% of the population are chronic carriers, with most HBV infections occurring in adolescents and young adults in relatively well-defined high-risk groups, including injection drug user, homosexual males, and health care workers, patients who require regular blood transfusion or heamodialysis (Jinlin et al., 2005).

Figure 1:



* For multiple countries, estimates of prevalence of hepatitis B surface antigen (HBsAg), a marker of chronic HBV infection, are based on limited data and might not reflect current prevalence in countries that have implemented childhood hepatitis B vaccination. In addition, HBsAg prevalence might vary within countries by subpopulation and locality.

Source: CDC. Travelers' Health: Yellow Book. http://wwwnc.cdc.gov/travel/yellowbook/ch4-HepB.aspx

2.5 PREVALENCE OF HEPATITIS B VIRUS INFECTION

It has been estimated that roughly 30% of the world's population show serological evidence of current or past infection with HBV, while national and regional prevalence of hepatitis B virus infection ranges from over 10% in Asia and Africa to under 0.5% in the United States and Northern Europe. Countries with high endemicity are those where HBsAg seroprevalence is greater than or equal to 8 percent; countries with intermediate endemicity are those where seroprevalence is 2 to 7 percent; and those with low endemicity are those where seroprevalence is less than 2 percent (Colin et al., 2006). HBsAg seroprevalence has marked geographic variations, and the degree of HBV endemicity often correlates with the predominant mode of transmission (Colin et al., 2006).

In high-prevalence areas such as China and South East Asia, transmission during childbirth is most common, likewise in other areas of high endemicity such as Africa; transmission during childhood is a significant factor. In moderate prevalence areas, which include Eastern Europe, Russia, and Japan, where 2–7% of the population is chronically infected, the disease is predominantly spread among children. However in low prevalence areas such as the continental United States and Western Europe, injection drug abuse and unprotected sex are the primary methods (Redd et al., 2007).

According to Wasley et al., (2010) in a study to assess the prevalence of HBV in the United States, the prevalence of HBV infection and immunity was determined in a representative sample of the US population for the periods 1999-2006 and 1988-1994, during this period the age-adjusted prevalences of anti-HBc was 4.7% while HBsAg was 0.27%, the prevalence of chronic HBV in United States was estimated to be 1.2% (Anne et al., 2012). It was reported that as of 2010, China has 120 million infected people, followed by India and Indonesia with 40 million and 12 million, respectively (Komas et al., 2013).

HBV prevalence in Africa is about 10-15%, and is considered a region of high endemicity for hepatitis B virus infection, having the second largest number of chronic carriers after Asia. Western Africa has the highest rate of endemicity within Africa, where 95% of the adult population displays markers of past infection (Elizabeth and Ramsey, 2011).

According to Musa et al., (2015) Nigeria was estimated to have a population of 160 million people with an overall HBV estimates to be 21,760 million sero-positive persons. A review to previous studies done in Nigeria showed HBV carriage rate in the range of 9 to 39% (Emechebe et al., 2009). Another review of hepatitis B virus infection in Nigeria in the year 2000 to 2013 by Musa et al., (2015) showed that HBV prevalence was greatest among pregnant women attending antenatal clinics 14.1%, followed closely by voluntary blood donors 14.0% and the highest prevalence occurred in 2003 at 53.9% and the lowest in 2011 at 7.0%, HBV prevalence was also estimated to be 14.0% among adults and 11.5% among children; the prevalence of HBV was slightly greater for Northern Nigeria at 14.7% as compared to 13.6% for Southern Nigeria. Studies carried out by Bello et al., (2000) found high HBV prevalence among surgeons 25.7%, voluntary blood donors 23.4% (Bada et al., 1996) and infants 16.3% (Sadoh and Sadoh, 2013). The gender related prevalence of HBsAg was 9.5% in females and 24.1% in males according to Aliyu et al., (2010). In Ibadan 57.1% of patients with primary liver cell carcinoma were reported to be infected with HBV and a high (39 %) prevalence of HBsAg was associated with Surgeons and Dentists (Olubuyide et al., 1997). The seroprevalence of hepatitis B virus infection among butchers in Ibadan was 9.4% (Ola et al., 2008). The prevalence of HBV varies among ethnic groups and age groups, however, Eke et al., (2011) attributed the varying prevalence among age groups of pregnant women to differences in early marriage and pregnancy of women in south eastern Nigeria.

2.6 PATHOLOGY OF HEPATITIS B VIRUS INFECTION

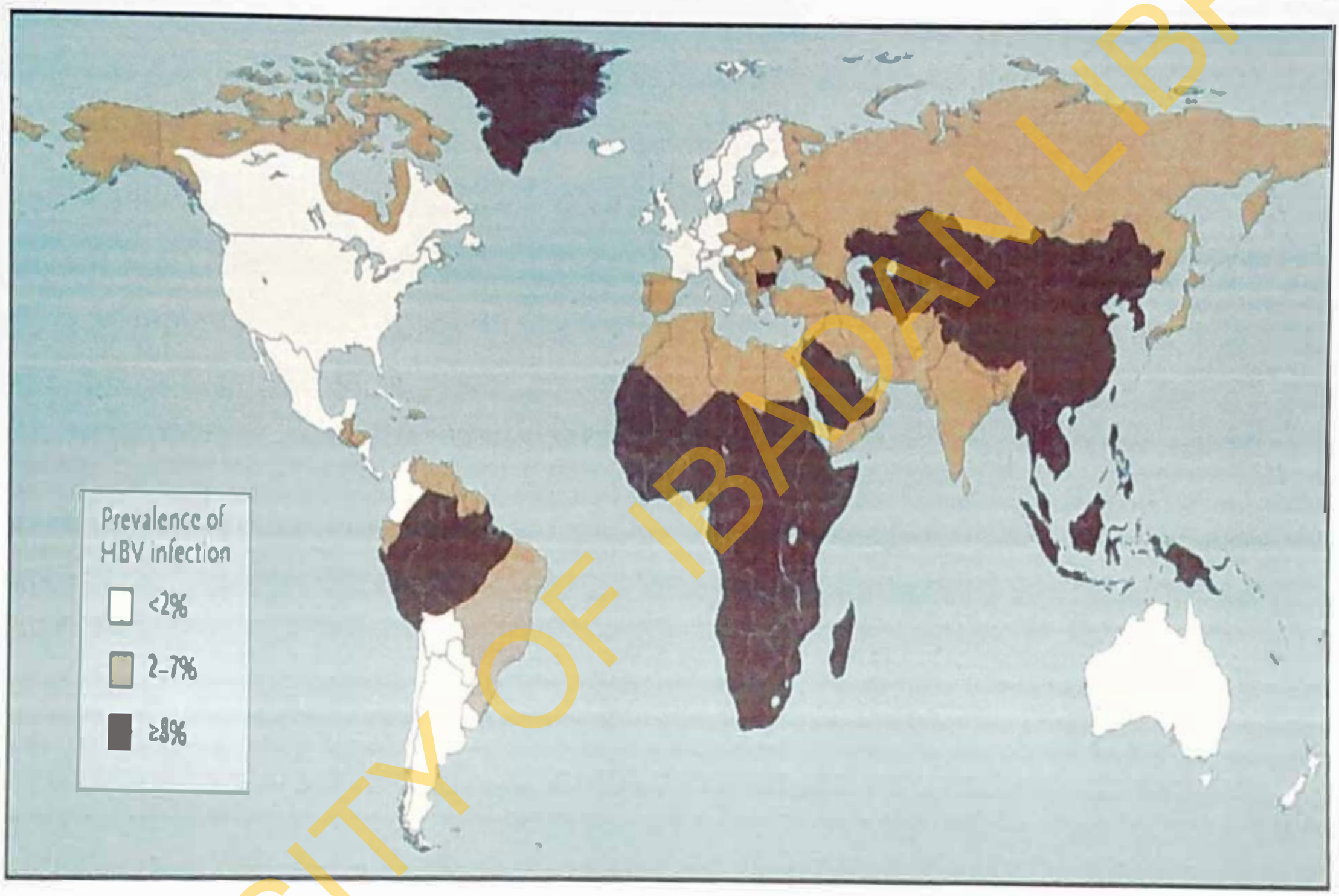
Hepatitis B virus infection is caused by hepatitis B virus (HBV) which is a double-stranded DNA virus of the family hepadnaviridae. Hepatitis B virus (HBV) is a non-cytopathic hepatotropic virus that can lead to severe liver disease including acute hepatitis, cirrhosis and hepatocellular carcinoma. Infection with hepatitis B virus (HBV) can lead to a wide spectrum of clinical presentations, which ranges from an asymptomatic carrier state to a self-limited acute or fulminant hepatitis, or to chronic hepatitis with progression to cirrhosis and hepatocellular carcinoma. Both viral factors as well as the host immune response have been implicated in the pathogenesis and clinical outcome of HBV infection, by a complex interaction between the virus and the host immune response. This determines successful clearance of the virus as well as the

establishment of liver disease, liver injury, cirrhosis and hepatocellular carcinoma. Patients could have either an acute symptomatic disease or an asymptomatic disease.

Resolution of HBV infection also depends on the age and immune status of the individual, with most infections of immunocompetent adults being self-limiting, whereas in most neonates and infants they become chronic. Hepatitis B virus infection is acute when it lasts less than six months and chronic when it persists longer. Routes of infection include vertical transmission (such as through childbirth), early life horizontal transmission (bites, lesions, and sanitary habits), and adult horizontal transmission which includes sexual contact, intravenous drug use (Custer et al., 2004). Persistent or chronic infection occurs more following vertical transmission (from mother to child) or horizontal transmission to children or to immunocompromised adults (Ganem and Prince, 2004).

In developing countries such as Nigeria, most infections with hepatitis B virus infection occur during infancy or childhood and high rate of chronic infection is primarily maintained by transmission during infancy and early childhood (Olatunji et al., 2012). Vertical transmission is an important mode of HBV infection and is responsible for the high number of HBV carriers in the population, with 40–50% of all chronic infections occurring through vertical transmission of hepatitis B virus. Chronic hepatitis B virus has been reported to be the leading cause of liver disease and hepatocellular carcinoma worldwide (Hoffmann et al., 2014; Dienstag, 2008). Previous studies revealed that 15 to 40% of patients with chronic HBV will develop cirrhosis, end-stage liver failure or hepatocellular carcinoma (HCC) in their lifetime (Lok, 2002).

FIGURE 2: CLINICAL AND EPIDEMIOLOGICAL CORELLATIONS IN HBV INFECTION



Source: Jules and Dienstag (2008).

2.7 SIGNS AND SYMPTOMS OF HEPATITIS B VIRUS

2.7.1 Acute Infection

Acute infection with hepatitis B virus ranges in severity, from a very mild illness with few or no symptoms, to a serious condition requiring hospitalization. Acute infection with HBV symptoms may include loss of appetite, myalgia, nausea, low grade fever, abdo minal pain, vomiting, jaundice (yellowing of the eyes and skin), unusually light-colored stool and unexplained fatigue that persists for weeks or months. Some people may have symptoms that last for months such as signs of abnormal liver function, before they completely recover from acute infection. There may be no symptoms in some cases and infection is only discovered in a blood test. Symptoms often occur one to six months after exposure. An estimated 30% of those infected do not show typical signs or symptoms. Acute hepatitis B progresses to chronic HBV infection in 30%–90% of people infected as infants or young children and in less than 5% of people infected during adolescence or adulthood (CDC, 2012).

2.7.2 Chronic hepatitis

Chronic infection is a lifelong illness which occurs when the hepatitis B virus remain in a person's body, causing serious health problems overtime. In Southern parts of the country, up to 58.1% of patients with chronic liver disease were found HBsAg positive (Lesi et al., 2004). Symptoms of chronic HBV can take up to 30 years to develop, thus many people with hepatitis B virus do not have symptoms and do not know they are infected, during this time damage to the liver can silently occur. However when symptoms do appear they often are a sign of advanced liver disease and can include fever, fatigue, abdominal pain, jaundice, hepatomegaly, splenomegaly, muscle wasting, palmar erythema, spider angiomas and rarely vasculitis. Patients with cirrhosis may develop ascites, history of variceal bleeding, peripheral edema, gynecomastia, testicular atrophy and abdominal collateral veins. Most people with chronic HBV were infected with the virus at birth or during early childhood and developed a lifelong chronic infection, which may result in chronic liver disease, including cirrhosis and liver cancer (CDC, 2012). Many of those infected are unaware that they have Hepatitis B virus, since they may not have symptoms as a result they can unknowingly spread the disease to others.

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2.8 HEPATITIS B VIRUS SEROLOGIC MARKERS

HBV antigens are proteins that appear in different areas of the virus. HBV has three antigens (surface, core, and envelope). The body's immune response also produces antibodies to each type of these antigens (surface antibody, core antibody, and envelope antibody), both the antigens and antibodies can be detected in the blood, they are known as Hepatitis B serologic markers. Each of this markers or combinations of markers are used to identify different phases of HBV infection, to determine acute or chronic HBV infection, to detects immunity to HBV after infection or vaccination, and to identify individuals who are susceptible to infection.

2.8.1 Hepatitis B surface antigen (HBsAg)

Hepatitis B surface antigen is a marker of infectivity which indicates the presence of either acute or chronic HBV infection, it determines whether a person currently has the infection. It is a protein on the surface of HBV which can be detected in high levels in serum during acute or chronic HBV infection. The body normally produces antibodies to HBsAg as part of the normal immune response to infection. The presence of HBsAg for longer than 6 months after acute infection indicates chronic infection. The presence of HBsAg indicates that the person is infectious. HBsAg is the antigen used to make Hepatitis B vaccine (CDC, 2005)

2.8.2 Hepatitis B surface antibody (anti-HBs)

It is also known as HBsAb. It is the antibody to hepatitis B surface antigen and a marker of immunity, indicating the presence of an immune response to HBV infection, vaccination, or the presence of passively acquired antibody. It determines whether a person has cleared the virus after infection, or has been vaccinated and is now immune to future infections. The presence of anti-HBs indicates recovery and immunity from HBV infection, and successful va ccination against Hepatitis B virus infection (WHO, 2013).

2.8.3 Hepatitis B core antigen (HBcAg)

This is the core protein antigen of the hepatitis B virus which is present in the complete virion and in the nucleus of infected hepatic cells. It indicates the presence of reproducing virus. The antigen is not present in the blood of infected individuals, but antibodies against it appear during

the acute infection. Positivity indicates recent infection with HBV in less than six months, thus its presence indicates acute infection, which is a recent infection (WHO, 2013; CDC, 2005). The presence of hepatitis B core antigen do not protect against reinfection.

2.8.4 Hepatitis B core Antibody (anti- HBc)

Antibody to hepatitis B core antigen is a nonspecific marker of acute, chronic, or resolved HBV infection. It determines whether a person has ever been infected. It is not a marker of vaccine-induced immunity, but it may be used in prevaccination testing to determine previous exposure to HBV infection. This antibody appears at the onset of symptoms in acute Hepatitis B infection and persists for life. The presence of the antibody indicates previous or ongoing infection with HBV in an undefined time frame (Lozano et al., 2012). It is also known as HBcAb.

2.8.5 Hepatitis B envelope antigen (HBeAg)

This is a serologic marker of high degree of HBV infectivity correlating with high level of HBV replication. It is primarily used to determine the clinical management of patients with chronic HBV infection. It is a secreted product of the nucleocapsid gene of HBV that is found in serum during acute and chronic Hepatitis B virus infection. Its presence indicates that the virus is replicating and the infected person has high levels of HBV (WHO, 2013). Hepatitis B envelope antigen (HBeAg) and an antibody to HBeAg (anti-HBe) are closely related to the level of hepatitis B virus (HBV) replication, they are thus used in assessing the activity of liver disease and monitoring the responses to antiviral therapy in patients with chronic infection.

2.8.6 Hepatitis B envelope antibody (HBeAb or anti-HBe)

Antibody to hepatitis B "e" antigen may be present in an infected or immune person. Its presence in persons with chronic HBV infection suggests a low viral titer and a low degree of infectivity. The antibody is produced by the immune system temporarily during acute HBV infection or consistently during or after a burst in viral replication. Spontaneous conversion from "e" antigen to "e" antibody (a change known as seroconversion) is a predictor of long-term clearance of HBV in patients undergoing antiviral therapy and indicates lower levels of HBV (WHO, 2013).

2.8.7 HBV Deoxyribonucleic acid

This is a marker of viral replication which correlates with infectivity. It is used to assess and monitor the treatment of patients with chronic HBV infection.

2.9 MODES OF HEPATITIS B VIRUS TRANSMISSION

Hepatitis B virus is transmitted through parenteral or mucosal exposure to infected blood and body fluids. The mode of transmission is usually vertical or horizontal in highly endemic areas early in life, resulting in a high rate of chronic infection, while transmission in low endemic countries is usually in adulthood which mostly results in self-limiting infection. The risk of chronic infection is low (less than 5%) for infections acquired through sexual contact, intravenous drug use, acupuncture, and transfusion (Hyams, 1995). This is because HBV infection through these modes mostly occurs in adolescence or adult without immune tolerance. In most adult the disease progress directly to the immune clearance phase and is of short duration. The modes of HBV transmission are recognized as perinatal, sexual and parenteral / percutaneous transmission

2.9.1 Perinatal transmission

The most important factor in determining the prevalence of HBV infections in highly endemic areas are transmission from carrier mothers to their babies, which can occur during the perinatal period. The proportion of babies that become HBV carriers are about 10-30% for mothers who are HBsAg-positive but HBeAg-negative, while the incidence of perinatal infection is even greater, around 70-90%, when the mother is both HBsAg-positive and HBeAg-positive, it has also been reported that as much as 40% of men and 15% of women with perinatally acquired hepatitis B virus infection will die of liver cirrhosis or hepatocellular carcinoma (Trepo et al., 2014). There are three possible routes of transmission of HBV from infected mothers to infants these include: transplacental transmission of HBV in utero, natal transmission during delivery or postnatal transmission during care. Epidemiological studies on HBV intrauterine infection in China showed that intrauterine infection occurs in 3.7 - 9.9% pregnant women with positive HBsAg and in 9.8-17.39% with positive HBsAg and HBeAg (Wang et al., 2003). It was reported that for neonates and children younger than one year who acquire HBV infection perinatally, the

risk of the infection becoming chronic is 90% (Hyams, 1995), this is probably because neonates have an immature immune system. Transplacental passage of HBeAg is one of the possible reasons for the high rate of chronic infection as this may induce immunological tolerance to HBV in fetus.

2.9.2 Sexual transmission

This is a major source of infection in all areas of the world, especially in the low endemic areas such as North America. HBV is considered to be a sexually transmitted disease (STD), with both homosexual and heterosexual transmission accounting for an increased proportion of HBV infections. In heterosexuals, factors associated with increased risk of HBV infection include duration of sexual activity, number of sexual partners, history of sexual transmitted disease, and positive serology for syphilis. Sexual partners of injection drug users, prostitutes, and clients of prostitutes are at particularly high risk for infection. According to reports, homosexual men are considered to be at the highest risk of infection due to sexual contact (70% of homosexual men were infected after 5 years of sexual activity) (Alter, 2003).

2.9.3 Parenteral / percutaneous transmission

The parenteral transmission include injection drug use, transfusions with HBV infected blood and blood products, dialysis, acupuncture, contaminated surgical instruments and utensils, nosocomial infection, household contact, tattooing and scarification. Injection drug use remain a very important mode of HBV transmission, occurring in 23% of all patients in the United States and Western Europe and the risk of acquiring infection increases with the duration of injection drug use (Jinlin et al, 2005). Various studies in Nigeria showed that blood transfusion is an important source of HBV transmission (Multimer et al., 1994; Emechebe et al., 2009). Risk for HBV infection through transfusion has reduced greatly since the screening of blood for HBV markers and the exclusion of donors who engage in high-risk activities. However, transmission is still possible when the blood donors are asymptomatic carrier with HBsAg negative. People at high risk of infection include those requiring frequent transfusions or hemodialysis, physicians, dentists, laboratory scientists, nurses and others who are likely to come into contact with potentially infected blood and blood products as a high 39% prevalence of HBsAg among

Surgeons and Dentists has been reported in Ibadan by Olubuyide et al., (1997) which was associated to lack of vaccination and infrequent application of universal precaution.

2.10 RISK FACTORS FOR HEPATITIS B VIRUS INFECTION

Several risk factors predispose to HBV infection, and these also relate to the modes of transmission of the virus. Estimates of risk group have been found to vary nationwide, some reports suggest a prevalence of 10-15% in the average risk among Nigerian population (Emechebe et al., 2009).

Risk for HBV infection include transfusion with blood or blood products, sharing of personal items such as razor blades, toothbush and clippers (Sylvester and Uchenna, 2011), co infection with hepatitis C virus or human immunodeficiency virus, alcohol consumption greater than 60g/day (Gheorghe et al., 2013) history of sexually transmitted infections, history of circumcision (Sylvester and Uchenna, 2011), living in regions with high HBV endemicity, household contacts, illiteracy (Garima et al, 2013), people not vaccinated as an infant, use of unsterile equipment during medical and surgical procedures, intravenous drugs users, inmates of correctional facility or prisons, infants born to infected mothers, unprotected sex with more than one partner, sex partners of infected persons, men who have sex with men, cigarette smoking (Chuang et al., 2010), induced abortion (Oliver et al., 2014), people with occupational exposure to blood or blood-contaminated body fluids, and travellers to countries with intermediate or high prevalence of HBV infection (CDC, 2008). Report shows that social status is a factor for HBV infection, as prevalence of HBsAg among pregnant women decreases with increasing social status in Akwa (Ezegbudo et al., 2004).

Pregnant women are considered at a higher risk due to increased exposure to risk factors (such as blood transfusion, intravenous drugs or surgical procedures) and most importantly pregnant women and infant of HBV positive mothers are highly at risk due to their immune status. These groups generally have depressed immunity and infection with HBV is dependent on immune response (Tran, 2009).

In Gombe, Jos and Lagos respectively multiple sex partner was found to increase the carriage of HBsAg (Mustapha and Jibrin, 2004; Sirisena et al., 2002, Rabiu et al., 2010). According to

(Amazigo and Chime, 1990) overcrowding and clustering are risk factors for HBV infection as he found that HBsAg carriage and exposure rate to HBV were significantly higher in rural than in urban population and also among prisoners. HBV infection has been linked to transmission from tattoos and body cuttings/ piercing (CDC, 2003; Mustapha and Jibrin, 2004) and it has also been found to be associated with ethnicity (Nurul et al., 1997). Studies from North-central Nigeria indicate that unprotected sex is implicated in the transmission of HBV (Mustapha and Jibrin, 2004; Sirisena et al., 2002). People with polygamous family type (Olatunji et al., 2012) have been reported to be at higher risk for HBV. Socio-economic and living condition of most Nigerians has been reported to encourage transmission of HBV (Amazigo and Chime, 1990).

2.11 HEPATITIS B VIRUS IN PREGNANT WOMEN

The World Health Organization reports that perinatal and maternal deaths are substantially increased in hepatitis B virus infection, more especially in under priviledged populations and developing countries (WHO, 2005). Elinav et al., (2006) submits that hepatitis B virus infection is a leading cause in maternal mortality and is also said to be the most familiar cause of jaundice in pregnancy (Hill et al., 2002). Previous studies identified risk factors for HBV infection among pregnant women as an early age of sexual intercourse below 19 years, history of multiple sexual partners, and past history of sexually transmitted infection (Rabiu et al., 2010). In a large population-based study from Florida involving nearly 1.7 million pregnant women, the prevalence of HBV was approximately 27 times higher among Asian-Americans and 5 times higher among African-Americans as compared with whites (Conell et al., 2011). Moreover, high-risk behaviours such as smoking, alcohol abuse and drug abuse is reportedly increased in pregnant women with HBV (Reddick et al., 2011). Studies on maternal HBV infection in Hong Kong yielded the prevalence of 6.6% in 1976, 7.4% in 1983 and 10.0% in 1996 (Kwan et al., 1997), this 10% prevalence has remained unchanged in most recent studies (Suen et al., 2010).

Maternal infection with hepatitis B virus (HBV) can expose the newborn to a subsequent chronic hepatitis infection. The risk of vertical transmission depends on the time at which the pregnant woman acquired HBV infection and on her status of hepatitis B surface antigen (HBsAg) and hepatitis B e antigen (HBeAg). Maternal acute hepatitis B virus infection in the third trimester is associated with a high likelihood of perinatal HBV transmission as well as

infection in the first postpartum or if the mother is a chronic HBsAg carrier, however most perinatal infections occur in infants born to mothers with chronic HBV infection (Colin et al., 2006), this indicates that mothers with HBV chronic infection will continuously transmit HBV to their children, resulting in higher numbers of chronic carriers who serve as infectious HBV reservoirs, thus maintaining HBV infection and its devastating effect in the population from generation to generations, if preventive measures are not put in place.

Viral hepatitis during pregnancy has been reported to be associated with high risk of maternal complications (Ugbebor et al., 2011). Studies have found an increased risk of gestational diabetes, antepartum hemorrhage, and threatened preterm labor in hepatitis B surface antigen (HBsAg) positive mothers, but no association with preeclampsia or premature rupture of membranes (Grant and Jorge, 2014). Newborns of women infected with HBV are most commonly infected during exposure to infected maternal blood at the time of delivery. In utero infection is not common as it occurs in less than 5 percent of perinatal HBV infections and factors that seem to be associated with in utero infection include the presence of maternal HBeAg, history of preterm labor, high HBsAg and HBV DNA titers, as well as the presence of HBV DNA in villous capillary endothelial cells (Xu et al., 1999). No evidence exists that caesarean delivery provides additional protection against HBV transmission (Wang et al., 2003).

Study in Zahedan Iran showed that 6.5% of the pregnant women had a positive test for HBsAg (Batool et al., 2004) and it concludes that hepatitis B virus infection is highly endemic among pregnant women in Zahedan. Rates as high as 11% have been reported in Nigeria (Mbaawuaga et al., 2008). HBV prevalence of 12.5% was found among pregnant women attending the antenatal clinic of the University of Benin Teaching Hospital (Ugbegbor et al., 2011). A similar study in Keffi found the overall seroprevalence of HBsAg in the study population at 6.67% with higher HBV rate among the women in the age group of forty to forty four (Pennap et al., 2011). A prevalence of 2.89% of HBV infection was found among pregnant women in Porthacourt (Obi et al., 2006). Prevalence rate of 16.5% was obtained for hepatitis B surface antigen among pregnant women in Osogbo (Olatunji et al., 2012). Olumuyiwa et al., (2014) reported a prevalence of 12.7% among pregnant women in Ilorin, while Esan et al., (2014) reported 6.78% prevalence among pregnant women in Ido Ekiti.

2.11.1 Complications of Hepatitis B virus infection among Pregnant women

Chronic hepatitis B virus infection

Chronic HBV infection in pregnant women is associated with mother-to-child transmission and may be associated with increased maternal and fetal complications (Dunkelberg et al., 2014). Maternal chronic hepatitis B virus infection has been found to be associated with cholestasis of pregnancy, neonatal narcotic withdrawal syndrome and neonatal intensive care unit admission (Berkley et al., 2008).

Acute hepatitis B virus

Ten percent (10%) of infants born to women with acute HBV infection during the first trimester of pregnancy will be HBsAg positive at birth while 80 to 90% of neonates become HBsAg postive without prophylaitic therapy if acute maternal infection develops during the third trimester of pregnancy (Narendra, 2004). Acute hepatitis B virus infection, particularly late in pregnancy, may induce premature labour and incidence of prematurity, intrapartum or postpartum hemorrhage may occur especially if the prothrombin time is prolonged as in fulminant hepatic failure and high aminotransferases even if the bilirubin is normal (Narendra, 2004).

2.11.2 Screening for hepatitis B virus among pregnant women

Screening is essential in the prevention of HBV infections. According to the United States preventive services task force (2009), all pregnant women should be screened at the first prenatal visit, to reduce vertical transmission of HBV. In a study by Batool et al., (2004) in Zahedan, Iran in which 6.5% of the pregnant women had a positive test for HBsAg, it was concluded that all pregnant women be screened for hepatitis B virus. Pregnant women with unknown HBsAg status or new or continuing risk factors should be screened upon admission to the hospital or other delivery setting. Screening for HBV infection by testing for HBsAg should be performed in each pregnancy, regardless of previous hepatitis B vaccination or previous negative HBsAg tests and the test for HBsAg should be ordered at the first prenatal visit with other recommended screening tests, as reports shows that HBV carrier population has reduced through improved maternal screening (Chen et al., 1996).

Studies showed that screening pregnant women for hepatitis B virus infection on the basis of risk factors may not be effective, therefore education on modification of lifestyle, sexual behavior as well as non-selective screening of pregnant women for HBV infection is recommended (Rabiu et al., 2010). A study on mother to child transmission of HBV in Ilorin reported a 40% vertical transmission. The study concluded that vertical transmission of hepatitis B virus plays a significant role and stresses the significance of routine HBV screening among pregnant women (Olumuyiwa et al., 2014). Furthermore Chasela et al., (2014) recommended that there is need to institute antenatal testing for HIV and HBV to facilitate implementation of prophylactic measures against infant infection by both viruses. Adesina et al., (2010) also recommended that HIV positive pregnant women should be screened for HBV and assisted to access care targeted at preventing morbidity and vertical transmission.

2.12 NEONATAL HEPATITIS B VIRUS INFECTION

Neonates are the most likely to be affected around the world, particularly in areas with a high prevalence of disease and lack of identification of infected women whose infants are at risk for becoming chronic carriers (Stephen and Christine, 2014), as neonates mostly acquire HBV infection during delivery. The likelihood of an individual resolving HBV infection correlates with their age and the strength of the initial immune response to HBV. Neonates are vulnerable to HBV due to weak immune response. The weak immune response generated by young children acutely infected with HBV generally corresponds with minimal killing of HBV-infected hepatocytes: for this reason, clinical symptoms suggestive of acute HBV infection are frequently absent among children, thus most neonates with HBV infection are usually asymptomatic. Furthermore the age dependency of the clinical manifestations of acute HBV infection results in asymptomatic infection among infants, young children and immunosuppressed adults with newly acquired HBV infection. In infants, young children, and immunosuppressed persons, most newly acquired HBV infection result in chronic infection (Edmunds, 1993).

Acute infection however occurs in very few cases causing jaundice, lethargy, failure to thrive, abdominal distention, clay-colored stools and in cases of severe illness acute liver failure which requires liver transplantation, hepatomegaly, ascites, and hyperbilirubinemia occurs.

The risk of transmission of HBV to neonates is 70 to 90% from mothers positive for hepatitis B surface antigen (HBsAg) and hepatitis B envelope antigen (HBeAg), and 5 to 20% from mothers without the envelope antigen at the time of delivery (CDC, 2006). Neonates are at greatest risk, with a 90% chance of developing chronic infection if infected at birth. Although people who acquire chronic HBV infection as infants or young children are often asymptomatic, chronic liver disease develops in two-thirds of these persons, and approximately 15%-25% die prematurely from cirrhosis or liver cancer.

Neonatal chronic infection with HBV infection is an important viral reservoir in areas with high endemicity, this is because it is generally agreed that the risk of chronic infection with HBV is inversely related to age of onset of infection, thus children are most times chronically infected, and they mostly represent the reservoir of infection in the community. The chronic infection in neonates is usually characterized by persistent HBsAg antigenemia and variably elevated transaminase activity. Approximately 5% to 10% of adults and children older than age 5 with hepatitis B virus infection go on to develop chronic infection. These rates climb much higher for children younger than age 5 (25% to 50%) and even higher for infants infected at birth (90%) with an estimate of 30%--40% of chronic infections in this age resulting from perinatal or early childhood (Wasley et al., 2008).

HBV infection at the time of birth could cause congenital infections among offspring born to HBsAg positive mothers and incidence of low birth weight has been reported among infants born to mothers with acute hepatitis B virus infection during pregnancy. It has also been shown that acute hepatitis B virus infection in pregnancy could induce premature labour and prematurity with its effects (Gambarin, 2007). Projections indicate that about half of the babies born to mothers with HBV infection during pregnancy will show hepatitis B antigen in their blood with some proportion of them developing hepatic lesions (Tse et al., 2005). In a study by (Hanan et al., 2015) among neonates HBV DNA was discovered among two neonates whose both mothers were HBsAg and HBeAg-positive. In another study by Chasela et al., (2014) HBV DNA was detected in nearly 10% of infants born to HBV/HIV-coinfected women.

The prevention of transmission of infection in this group would be most important to decrease overall carrier rate, identification of disease prevalence in the population and predominant mode of transmission is necessary before initiation of preventive measures.

2.13 HIV-HBV COINFECTION

Human Immuno-deficiency virus (HIV) and Hepatitis B Virus (HBV) share common modes of transmission which include blood borne and the vertical routes. Co-infection with HIV has a major impact on the natural history, diagnosis, progression, morbidity, and mortality of HBV infection. HIV coinfection with hepatitis B virus has also been implicated in the complication of the management of HIV infection.

World Health Organization estimated that 3.3 million people were living with Human Immunodeficiency Virus (HIV) in 2009, with 68% of them living in sub-Saharan (WHO, 2011). Estimates shows that 3.6% of the Nigerian populations were living with the virus in 2009, and the country had the world's second highest number of HIV/AIDS (Acquired Immune Deficiency Syndrome) related deaths (220,000) after South Africa (WHO, 2011). Although Nigeria share similarity with South Africa in the burden of HIV, the Nigerian estimate is higher than that of South Africa, with a prevalence of 10%.(Firnhaber et al., 2008).

Regional differences exist in the prevalence of this co-infection with the highest rates also occuring in sub-Saharan Africa and Asia (Okocha et al., 2012). A lower prevalence of HIV-HBV 1.5% co-infection was reported by Santiago-munoz et al., (2005) from Texas. The rate of liver-related deaths was also reported to be several times higher among HIV/HBV co-infected persons (Adesina et al., 2010). HIV- HBV co infection is also associated with accelerated progression to cirrhosis and thus a higher mortality (Petrovic, 2007).

Studies across Nigeria have shown varying prevalences of HBV/HIV co-infection from 9. 2% (Balogun et al., 2012), 12.1% in Uyo (Ekanem et al., 2013), 25.9% and 26.5% in Jos and Gombe respectively (Ukaeje et al., 2005; Mustapha et al., 2004). Okonko et al., (2012) reported 0.3% co infection prevalence among sexually active adults in Ibadan. Individuals co-infected with Hepatitis B virus and HIV are at risk of hepatoxicity associated with the use of antiretroviral drugs (Petrovic, 2007). The presence of chronic hepatitis B virus infection results in increased

risk of hepatotoxicity related to administration of Highly Active Anti-Retroviral Therapy (HAART) (Sulkowski et al., 2004). Co-infected patients have a higher chance of death from liver-related causes, (Ocama et al, 2005) resulting from continuous administration of antiretroviral drugs. A study in Kano Nigeria found in 2012 that among 440 HIV positive patients, 12.3% were co-positive for HBV (Hamza et al, 2013). The rate of progression and complications from viral hepatitis was reported to be accelerated in HIV infected patients (Thio, 2009), similarly HIV infected persons were shown to be six times more likely to develop chronic hepatitis if they were infected with HBV, compared to HIV negative persons (Gatanga et al., 2000) due to the similarities in their routes of infection and high rates of transmission by both viruses. Puoti et al., (2002) reported chronic HBV infection among about10% of HIV-infected patients, also an increased incidence of HIV infection among pregnant women with chronic HBV infection was reported by Connell et al., (2011).

2.14 AWARENESS AND KNOWLEDGE OF HEPATITIS B VIRUS INFECTION

In 2010, the World Health Assembly adopted resolution to recognize viral hepatitis as a global health problem. In response, the WHO developed a four-prong strategy aimed at raising awareness/mobilizing resources, policy, preventing transmission, screening and treatment (WHO, 2013). While 180 countries included Hepatitis B vaccination as part of their routine vaccination schedule and the worldwide coverage approached 80% in 2011, disparities remain between developed and developing countries.

World hepatitis day is observed every July 28 and it aims to raise global awareness of Hepatitis B and Hepatitis C, and to encourage prevention, diagnosis and treatment. It is has been led by the World Health Alliance since 2007, and it was approved by the World Health Organization in 2010. WHO is working to prevent and control viral hepatitis by raising awareness, promoting partnerships, mobilizing resources, formulating evidence-based policies/data for action, preventing of transmission and promoting access to screening, care and treatment services.

Previous studies have shown the awareness and knowledge of Hepatits B virus among different populations. According to a study by Elin et al., (2013) among university students, the majority

of the university students (95.3%) had heard about hepatitis B virus (HBV), more than half (55.4%) knew correctly that HBV cannot be transmitted by sharing food with an infected person, and 58.4% knew that HBV can cause liver cancer, only 47.6% knew that HBV can be sexually transmitted and 39.5% knew that HBV can be transmitted from mother to child at birth. In another study by Marina et al., (2013) in which only 58.1% of 179 students, knew about the degree of virulence of the Hepatitis B virus (HBV), as to the means of transmission 98.3% considered blood transmission, 82.6% plates and cutlery, 15.6% cough and 12.3% vertical transmission. Most students (87.4%) knew that they should take 3 doses of the vaccine and 62.2% completed the immunization schedule. A minority of students (48.6%) knew about the Anti-HBs test and 5.6% took the test.

Previous study by Sandesh et al., (2011) in Bangladesh about awareness of HBV, 85% of the respondents were aware of HBV. Setia et al., (2013) reported that all respondents were aware of hepatitis B virus, while an average of 88% had been vaccinated against HBV infection. In a similar study by Taylor et al., (2005) 81% of the respondents had heard of hepatitis B virus and 67% reported HBV testing, majority of the participants knew that HBV can be transmitted during sexual intercourse, by sharing toothbrushes and by sharing razors. However Trevisan et al., (2002) reported HBV vaccination awareness of only 30.5% among university employee.

Deficient knowledge on infection with the HBV in a female population has been linked to high level of HBV prevalence, especially regarding its prevention in horizontal transmission. A study by Oi Ka et al., (2012) concludes that misconceptions about HBV transmission are still common among the pregnant women, and there is a need for the provision of correct and appropriate information among the obstetric group for the control of HBV infection.

In Nigeria, study carried out among operating staffs showed that majority (86.8%) of the them, had the awareness of the existence of Hepatitis B vaccine, 83.8% of respondents believed that the vaccine should be given to the operating room personels, as part of work place safety measures, 78.9% of respondents believed that Hepatitis B vaccine is safe and 81.1% would recommend it to another staff (Emeka et al., 2011), however study carried out in Ibadan shows lower level of hepatitis B virus infection knowledge, where 76% of all women had inadequate knowledge about hepatitis B virus infection; 19.5% had been screened, while 9.7% had been

vaccinated, the study concluded that there is inadequate knowledge, previous screening and vaccination among pregnant women in Ibadan (Adeyemi et al., 2013).

2.15 PREVENTION OF HEPATITIS B VIRUS INFECTIONS

Prevention of HBV is by strict adherence to standard microbiological practices and techniques, routine use of appropriate barrier precautions to prevent skin and mucous membrane exposure when handling blood and other body fluids of all patients in health-care settings as well as pre-exposure vaccines. Prevention is a safeguard against epidemic of viral hepatitis, by knowing facts, having proper awareness and attitudes, the menace of this disease can be prevented to a great extent (Razi et al., 2010). Hepatitis B virus preventive strategies include primary prevention of new infections (vaccines and post-exposure prophylaxis), secondary prevention of HBV transmission by appropriate sexual and sanitary practices and tertiary prevention of the effects of chronic HBV by anti-viral treatment. Three main strategies are available for the prevention of HBV infection, these includes; behavior modification to prevent disease transmission, passive immunoprophylaxis and active immunization.

2.15.1 Behavior modification

These involve changes in practices that predispose to HBV infection, such as changes in risk factors associated with HBV infection and improved screening measures of blood and blood products to reduce the risk of transfusion associated hepatitis. In developed countries behavior modification is more beneficial, than in developing countries where neonates and children in early childhood are at the greatest risk of acquiring infection.

2.15.2 Passive immunoprophylaxis

Passive immunoprophylaxis for prevention of HBV infection is recommended for newborns of mothers infected with hepatitis B virus, unvaccinated infants whose primary caregivers have acute hepatitis B virus infection, sexual contacts of people with acute hepatitis B virus infection, after occupational exposure, after sexual exposure, after liver transplantation and for people without immunity who have been occupationally exposed to HBsAg-positive blood (Van Herck et al., 2008). Hepatitis B Immune Globulin (HBIG) is used for passive immunization against HBV infection. It is a sterile solution of ready-made antibodies against hepatitis B virus, which is

prepared from blood of donors with high level of antibodies to HBV. Hepatitis B immune globulin plus hepatitis B vaccine has been reported to be superior to hepatitis B vaccine alone and adverse events associated with prophylaxis are minor and uncommon (Lee et al., 2006). Both combinations results in higher than 90% level of protection against perinatal acquisition of HBV (Colin et al., 2006), although 3.7% to 9.9% of infants still acquire HBV infection perinatally from their HBV - positive mothers, despite immunoprophylaxis (Wang et al., 2003), these may be due to utero transmission of HBV infection, perinatal transmission related to a high inoculum, or the presence of surface gene escape mutants.

2.15.3 Active Immunoprophylaxis

Active immunization is by vaccination with hepatitis B vaccine. The first-generation hepatitis B vaccine, an inactive plasma-derived vaccine, was first commercially prepared and became available in the United States in the year 1982 while the second generation of HBV vaccine, a DNA recombinant HBV vaccine became available for general use between the year 1986 and 1989 (Zanetti et al., 2008). After the introduction of recombinant vaccines and the subsequent drop in cost of the plasma derived vaccines, the WHO set a goal in 1992 for all countries to introduce the HBV vaccine into their national routine infant immunization programs by 1997. By 2006, 162 of 193 countries had introduced the vaccine into their national infant immunization schedules. As of 2008, 177 countries had incorporated the vaccine as part of their national infant immunization program and an estimated 69% of all newborns had received all 3 doses of the HBV vaccine (CDC, 2008). In 2010, the WHO recommended universal administration of a birth dose regardless of the level of endemicity (WHO, 2010). As of 2006, 81 of 193 countries (42%) reported using a vaccination schedule with a birth dose; however, only 36% of all newborns in highly endemic countries and 27% of newborns worldwide received a birth dose (CDC, 2006) due to missing data from logistical and financial issues. The CDC also recommended hepatitis B vaccination for adults with diabetes; household and sexual contacts of people with chronic hepatitis B virus infection; healthcare workers and other people at increased risk for hepatitis B virus exposure due to occupational, behavioural, medical factors and international travellers to countries with high or intermediate hepatitis B virus infection rates (CDC, 2012).

CHAPTER THREE
METHODOLOGY

3.1 Study design: Hospital based cross sectional study

3.2 Study location: This study was carried out in two public secondary health facilties in Ibadan metropolis. Adeoyo Maternity Teaching Hospital Yemetu, located in Ibadan North and Jericho Specialist hospital, located in Ibadan South West.

Adeoyo Maternity Teaching Hospital is a specialized secondary health facility located at Adeoyo- Oje Road in Ibadan North Local government of Oyo State. It is a state owned general hospital founded in 1927 to cater for indigenous masses. It is highly patronized by Ibadan residents especially those of low and middle socio-economic status, and also serves as a referral center for many primary health centers and private clinics within Ibadan and its environs. It is a major provider of maternal care in Ibadan and South western Nigeria. It has an annual pregnant women booking rate of about 6500 and an annual delivery rate of about 4000. The hospital has about 100 beds, and it has a labour room, two lying in ward, antenatal ward, postnatal ward, main and minor theatre, gynaecology clinic, gynaecology ward, antenatal clinic, immunization clinic, family planning clinic, special care baby unit, pharmacy unit, physiotherapy unit, radiology unit, medical records department and a functional laboratory unit (Adeoyo maternity teaching hospital archive, 2014).

Jericho Specialist hospital is also a state owned health facility founded in the year 1976. It is located at Ward 8, Aleshinloye in Ibadan South West local government of Oyo State. It is an hospital with specialization in Family Medicine. It has an annual booking rate of about 2,000 and an annual delivery rate of about 1300. The hospital has 30 beds and it has a radiology unit, antenatal clinic, labour ward, postnatal ward, male ward, female ward, laboratory, physiotherapy unit and a medical record department (Jericho specialist hospital archive, 2014).

3.3 Study population:

The study populations are pregnant women at first booking for antenatal care in the hospitals.

3.4 Exclusion criteria: Those excluded from the study included pregnant women that were too sick to participate in the study and those who refuse to participate

3.5 Sample size determination

The sample size is derived using the statistical formula for estimating single proportion,

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

Where: Zα = two tailed test with an α of 0.05 = 1.96

P = Proportion of interest P =11.5% (●konko and Udeze., 2011)

q = 1-p ; 1- 0.115 =0.885

d = 0.04

Therefore,

$$\frac{1.96^2 \times 0.115 \times 0.885}{0.04^2}$$

=244 Subjects

Adjusting for non response rate $N = \frac{n}{NR}$

Where NR is Non response at 10%

$$\frac{244}{1-0.1} = 271 \text{ subjects}$$

3.6 Sampling technique

Two stage sampling technique

Stage 1

Two public secondary health facilities were randomly selected by balloting from the list of the six secondary health facilities, in the local governments within Ibadan metropolis which are (Ibadan North; Adeoyo Maternity teaching hospital. Ibadan North East; Aremo St Peter's General hospital. Ibadan North West; Jericho Nursing Home. Ibadan South East; None. Ibadan South West; Jericho Specialist Hospital, Ringroad State Hospital and Oni Memorial General Hospital. Figure 3.1 Distribution of Secondary health facilities in Ibadan Metropolis)

The selected secondary health facilities were Adeoyo Maternity teaching hospital in Ibadan North local government and Jericho Specialist hospital in Ibadan South West.

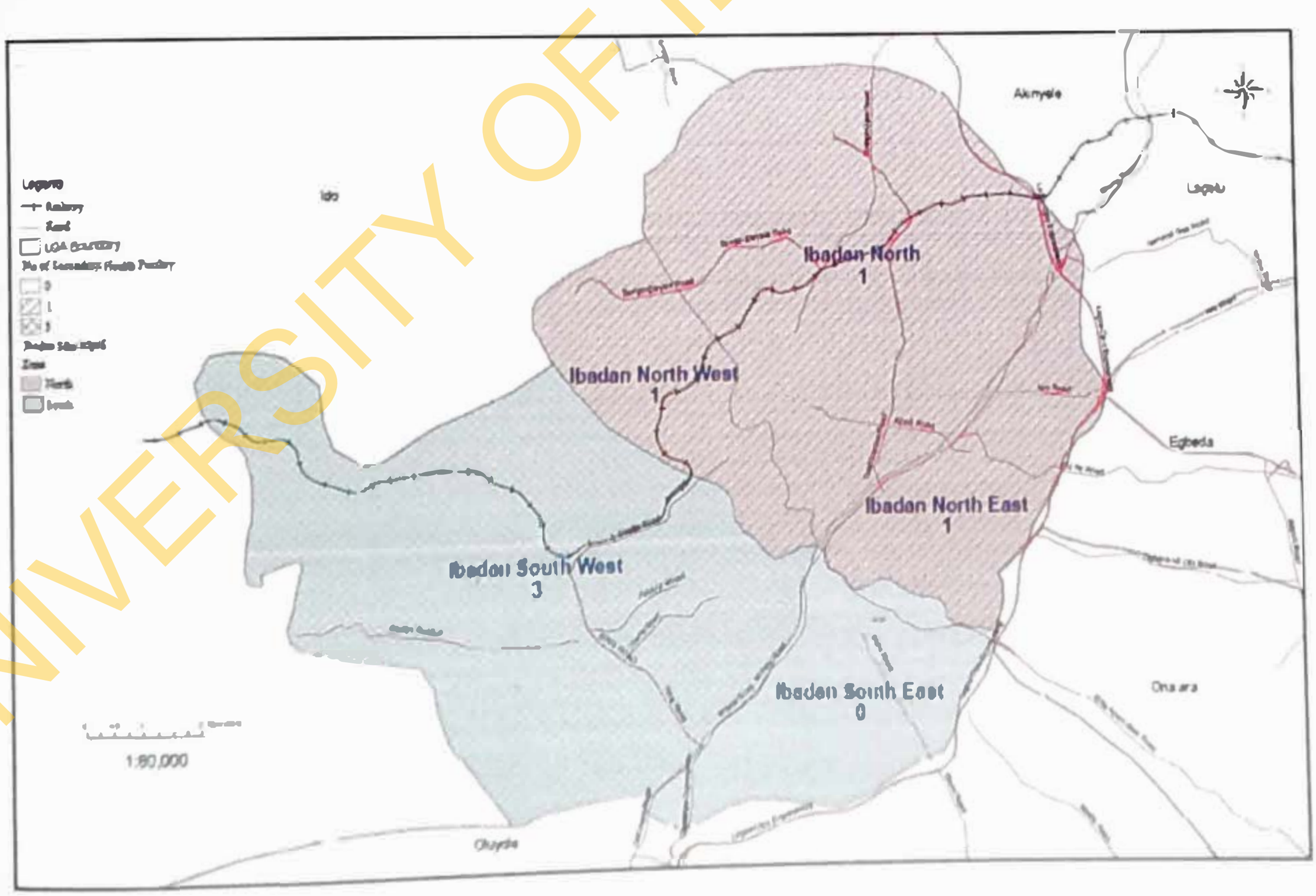


Figure 3.1 Distribution of Secondary health facilities in Ibadan Metropolis (Mapped using ArcGIS 9.3)

Stage 2

The study participants from each health facility were proportionately allocated based on the total number of pregnant women from the antenatal records within a 6 months period.

Selecton of study participants from each facility using proportionate sampling:

$$Pa = \frac{n_0 \times n_i}{N}$$

Where n_0 = The record for each health facility within a 6months period

n_i = The sample size for the study

N= The total number of antenatal record for both facilities within a 6months period.

For Adeoyo Maternity Teaching Hospital Yemetu, Ibadan, the total number of pregnant women at first booking in the antenatal clinic within January 2014- June 2014 was 2,706.

Thus: $\frac{2706 \times 271}{3471}$

= 211 Subjects from Adeoyo Maternity Teaching Hospital Yemetu, Ibadan.

For Jericho Specialist Hospital Jericho, Ibadan, the total number of pregnant women at first booking in the antenatal clinic within January 2014- June 2014 was 765.

Thus: $\frac{765 \times 271}{3471}$

=60 Subjects from Jericho Specialist Hospital Jericho, Ibadan.

Total sampling of all consenting pregnant women attending antenatal clinic for first booking within a one month period (1st December to 31st December) were enrolled as respondents and tested to detect the periodic prevalence of HBV.

3.7 Study variables

Dependent variable – Hepatitis B virus (Hepatitis B surface Antigen seropositive status).

Independent variables – Socio demographic variables such as; occupational risk, age, education and family type. Life style which includes sharing of sharp object and personal items, (such as toothbrush, shaving stick, razor blade, needles, and clippers), injecting drug abusers, alcohol intake, cigarette smoking. Sexual behaviour such as multiple sexual partners. Clinical history such as recipient of blood or blood components, history of sexually transmitted diseases, history of surgical operation. Obstetric details such as parity, gravidity, contraceptive / family planning methods, history of circumcision, history of abortion, age at first sexual intercourse. Awareness of hepatitis B virus, screening and vaccination. Knowledge of hepatitis B virus infection in which 11 questions were used to access the knowledge of the respondents. Total score obtainable was 11, score above 6 or equal to 6 was categorized as good knowledge and score below 6 was categorized as poor knowledge.

3.8 Data collection methods

Semi- structured Questionnaire

- A pre- tested, semi - structured, interviewer administered questionnaire was administered, with questions to obtain social demographic information, obstetric history and risk perception associated with hepatitis B virus infection. Awareness of hepatitis B virus, screening and vaccination and assessment of knowledge on Hepatitis B virus infection were also obtained. The questionnaire was pre- tested among 35 pregnant women for first booking at the antenatal clinic of the University College hospital, Ibadan.

Hepatitis B surface antigen (HBsAg) Screening test

- 3mls of blood samples was collected asceptically by vein puncture into EDTA bottles.
- Hepatitis B surface antigen (HBsAg) test was carried out, using in vitro diagnostic strip designed for the qualitative determination of HBsAg in human serum or plasma (One step Hepatitis B Surface Antigen test strip, a chromatographic immunoassay, ABON).
- Principle of test: The test strip membrane is pre coated with anti- HBsAg antibodies on the test line region of the strip, the serum or plasma specimen reacts with the particle

coated with anti HBsAg. The mixture migrates upward on the membrane chromatographically by capillary action to react with anti- HBsAg antibodies on the membrane and generate a coloured line. The presence of this coloured line in the test region indicates a positive result, while its absence indicates a negative result.

- Test procedure:
  - (i) The blood samples were centrifuged at 3,600rpm for 5 minutes to separate the plasma.
  - (ii) Test strip was dip in the plasma of each study participant.
  - (iii) Test strip was also dip in the control sample, and subsequently for each batch of assay.
  - (iv) Test strip for both the study participant sample and control sample were read after 10 mins, with single band on a test strip (control band) indicating HBsAg negative, while double bands (control and test band) indicating HBsAg positive.
- HIV status of subjects was got from the routine antenatal screening result.

3.9 Data Management

The researcher checked for missing data and inconsistencies in the questionnaires collected on a daily basis and a coding guide was developed to facilitate data entry. Each questionnaire was numbered and coded. Data was carefully entered, cleaned regularly to detect and correct errors. All analysis was done using Statistical Package for the Social Sciences (SPSS) version 20.0 Statistical significant results were interpreted at 5% level or less.

3.10 Data analysis

Frequency, percentage, charts, mean and standard deviation were used to summarise the socio-demographic characteristics, obstetrics characteristics, risk factors, prevalence of HBV, prevalence of HIV-HBV co infection, awareness and knowledge of hepatitis B virus, screening and vaccination.

Chi square (cross tabulation) was performed to test for associations between socio- demographic characteristics, obstetrics characteristics, risk factors, awareness and knowledge of hepatitis B virus, screening, vaccination and hepatitis B virus infection.

Multivariable analysis (binary logistic regression) was further used to measure the strength of association between the variables (independent) found to be significant in the chi –square test, as well as control for confounders.

3.11 Ethical consideration:

Ethical approval was sought from the Ethics Review Committee of the Oyo State Ministry of Health and informed consent was sought from all participants.

- **Confidentiality of Data:**
  All data acquired during the process of the research was kept confidential. The questionnaire did not bear any identity of the participants. Confidentiality of data was maintained through coding, storage and archiving.

- **Translation of Protocol to local language for easy communication:**
  The Questionnaire was translated to Yoruba language which is the local language in the study area.

- **Beneficence to participants:**
  The participants had access to free Hepatitis 'B' surface Antigen Screening.
  Results of the screening with the consent of the subjects were reported with results of routine antenatal screening to enable proper management of HBsAg positive pregnant women and prevention of Hepatitis B virus infection in the unborn child.

- **Non Maleficence to Participants:**
  No harm was done to participants as a result of the research. Blood samples were collected with professional's guideline and safety precautions were observed.

- **Right to Decline / Withdrawal from study without loss of benefits:**
  The participants had the right to withdraw from the research, with no consequences for doing so.

CHAPTER FOUR

RESULTS

4.1 Socio- demographic characteristics of study participants

Table 4.1 shows the socio - demographic characteristics of the study participants. The mean age of the study participants was 28.75 ± 5.21years. Of the total respondents, 229 (61.9%) were in the age group 25-34 years, while 60 (16.2%) were of the age group 35 years and above. Majority were married (87.0%) and were in monogamous relationships (81.6%). About half (49.7%) of the pregnant women were business women/ traders. Over 90% were of the Yoruba ethnic group, while 187 (50.5%) had secondary education as their highest level of education

TABLE 4.1: Percentage distribution of study participants by socio demographic characteristics

Variables	Frequency	Percentages
Age group		
Below 25 years	81	21.9
25 – 34 years	229	61.9
35 years and above	60	16.2
Marital Status		
Not married	48	13.0
Married	322	87.0
Ethnic group		
Yoruba	341	92.2
Others	29	7.8
Religion		
Christianity	171	46.2
Islam	168	53.5
Traditional	1	0.3
Education		
No education/ Primary	43	11.6
Secondary	187	50.5
Tertiary	140	37.8
Occupation		
Student/Unemployed/Housewife	42	11.4
Health worker/teacher	92	24.9
Business/Trader	184	49.7
Artisan	52	14.1
Family type		
Monogamous	302	81.6
Polygamous	68	18.4

4.1.2 Obstetrics and reproductive health characteristics of the study participants

From table 4.2, One hundred and fourteen (30.8%) were primagravida, while more than half were multigravida 216 (58.4%). Sixty three (17%) of the respondents had history of induced abortion. About two-thirds (248 (67.0%) o f the women were in the second trimester. One hundred and seventy two (46.5%) had previously use contraceptives/ family planning methods, while 43 (17.2%) had experience complications in previous pregnancies. One hundred and eighty women (48.9%) had a history of circumcision. Sixteen of the respondents (4.4%) had a history of sexually transmitted disease while 26 (7.2%) had a history of blood transfusion.

TABLE 4.2: Percentage distribution of study participants by obstetrics and reproductive health characteristics

Variables	Frequency	Percentages
Previous pregnancy/ pregnancies		
Yes	250	67.6
No	120	32.4
Gravidity		
Primagravida	114	30.8
Multigravida	216	58.4
Grand multigravida	40	10.8
Parity		
Nulliparity	141	38.1
Primiparity	87	23.5
Multiparity	135	36.5
Grand multiparity	7	1.9
Pregnancy loss/ Miscarriage		
Yes	25	65.8
No	13	34.2
History of Induced abortion		
Yes	63	17.0
No	307	83.0
Gestational age		
First trimester	44	11.9
Second trimester	248	67.0
Third trimester	78	21.1
Previous use of contraceptive/ family planning		
Yes	172	46.5
No	195	53.1
Complications in previous pregnancies		
Yes	43	17.2
No	207	82.8
History of Circumcision		
Yes	180	48.9
No	120	32.6
Don't know	68	18.5
History of Sexually transmitted disease		
Yes	16	4.4
No	350	95.6
Age at first sexual Intercourse		
Less than 18yrs	67	18.2
19-24 yrs	200	54.2
Greater than 24yrs	102	27.6

4.1.3 Percentage distribution of pregnant women by risky lifestyles

The table 4.3 below shows some risky lifestyles reported by the respondents 6 months prior to the study, as well as history of surgery and blood transfusion. Among the study participants 65 (17.6%) shared razor blade, 35 (9.5%) shared needles, 16 (4.3%) drank alcohol, 3 (0.8%) injected drugs, while 5 (1.4%) smoked cigarettes. Seventy four (20.1%) of the women shared tooth brush and 29 (7.9%) shared shaving stick. An overwhelmingly majority (98.1%) had one sexual partner and (98.9%) did not use tattoos.

TABLE 4.3: Percentage distribution of pregnant women by risky lifestyles

Variable	Frequency	Percentages
Share toothbrush		
Yes	74	20.1
No	295	79.9
Share shaving stick		
Yes	29	7.9
No	340	92.1
Share razor blade		
Yes	65	17.6
No	304	82.4
Share needles		
Yes	35	9.5
No	334	90.5
Share clipper		
Yes	11	3.0
No	358	97.0
Alcohol consumption		
Yes	16	4.3
No	353	95.7
Smoke cigarette		
Yes	5	1.4
No	364	98.6
Inject drugs		
Yes	3	0.8
No	366	99.2
Number of sexual partners		
One	359	98.1
More than one	7	1.9
Apply tattoo/ incision		
Yes	4	1.1
No	366	98.9
History of surgical operation		
Yes	36	10.0
No	324	89.8
History of blood transfusion/blood products		
Yes	26	7.2
No	335	92.8

4.2 Prevalence of hepatitis B virus among pregnant women

Table 4.4 shows the prevalence of hepatitis B virus among pregnant women

Of the total 370 study participants, 35 (9.5%) tested positive for hepatitis B surface antigen, while 335 (90.5%) tested negative.

TABLE 4.4: Prevalence of hepatitis B virus among pregnant women

	Frequency	Percentage (%)
Positive	35	9.5
Negative	335	90.5
Total	370	100

4.2.1 Prevalence of Hepatitis B virus according to each hospital

Table 4.5 presents the prevalence of hepatitis B virus among the pregnant women in each of the hospitals. Of the total 370 study participants, 296 of the study participants were for antenatal booking in Adeoyo maternity teaching hospital, while 74 were for booking at Jericho specialist hospital. Twenty eight (9.5%) of the pregnant women for first booking in Adeoyo maternity teaching hospital tested positive for hepatitis B surface antigen, while 268 (90.5%) tested negative. Seven (9.5%) of the total 74 study participants in Jericho specialist hospital tested positive to hepatitis B surface antigen, while 67 (90.5%) tested negative for hepatitis B surface antigen. Hepatitis B virus prevalence was 9.5% for both hospitals.

Table 4.5: Prevalence of hepatitis B virus according to each hospital

	Hepatitis B		
Name of hospital	**Negative**	**Positive**	**Total**
Adeoyo maternity teaching hospital	268 (90.5%)	28(9.5%)	296 (100%)
Jericho specialist hospital	67 (90.5%)	7(9.5%)	74(100%)

4.3: Prevalence of HIV -Hepatitis B virus co infection

Table 4.6 shows the prevalence of HIV -Hepatitis B virus co infection among the study participants. Of the study participants who were reactive for HIV, 3 (21.4%) were co infected with Hepatitis B virus. Three fifty six pregnant women were non reactive to HIV virus, out of which 32 (9%) tested positive to hepatitis B virus.

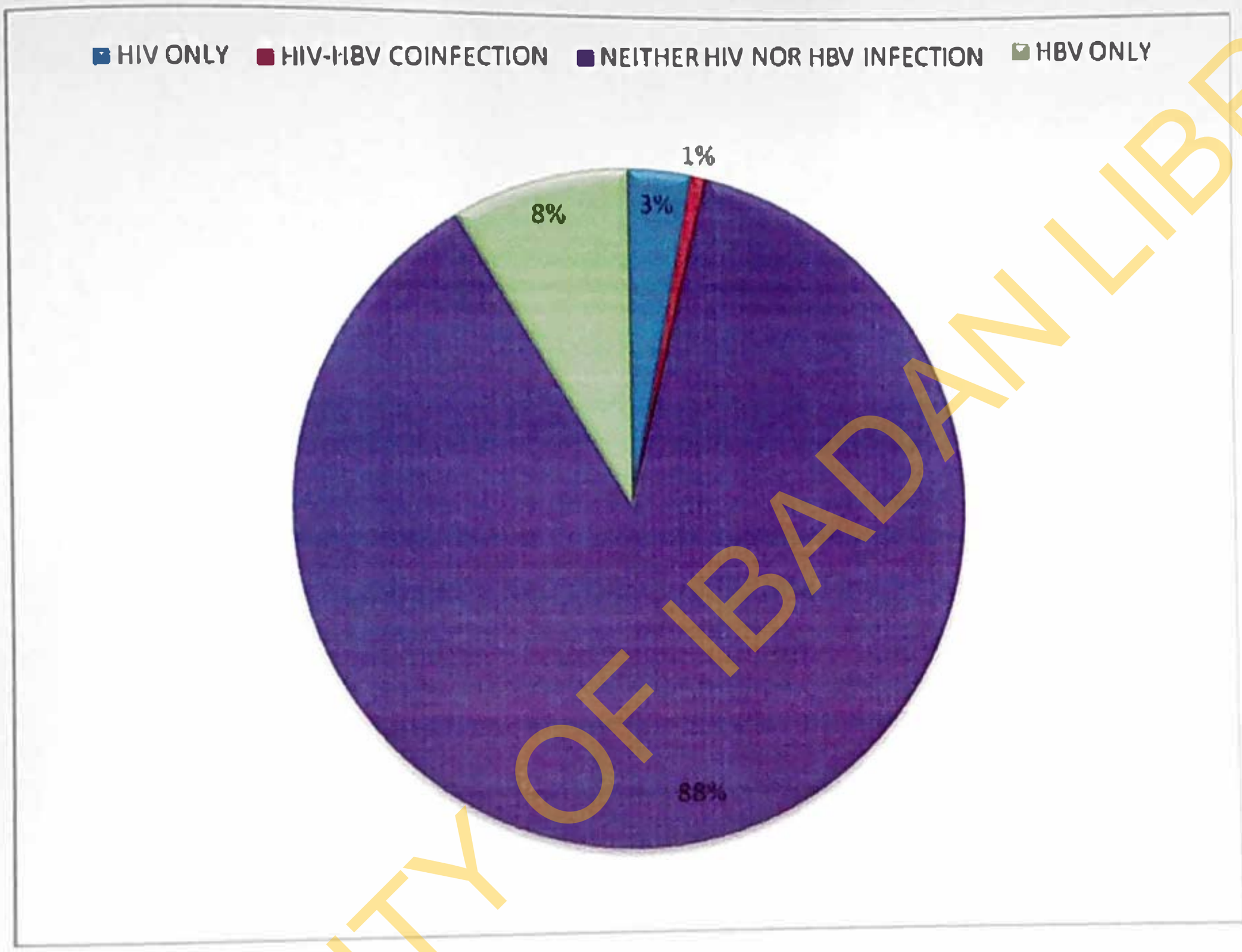
TABLE 4.6: Prevalence of HIV - Hepatitis B virus co infection

	Hepatitis B virus		
N (%)	Positive	Negative	Total
Hiv reactive	3 (21.4)	11(78.6)	14 (100.0)
Hiv non reactive	32 (9)	324 (91.0)	356 (100.0)
Total	35(9.5)	335 (90.5)	370 (100.0)

4.3.1 Pattern of HIV- Hepatitis B virus co infection

Figure 4.1 shows the pattern of HIV- HBV co infection among the total study participants. A total of 3 (0.8%) of the total respondents were co infected with both HIV and Hepatitis B virus.

Figure 4.1: Pie chart showing the pattern of HIV- HBV co infection among the total study participants.



4.4 Awareness about hepatitis B virus, screening and hepatitis B virus vaccination among the respondents

Table 4.7 shows awareness of hepatitis B virus, screening and hepatitis B virus vaccination among the respondents. About a quarter of the study population had heard about hepatitis B virus 91 (24.6%), hepatitis B virus screening 96 (26.0%) and hepatitis B virus vaccination 105 (28.6%).

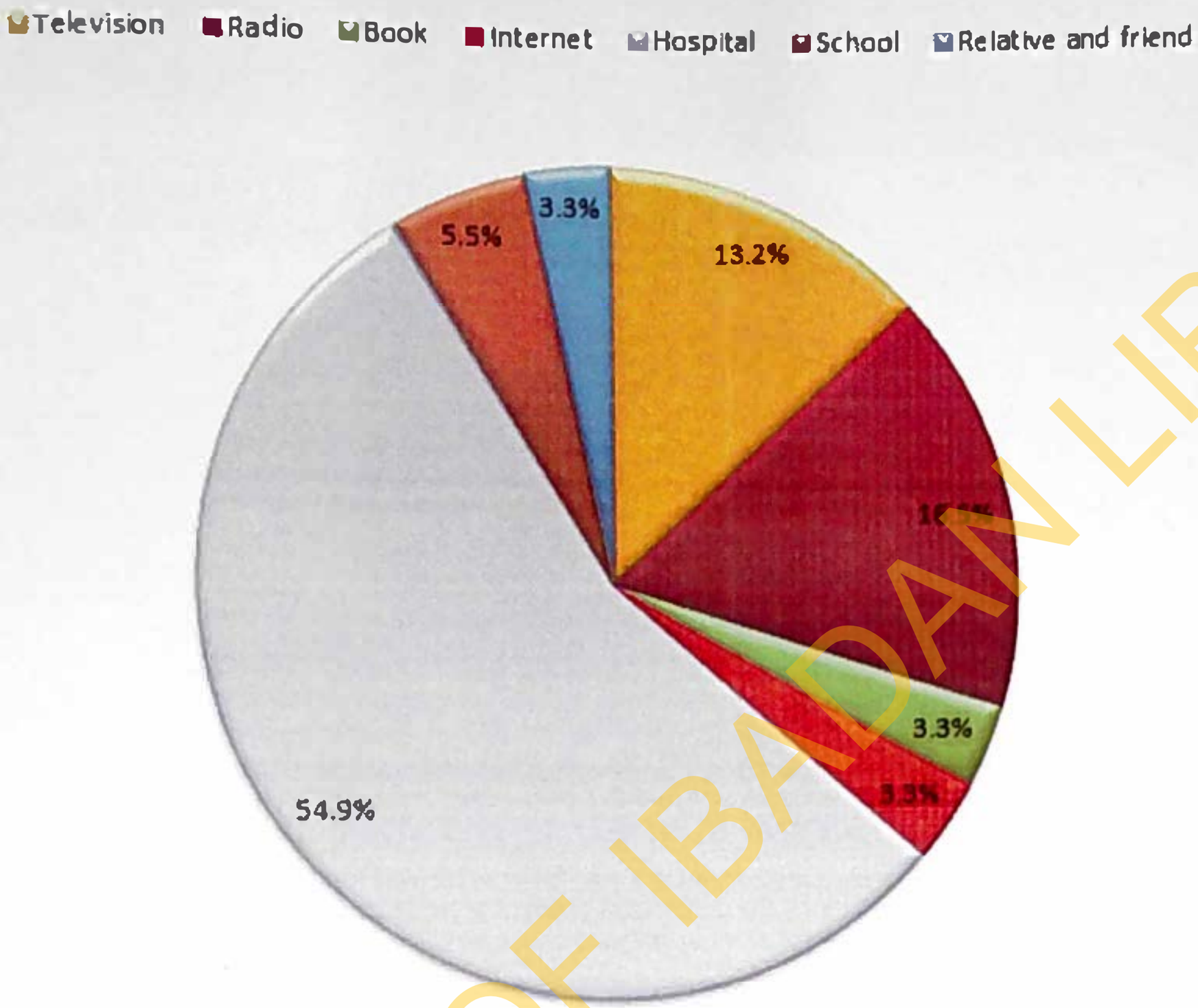
TABLE 4.7: Awareness about hepatitis B virus, screening and hepatitis B virus vaccination among the respondents

Variables	Frequency	Percentages
Ever heard of Hepatitis Viruses		
Yes	143	38.6
No	227	61.4
Total	**370**	**100**
Ever heard of Hepatitis B Virus		
Yes	91	24.6
No	279	75.4
Total	**370**	**100**
Ever heard of Hepatitis B virus screening		
Yes	96	26.0
No	273	74.0
Total	**369**	**100**
Ever heard of Hepatitis B Virus vaccination		
Yes	105	28.6
No	262	71.4
Total	**367**	**100**

4.4.1 Source of information on hepatitis B virus among the respondents

Figure 4.2 shows the source of information on Hepatitis B virus among the respondents. The source of information on hepatitis B virus were from hospital 50 (54.9%), radio 15 (16.5%), School 5 (5.5%), 12 (13.2%) from television and others 3 (3.3%).

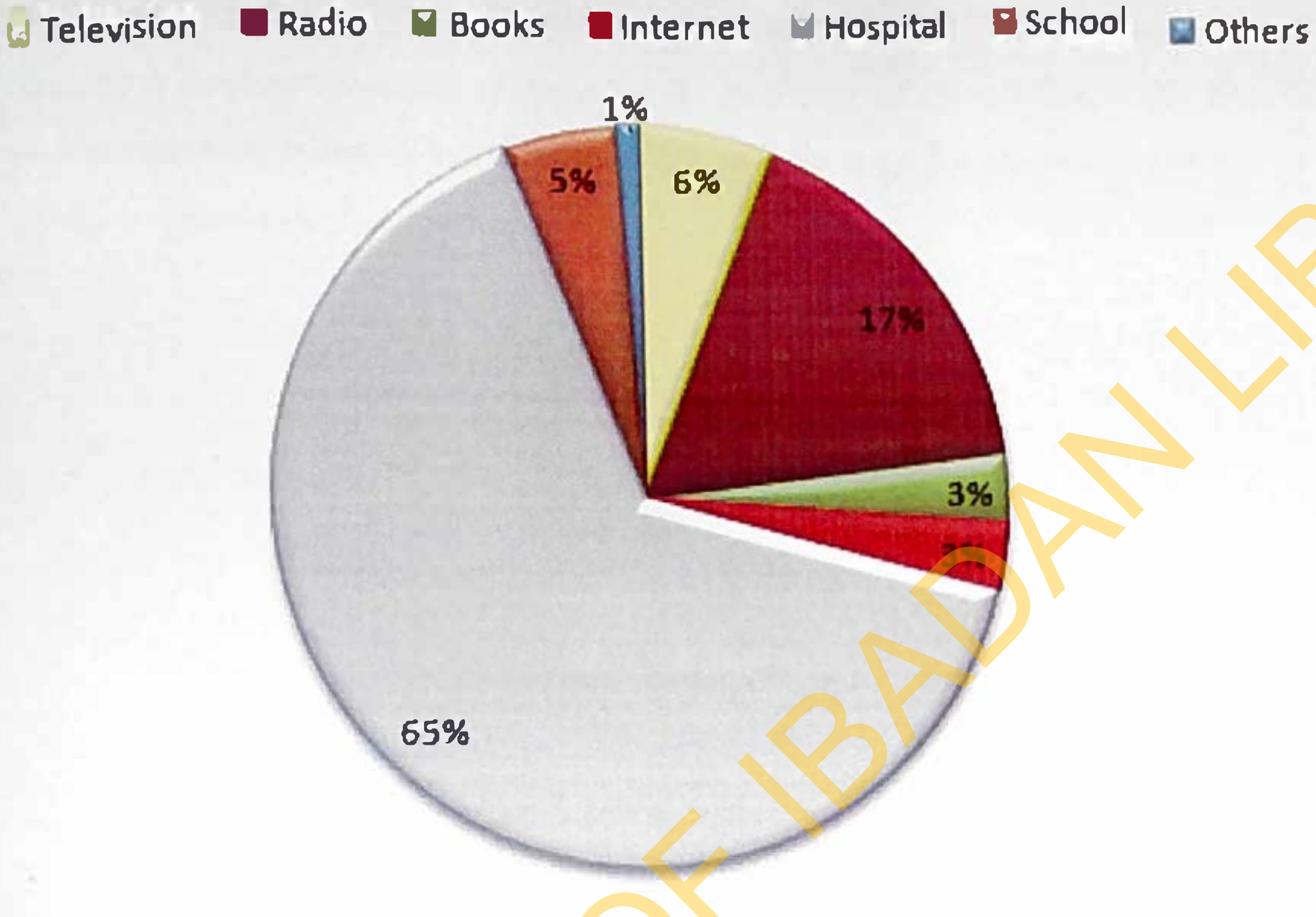
Figure 4.2 Source of information on Hepatitis B virus among the respondents



4.4.2 Source of information on hepatitis B virus vaccination among the respondents

Figure 4.3 shows the source of information on Hepatitis B virus among the respondents. The source of information on hepatitis B virus vaccination were from radio17 (17%), hospital 65 (65%), television 6 (6.0%), school 5 (5.0%) and others 3(3.0%).

Figure 4.3: Source of information on hepatitis B virus vaccination among the respondents



4.4.3 Hepatitis B virus screening among the study participants

Table 4.8 shows Hepatitis B virus screening practices among the study participants. Only 45 (12.2%) of the total respondents have been screened for hepatitis B virus. Nine (20%) respondents were screened as prerequisite for wedding, while 6 (13.3%) were screened as prerequisite for medical fitness. Majority of the respondents 216 (67.7%) have not been screened because they have never heard of hepatitis B virus/ lack of knowledge, while 8 (2.5%) have not been screened due to fear, 24 (7.5%) claimed no time to go for screening, while 11 (3.4%) have not been screened due to screening fee.

Table 4.8 Hepatitis B virus screening among the study participants

Variable	Frequency	Percentages
Ever been screened for Hepatitis B virus		
Yes	45	12.2
No	324	87.8
Total	**369**	**100**
Reasons for undergoing Hepatitis B screening		
Personal decision	10	22.2
Prerequisite for wedding	9	20.0
During an illness	2	4.4
As prerequisite for medical fitness	6	13.3
Antenatal booking/Pregnancy	18	40.0
Total	**45**	**100**
Reasons for not been screened		
Never heard of hepatitis B screening/ Lack of knowledge	216	67.7
Screening fee	11	3.4
Non challant attitude	15	4.7
Fear	8	2.5
No time to go for screening	24	7.5
I have never been sick	38	11.9
Others	7	2.2
Total	**319**	**100**

4.4.4 Screening/ test carried out during antenatal care in previous pregnancies

Table 4.9 identifies the screening/ test carried out during antenatal care in previous pregnancies. Of the 225 respondents who sought antenatal care in their previous pregnancy/ pregnancies, HIV screening was carried out among 192 (85.3%) women, while hepatitis B virus screening was carried out in only 31 (13.8%) of the women.

Table 4.9 Screening/ test carried out during antenatal care in previous pregnancies

Variable	Frequency	Percentage
Sought antenatal care in previous pregnancy/ pregnancies		
Yes	225	91.5
No	21	8.5
***Screening/test carried out on you during antenatal in your previous pregnancy**		
Human Immunodeficiency Virus (HIV)	192	85.3
Hepatitis B virus	31	13.8
Hepatitis C virus	12	5.3
PCV (Anaemia)	208	92.4
Genotype	195	86.6
Blood Group	193	85.7
Urine analysis	209	92.8

*Multiple responses

4.4.5 Uptake of hepatitis B virus vaccination among the study participants

Table 4.10 shows details of hepatitis B virus vaccination uptake among the study participants. Only 22 (6%) of the respondents have received hepatitis B virus vaccination among whom 4 (18.2%) received the vaccine from non-governmental organization and 17 (77.3%) from hospital. Ten (45.5%) of the respondents received the vaccine to personally protect themselves, while 5 (22.7%) received the vaccine because they got it free of charge. Two hundred and fifty seven (75.5%) of the respondents who have not received the vaccine was because they never knew of the existence of HBV vaccine/ lack of knowledge, 18 (5.3%) had no time to go for vaccination.

Table 4.10 Uptake of hepatitis B virus vaccination among the study participants

Variable	Frequency	Percentages
Ever received Hepatitis B Virus vaccine		
Yes	22	6.0
No	342	94.0
Total	364	100
Place where vaccine was received		
Hospital	17	77.3
Non-governmental Organization	4	18.2
School	1	4.5
Total	22	100
Reason for receiving the vaccine		
Personally decided to protect myself	10	45.5
Medical practitioners/others told me to receive the vaccine	5	22.7
Because am at risk/exposure to the infection	1	4.5
Got the vaccination free of charge	5	22.7
The vaccine was brought to me	1	4.5
Total	22	100
Reason for not receiving the vaccine		
Never knew of the existence of the vaccine/ Lack of knowledge	257	75.5
Vaccine fee	9	2.6
Non challant attitude	21	6.1
Am not at risk/expose	33	9.6
No time to go for vaccination	18	5.3
Others	3	0.9
Total	341	100

4.5 Knowledge of hepatitis B virus infection among pregnant women

Table 4.11 shows the assessment of knowledge on hepatitis B virus infection among the pregnant women. Only 32 (35.2%) had good knowledge of hepatitis B virus infection out of the total 91 respondents who had heard of hepatitis B virus .

TABLE 4.11 Knowledge of hepatitis B virus infection among pregnant women

Variable	Frequency	Percentage
Knowledge of Hepatitis B Virus Infection		
Poor (score < 6)	59	64.8
Good (score ≥ 6)	32	35.2
Total	91	100

4.6 Association between sociodemographic characteristics and prevalence of hepatitis B virus among the study participants.

Table 4.12 shows the association between the socio- demographic variables and the occurrence of hepatitis B virus infection among the study participants. Type of marriage (p= 0.036) and ethinicity (p= 0.005) were significantly associated with the occurrence of HIV. The proportion of women with HBV (24.1%) was significantly higher among women with polygamous relationships (16.2%) as compared with those in monogamous relationships (7.9%). Similarly, women who belong to other ethnic group (Ibo, Hausa, Ebira) had higher prevalence of HBV.

Table 4.12 Socio demographic profile and prevalence of hepatitis B virus

Variables	Hepatitis B virus			X^2	P-Value
	Positive N (%)	Negative N (%)	Total N (%)		
Age group					
Below 25 years	11 (13.6)	70 (86.4)	81(100)	2.310	0.315
25 – 34 years	18 (7.9)	211(92.1)	229(100)		
35 years and above	6 (10.0)	54 (90.0)	60(100)		
Marital Status					
Not married	5 (10.4)	43 (89.6)	48(100)	0.059	0.808
Married	30 (9.3)	292 (90.7)	322(100)		
Ethnic group					
Yoruba	28 (8.2)	313 (91.8)	341(100)	7.916	0.005
Others	7 (24.1)	22(75.9)	29(100)		
Education					
Below secondary school	4 (9.3)	39 (90.7)	43(100)	0.012	0.994
Secondary	18 (9.6)	169 (90.4)	187(100)		
Tertiary	13 (9.3)	127 (90.7)	140(100)		
Occupation					
Student/unemployed	3 (7.1)	39 (92.9)	42(100)	0.625	0.891
Health worker/teacher	9 (9.8)	83 (90.2)	92(100)		
Business/trader	19 (10.3)	165 (89.7)	184(100)		
Artisan	4 (7.7)	48 (92.3)	52(100)		
Family type					
Monogamous	24 (7.9)	278 (92.1)	302(100)	4.389	0.036
Polygamous	11 (16.2)	57 (83.8)	68(100)		

4.6.1 Obstetrics characteristics and prevalence of hepatitis B virus

Table 4.13 shows the association between obstetrics characteristics of respondents and prevalence of hepatitis B virus.

There was a significant association between the use of contraceptive / family planning and infection with hepatitis B virus. (p= 0.019). Out of the 172 women with previous use of contraceptive /family planning, 23(13.4%) had HBV compared to 12 (6.2%) that tested positive to HBV among those that do not use contraceptive.

There was a significant association between condom use and infection with hepatitis B virus (p= 0.040). Sixteen (17.4%) of the respondents who used condom tested positive to HBV compared to 6 (7.1%) that tested positive to HBV among those that do not use condom.

Likewise, there was a significant association between injectable contraceptive use and occurrence of hepatitis B virus ((X^2 = 7.574, p= 0.006). There was no significant association between the remaining obstetrics characteristics of the respondents and the occurrence of hepatitis B virus infection.

TABLE 4.13 Obstetrics characteristics and prevalence of hepatitis B virus

Variables	Hepatitis B virus			X^2	P-value
	Positive N (%)	Negative N (%)	Total N(%)		
Ever been pregnant before your current pregnancy					
Yes	21 (8.4)	229 (91.6)	250(100)	1.010	0.315
No	14 (11.7)	106 (88.3)	120(100)		
Number of pregnancy					
Primagravida	14 (12.3)	100 (87.7)	114(100)	1.531	0.216
Others	21(8.2)	235 (91.8)	256(100)		
Number of deliveries					
Nulliparity	14 (9.9)	127 (90.1)	141(100)	0.059	0.809
Others	21(9.2)	208 (90.8)	229(100)		
History of Induced abortion					
Yes	3 (4.8)	60 (95.2)	63(100)	1.956	0.162
No	32 (10.4)	275 (89.6)	307(100)		
Gestational age					
First trimester	5 (11.4)	39 (88.6)	44 (100)	3.648	0.162
Second trimester	27 (10.9)	221 (89.1)	248 (100)		
Third trimester	3(3.8)	75(96.2)	78(100)		
History of STI					
Yes	2 (12.5)	14 (87.5)	16(100)		0.658*
No	33 (9.4)	317 (90.6)	350(100)		
Previous use of contraceptive/ family planning					
Yes	23 (13.4)	149 (86.6)	172 (100)	5.519	0.019
No	12 (6.2)	183 (93.8)	195 (100)		
Complications in previous pregnancies					
Yes	1 (2.3)	42 (97.7)	43(100)		0.138*
No	20 (9.7)	187 (90.3)	207(100)		
Age at first sexual intercourse					
Less than or equal to 19 years	10 (10.1)	89 (89.9)	99 (100)	0.060	0.807
Greater than or equal to 20 years	25 (9.3)	245 (90.7)	270(100)		
Condom Use					
Yes	16 (17.4)	76 (82.6)	92 (100)	4.217	0.040
No	6 (7.1)	78 (92.9)	84(100)		
Injectable Contraception Use					
Yes	0 (0.0)	41 (100.0)	41(100)	7.574	0.006
No	22 (16.2)	114 (83.8)	136(100)		

*Fisher's exact test

4.6.2 Association between risky lifestyles and prevalence of hepatitis B virus

Table 4.14 shows details of association between some risky lifestyles of study participants and the occurrence of hepatitis B virus infection among the study participants. There was no significant association between any of the risky lifestyle, history of surgery, history of blood transfusion and occurrence of HBV.

TABLE 4.14 Risky lifestyles and prevalence of hepatitis B virus

Variable	Hepatitis B virus			X^2	P-value
	Positive N (%)	Negative N (%)	Total N (%)		
Share toothbrush					
Yes	6 (8.1)	68 (91.9)	74 (100)	0.204	0.651
No	29 (9.8)	266 (90.2)	295 (100)		
Share shaving stick					
Yes	2 (6.9)	27 (93.1)	29 (100)	0.246	0.620
No	33 (9.7)	307 (90.3)	340 (100)		
Share razor blade					
Yes	8 (12.3)	57 (87.7)	65 (100)	0.732	0.392
No	27 (8.9)	277 (91.1)	304 (100)		
Share needles					
Yes	3 (8.6)	32 (91.4)	35 (100)	0.038	0.846
No	32 (9.6)	302 (90.4)	334 (100)		
Share clipper					
Yes	2 (18.2)	9 (81.8)	7 (100)	0.999	0.318
No	33 (9.2)	325 (90.8)	358 (100)		
Did you drink alcohol					
Yes	0 (0.0)	16 (100.0)	16 (100)	1.753	0.186
No	35 (9.9)	318 (90.1)	353 (100)		
Did you smoke cigarette					
Yes	0 (0.0)	5 (100.0)	5 (100)		1.000*
No	35 (9.6)	329 (90.4)	364 (100)		
Do you inject drugs					
Yes	0 (0.0)	3 (100.0)	3 (100)		1.000*
No	35 (9.6)	331 (90.4)	366 (100)		
History of blood transfusion/ blood products					
Yes	1(3.8)	25(96.2)	26(100)	1.095	0.295
No	34(10.1)	301(89.9)	335(100)		
History of surgery					
Yes	1(2.8)	35(97.2)	36(100)	2.188	0.335
No	33(10.2)	291(89.8)	324(100)		

*Fisher's exact test

4.6.3 Awareness of hepatitis B virus and vaccination, screening for HBV and receiving HBV vaccine with prevalence of hepatitis B virus

Table 4.15 shows the association between awareness of hepatitis B virus, awareness of HBV vaccination, screening for HBV and receiving HBV vaccine with occurence of hepatitis B virus infection.

Eight (8.8%) study participants out of the 91 who have heard of hepatitis B virus tested positive to HBV and 27(9.7%) out of the 279 who had never heard of hepatitis B virus also tested positive to HBV. There was however no significant association between awareness of hepatitis B virus and hepatitis B virus infection ($p = 0.802$).

Eleven (10.5%) study participants who have heard of hepatitis B virus vaccination were positive to hepatitis B virus. Twenty four (9.2%) tested positive to HBV among those who have never heard of the vaccine, there was no significant association between awarenss of hepatitis B virus and occurrence of hepatitis B virus infection ($p= 0.698$).

Two (4.4%) of those that have ever screened for HBV tested positive to the virus and 33(10.2%) of those that have never screened for HBV also tested positive. There was no significant association between screening for hepatitis B virus and hepatitis B virus infection ($p = 0.218$).

Three (13.3%) of study participants who have received hepatitis B virus vaccination tested positive to HBV and 32 (9.4%) of those that have not received HBV vaccine tested positive. There was however no significant association between recieving hepatitis B virus vaccine and hepatitis B virus infection ($p = 0.457$).

TABLE 4.15 Awareness of hepatitis B virus and vaccination, screening for HBV and receiving HBV vaccine with prevalence of hepatitis B virus

Variables	Hepatitis B virus			X^2	P-value
	Positive N (%)	Negative N (%)	Total N (%)		
Ever heard of Hepatitis B Virus					
Yes	8 (8.8)	83 (91.2)	91(100)	0.063	0.802
No	27 (9.7)	252 (90.3)	279(100)		
Ever heard of Hepatitis B Virus vaccination					
Yes	11 (10.5)	94 (89.5)	105 (100)	0.150	0.698
No	24 (9.2)	238 (90.8)	262 (100)		
Ever screened for Hepatitis B virus					
Yes	2 (4.4)	43 (95.6)	45 (100)	1.517	0.218
No	33 (10.2)	291 (89.8)	324 (100)		
Have you received Hepatitis B Virus vaccine before					
Yes	3 (13.6)	19 (86.4)	22 (100)	0.436	0.457
No	32 (9.4)	310 (90.6)	342(100)		

4.6.4 Knowledge of hepatitis B virus infection and prevalence of hepatitis B virus

Table 4.16 presents information on the association between knowledge of hepatitis B virus infection and prevalence of hepatitis B virus. Of the total respondents, those with poor knowledge of HBV were 59, out of which 4(6.8%) were positive to HBV. Of those with good knowledge, 3 (9.4%) tested positive to HBV. However there was no significant association between knowledge of hepatitis B virus infection among the study participants and being infected with hepatitis B virus. (p=0.657).

TABLE 4.16: Knowledge of hepatitis B virus infection and prevalence of hepatitis B virus

Variables	Hepatitis B virus			X^2	P-value
	Positive N (%)	Negative N (%)	Total N (%)		
Knowledge of Hepatitis B Virus Infection					
Poor knowledge	4 (6.8)	55 (93.2)	59(100)	0.197	0.657
Good knowledge	3 (9.4)	29 (90.6)	32(100)		

4.7 Result of binary logistic regressions analysis

Table 4.17 shows binary logistic regression done to investigate further, association with hepatitis B virus infection and other characteristics. The table shows that women in polygamous family type were about 13 times more likely to have hepatitis B virus infection than those of monogamous family type (OR = 13.280, 95% C.I = 2.678-65.853, p= 0.002). There was no significant association between complication in pregnancy, history of abortion, condom use and hepatitis B virus infection controling for other characteristics. The table also shows that respondents who were of the Yoruba tribe were about 18 .5 times less likely to have hepatitis B virus infection than those of other tribes (OR = 0.054, 95% C.I = 0.003-0.969, p= 0.048).

TABLE 4.17 Binary logistic regression analysis on hepatitis B virus

Variables	OR	p-Value	95% C.I
Ethnic group			
Yoruba	0.054	**0.048**	0.003-0.969
Others*			
Condom			
Yes	3.448	0.130	0.695-17.116
No*			
Complication in pregnancy			
Yes	0.657	0.724	0.064-6.758
No*			
Family Type			
Polygamous	13.280	**0.002**	2.678-65.853
Monogamous*			
History of Abortion			
Yes	0.477	0.449	0.070-3.240
No*			

TABLE 4.17 Binary logistic regression analysis on hepatitis B virus

Variables	OR	p-Value	95% C.I
Ethnic group			
Yoruba	0.054	0.048	0.003-0.969
Others*			
Condom			
Yes	3.448	0.130	0.695-17.116
No*			
Complication in pregnancy			
Yes	0.657	0.724	0.064-6.758
No*			
Family Type			
Polygamous	13.280	0.002	2.678-65.853
Monogamous*			
History of Abortion			
Yes	0.477	0.449	0.070-3.240
No*			

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 DISCUSSION

Hepatitis B virus infections remain a public health problem, especially in developing countries despite the availability of vaccination since about 25 years ago. Without preventive measures, most newborns of HBV positive mothers are at risk of infection through perinatal transmission. HBV infection in these group results mostly in chronic infection due to their immune status, and hence large number of HBV chronic carriers in the population and in adulthood. Preventive measures against perinatal transmission of HBV, can only be put in place when the HBV status of pregnant women are known, to enable the provision of Hepatitis B Immunoglobulin and hepatitis B virus vaccination within 12- 24 hours after birth. Routine screening of all pregnant women for Hepatitis B virus is essential to prevent HBV infection through perinatal route among their children.

5.1.1 Prevalence of hepatitis B virus Infection

The findings of this research is similar to the studies on maternal HBV infection in Hong Kong which reported a prevalence of 10% (Kwan et al., 1997), and also similar to a prevalence of 9.4% reported by Ola et al., (2008) among butchers in Ibadan and a gender related prevalence of 9.5% among females in Keffi by Aliyu et al., (2010). The prevalence of hepatitis in this study was higher than several studies among pregnant women; Batool et al., (2004) reported a prevalence of 6.5% in Iran; Olokoba et al., (2011) with a prevalence of 8.2% from Yola; Pennap et al., (2011) reported a prevalence of 6.67% in Keffi; Esan et al., (2014) reported prevalence of 6.78% in Ido Ekiti, and a prevalence of 2.89% was reported by (Obi et al., 2006) in Porthacourt. The prevalence in this study was also lower than some other studies among pregnant women; Olatunji et al., (2012) reported a prevalence of 16.5% in Osogbo, Adeyemi et al., (2013) reported a prevalence of 16.3% in Ibadan, Olumuyiwa et al., (2014) reported a prevalence of 12.7% in Ilorin, Okonko and Udeze (2011) reported a prevalence of 11.5% in Ibadan and a prevalence of 12.5% was reported by Ugbegbor et al., (2011) from Benin. This shows that some part of Nigeria have a lower HBV prevalence than that found in Ibadan, while HBV prevalence in other parts of

Nigeria are higher than that of this study. These differences in HBV prevalence in different part of Nigeria may be due to location differences in policies to enhance preventive interventions, as well as differences in lifestyle, risky behavours and socio cultural variations in different localities and regions of the country.

5.1.2 Prevalence of HIV- HBV Co- infection

The lower prevalence of HIV- HBV co infection in this study was similar to a lower prevalence of 1. 5% among pregnant women as reported by Santiago-munoz et al., (2005) from Texas, USA. The lower prevalence obtained by Santiago-munoz et al., (2005) may be as a result of low endemicity of HBV in the area of North America. The 0.8% HIV-HBV co infection in this study was higher than 0.3% co infection prevalence reported by Okonko et al., (2012) among sexually active adults in Ibadan. However, this result was lower than those of several studies, Tremeau et al., (2012) reported HIV-HBV co infection of 7.9%. in Abuja; Adesina et al.,(2010) reported co infection of 8.9% among pregnant women in Ibadan, Ekanem et al., (2013) reported co infection of 12.1% in Uyo, 7.4% co infection was reported in South Africa by Hoffman et al., (2014); and a report of 4.2% co infection among pregnant women in Lagos (Oliver et al., 2014). Although the prevalence of HIV infection only 14 (3.7%) in this study is consistent with the 3.6% estimate of 2009 in Nigeria (Tremeau et al., 2012), the 0.8% prevalence of HIV and HBV co infection in this study was not in line with several studies. These may be due to the fact that most HIV- HBV co infection studies were carried out primarily among HIV patients, while this study was carried out among apparently healthy pregnant women.

5.1.3 Awareness of hepatitis B virus, screening and vaccination, and knowledge about Hepatitis B virus infection

This study showed that the awareness of hepatitis B virus is low among the pregnant women, only 24.6% pregnant women have heard about hepatitis B virus. The result of this finding is far lower than HBV awareness of 81% reported by Taylor et al., (2005) among men and women in Vietnamese. This may be due to high health literacy in developed countries compared to developing countries. as well as low level of education among the study participants as more than half 50.5% of them had secondary school certificate as their highest level of education.

The awareness of hepatitis B virus screening in this study was 26.0%, and only 12.2% of the respondents have ever been screened for HBV. The report of this study is consistent with those of Ytje et al., (2010) which reports a previous test rate of 15% among migrants in Turkey and Adeyemi et al., (2013) in which 19.5% of the pregnant women in Ibadan had been previously screened for HBV, this may be as a result of low HBV awareness in this regions, and thus among the study population. It was however not in line with Taylor et al., (2005) which reports 67% previous HBV screening among men and women in Vietnamese, this may be as a result of the local and national HBV educational campaigns in Vietnamese in the past years and probably due to the routine screening for HBV among pregnant women in developed countries.

The awareness of HBV vaccination among the total respondents was 28.6%. The result of this research is similar to Trevisan et al., (2002) that reported HBV vaccine awareness of 30.5% among university employee. Sandesh et al., (2011) however reported an 85% awareness of hepatitis B virus vaccination. Setia et al., (2013) also reported that the level of health literacy is high among health workers, with HBV vaccination awareness of 87.3% among medical interns and nursing interns in India. Awareness of HBV vaccination in this study is low, even among women who might have had more frequent contact with the health system. The low HBV awareness may be linked to insufficient education in antenatal clinics, post natal clinics and in immunization clinics, these calls to question the quality of health information given to pregnant women in antenatal clinics. The low HBV vaccination awareness may also be due to the low level of education among the women as only 37.8% of them had tertiary education.

Likewise only 6.0% participants of this study have been previously vaccinated against HBV. Similarly, Adeyemi et al., (2013) in a study among pregnant women in Ibadan reported that only 9.7% women had been previously vaccinated, this may be as a result of low HBV vaccination awareness in this area. However the result of these findings is higher than the 3% previous vaccination reported by Ytje et al., (2010), and is not in line with Trevisan et al., (2002) which reported 30.5% previous vaccination.

Surprisingly 13.6% of the respondents who claimed to have received HBV vaccine tested positive to HBsAg. The results of this findings was lower but similar to reports of Olatunji et al.,(2011) which found that 37.5% of pregnant women with history of HBV vaccine in Osogbo

tested positive to HBsAg, this may be due to various reasons, including lost of potency of the vaccine.

5.1.3.4 Knowledge of hepatitis B virus infection

Adeyemi et al., (2013) found that over 76% of pregnant women had inadequate knowledge of HBV, similarly assessment of knowledge on hepatitis B virus infection among pregnant women in this study reveals that only 35% of those that have heard of HBV had good knowledge of HBV infection. Almost 65% of the pregnant women who have heard of HBV in this study, had poor knowledge of HBV infection, this is also in line with the findings of ●i ka et al., (2012) among pregnant women in which over 75% of the respondents had wrong information of HBV transmission. The poor knowledge of HBV infection among the women is worrisome as 54.9% of the women got the source of information on HBV from hospital, this calls to question the quality of HBV health education in health facilities. The findings of this study however contrast that of Rajiv et al., (2010) which reported correct knowledge of hepatitis B virus infection (59.23 %) among students in India. This may be due to information and education on HBV infection in the country. This finding is also not in line with reports of Christiana et al., (2015) with reports of good knowledge (65.2%) among health care workers in Ibadan.

5.1.4 Factors associated with Hepatitis B virus infection among pregnant women.

This study showed statistical significance between family type and hepatitis B virus infection. Women in polygamous relationships were at higher risk of HBV infection as they were 13 times more likely to have hepatitis B virus infection than women in monogamous relationship. Findings from this study are similar to those of Olatunji et al., (2011) which reported highest positivity of HBsAg (22.2%) among pregnant women with polygamous family as compared to those in monogamous family (15.9%) in Osogbo. Findings from this study are higher, but in line with Rabiu et al., (2010) who reported that pregnant women with multiple sexual partners were 2.02 times more likely to have HBV infection in Lagos, as well as Lia et al., (2002) which reported a 1.5 times higher risk of HBV among people with multiple sexual partners in Brazil. probabily because the women in polygamous relationships may have sexual connectivity with other persons due to sexual networking among the partners of polygamous relationship.

This study also found that ethnic group was associated with hepatitis B virus infection. Respondents who were of the Yoruba tribe were about 18 .5 times less likely to have hepatitis B virus infection than those of other tribe. These findings are similar but higher to the 2.97 higher risk of HBV infection observed among Chinese group compared to the Malayan ethnic group in Central Jarkata, Indonesia (Nurul et al., 1997). This may be due to the socio-cultural differences among the various ethnic groups in Nigeria. The result of this study did not agree with that of Prier and Cowan, (1987), which reported no association between ethnicity and prevalence of hepatitis B virus infection among US Army in Europe.

5.2 Conclusion

Hepatitis B virus infection is a major public health problem. Mother to child transmission of hepatitis B virus (HBV) is a major route of transmission in developing countries and an important mode of maintaining chronic infection of HBV in endemic areas such as Ibadan. Preventive measures against perinatal transmission of HBV can only be established when the HBV status of pregnant women are known. This is important to ensure provision and availability of Immunoprophylaxis, and its administration within 12 hours of birth as recommended for newborns of HBV positive mothers, so as to reduce the rate of HBV transmission.

The prevalence of hepatitis B virus was found to be 9.5% in this study, which indicate Ibadan as an area of HBV high endemicity. The HIV-HBV co infection was 0.8%. The level of awareness on hepatitis B virus was 24.6%, screening 26.0%, vaccination 28.6%, and 35.2% had good knowledge of hepatitis B virus infection among the study participants. Family type (polygamy) and ethnicity (non Yoruba ethnic groups) were found to be risk factors for hepatitis B virus infection.

5.3 Recommendations

1. Prevalence of hepatitis B virus is high, all pregnant women should be screened routinely for hepatitis B virus in all health facilities, to enable timely interventions to prevent infections in newborns of hepatitis B virus positive mothers.

2. Co infection of HIV-HBV occurs among pregnant women. Only HIV screening mostly, without HBV is carried out routinely among pregnant women. Preventive measures and attention directed towards HIV should also be for HBV. Interventions should be targeted towards reducing the effect of HBV on HIV positive pregnant women

3. Awareness and knowledge of HBV is low. There is need to increase awareness and campaign on hepatitis B virus infection, screening and vaccination. There should be more education on HBV during antenatal and postnatal clinic. Awareness and knowledge of HBV should be created through social marketing.

4. Polygamous relationships was found to be at higher risk of HBV infection. Monogamous relationships should be encouraged and people should be advised to keep to one faithful partner. Ethnicity was found to be a risk factor for HBV infection; preventive measures and interventions against HBV should be directed across all ethnic groups in Nigeria.

5.4 Limitations

This study is hospital based thus pregnant women who do not come to hospital for antenatal care was not captured. Furthermore, test for the detection of Hepatitis B virus was limited to Hepatitis B Surface antigen (HBsAg).

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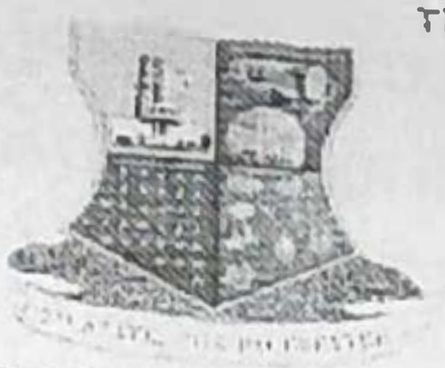
APPENDIX 1

ETHICAL APPROVAL

TELEGRAMS.....

TELEPHONE.....



MINISTRY OF HEALTH

DEPARTMENT OF PLANNING, RESEARCH & STATISTICS DIVISION

PRIVATE MAIL BAG NO. 5027, OYO STATE OF NIGERIA

Your Ref. No. .....

All communications should be addressed to

The Honorable Commissioner stating

Our Ref. No. AD 13/ 479/

December, 2014

The Principal Investigator,
Department of Epidemiology and Medical Statistics,
Faculty of Public Health,
University of Ibadan.
Ibadan.

Attention: Oshundele Bunmi

Ethical Approval for the Implementation of your Research Proposal in Oyo State

This acknowledges the receipt of the corrected version of your Research Proposal titled: "Prevalence and Factors Associated with Hepatitis B Virus (HBV) Infection among Pregnant Women in Selected Secondary Health Facilities in Ibadan."

2. The committee has noted your compliance with all the ethical concerns raised in the initial review of the proposal. In the light of this, I am pleased to convey to you the approval of committee for the implementation of the Research Proposal in Oyo State, Nigeria.

3. Please note that the committee will monitor closely and follow up the implementation of the research study. However, the Ministry of Health would like to have a copy of the results and conclusions of the findings as this will help in policy making in the health sector.

4. Wishing you all the best.

Sola Akande (Dr)
Director, Planning, Research & Statistics
Secretary, Oyo State, Research Ethical Review Committee

APPENDIX 1

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Sola Akande (Dr)
Director, Planning, Research & Statistics
Secretary, Oyo State, Research Ethical Review Committee

APPENDIX 2

INFORM CONSENT AND QUESTIONNAIRE

PREVALENCE AND FACTORS ASSOCIATED WITH HEPATITIS B VIRUS (HBV) INFECTION AMONG PREGNANT WOMEN IN SELECTED SECONDARY HEALTH FACILITIES IN IBADAN.

INFORM CONSENT FORM

My name is Oshundele Bunmi, a postgraduate student at the Department of Epidemiology and Medical Statistics, University of Ibadan. Presently I am undertaking a research on the prevalence and factors associated with hepatitis B virus infection among pregnant women in selected secondary health facilities in Ibadan.

I will like to ask you some questions about your behavior and views on hepatitis B virus infection. Please note that your answers will be kept vey confidential. You will be given a number and your name will not be written on the form, as such, you can never be traced in connection to your response. Your response and that of other respondents will be a tool to solving related problems by other researchers or appropriate health authorities.

During this exercise Hepatitis B surface Antigen screening shall be carried out on the blood sample collected from you. Co infection of Hepatitis B virus and HIV shall also be examined. The result of the screening with your consent shall be utilized to enable proper care for you and your unborn child.

Please, tick the appropriate box below to indicate your willingness to participate.

Would you like to participate? Yes [ ] No [ ]

Signature/thumbprint of Participant ---------- Interview Date ----------

Identification number [ ] Name of Hospital/ No [ ]

SECTION A: SOCIO DEMOGRAPHIC CHARACTERISTICS

1. Age ----------

2. Marital status (a) Single [ ] (b) Married [ ] (c) Cohabiting [ ] (d) Separated [ ]

(e) Divorced [ ] (f) Widowed [ ] (g) others specify ----------

3. Ethnic group (a) Yoruba [ ] (b) Igbo [ ] (c) Hausa [ ] (d) Others specify ----------

4. Religion (a) Christianity [ ] (b) Islam [ ] (c) Traditional [ ] (d) Others specify ----------

5. Family type (a) Monogamous [ ] (b) Polygamous [ ] (c) Others specify ----------

6. Highest level of education (a) None [ ] (b) Primary [ ] (c) Secondary [ ] (d) Tertiary [ ]

(e) Postgraduate [ ] (f) Others Specify----------

7. How many children do you have now? ----------

8. What is your occupation? (a) Health worker [ ] (b) Teacher/ Lecturer [ ] (c) Business / Trader [ ] (d) Artisan [ ] (e) Student [ ] (f) Unemployed /Housewife [ ](g) Others Specify------

9. What is your current income monthly? (a)None [ ] (b) Less than 10,000 [ ] (c) #10,000- #30,000 [ ] (d) #31,000- #50,000 [ ] (e) #51,000- #70,000 [ ] (f) #71,000- #90,000 [ ] (g) Above #90,000 [ ]

SECTION B: OBSTERIC HISTORY

10. What is the gestational age of your current pregnancy? (In weeks)----------

11. Before your current pregnancy, have you ever been pregnant? (a) Yes [ ] (b) No [ ]

12. How many pregnancies have you ever had ? ----------

13. Have you ever given birth? (a) Yes [ ] (b) No [ ]

14. How many deliveries have you ever had? ----------

15. How many of the children are alive? ----------

16. How many of the children died? ----------

SECTION C: AWARENESS OF HEPATITIS B VIRUS, SCREENING, VACCINATION AND ASSESSMENT OF KNOWLEDGE ON HEPATITIS B VIRUS INFECTION.

17. Have you ever heard of Hepatitis virus? (a) Yes [ ] (b) No [ ]

18. Have you ever heard of Hepatitis B virus? (a) Yes [ ] (b) No [ ]

If No to question 18, go to question 22

19. If yes, through what medium did you get your first information about hepatitis B virus

(i) Television (a) Yes [ ] (b) No [ ]

(ii) Radio (a) Yes [ ] (b) No [ ]

(iii) Books (a) Yes [ ] (b) No [ ]

(iv) Internet (a) Yes [ ] (b) No [ ]

(v) Hospital (a) Yes [ ] (b) No [ ]

(vi) School (a) Yes [ ] (b) No [ ]

(vii) Friends and Relatives (a) Yes [ ] (b) No [ ]

(viii) Others specify ----------

20. What are the likely complaints a person with hepatitis B virus infection may have?

(i) Loss of appetite and weakness (a) Yes [ ] (b) No [ ] (c) Don't know [ ]

(ii) Vomiting (a) Yes [ ] (b) No [ ] (c) Don't know [ ]

(iii) Sneezing and Catarrh (a) Yes [ ] (b) No [ ] (c) Don't know [ ]

(iv) Body aches and Fever (a) Yes [ ] (b) No [ ] (c) Don't know [ ]

(v) Dark urine (a) Yes [ ] (b) No [ ] (c) Don't know [ ]

(vi) Yellowing of skin and eyes (a) Yes [ ] (b) No [ ] (c) Don't know [ ]

21. Hepatitis B virus can be transmitted through which of the following means? (Please tick the correct options below)

(i) Infected blood transfusion (a) Yes [ ] (b) No [ ] (c) Don't know [ ]

(ii) Infected needles, syringes, shaving sticks and blades (a) Yes [ ] (b) No [ ] (c) Don't know [ ]

(iii) Sexual intercourse (a) Yes [ ] (b) No [ ] (c) Don't know [ ]

(iv) Infected pregnant women to her unborn child (a) Yes [ ] (b) No [ ] (c) Don't know [ ]

(v) Food and water (a) Yes [ ] (b) No [ ] (c) Don't know [ ]

22. Have you ever heard of hepatitis B virus screening? (a) Yes [ ] (b) No [ ]

23. Have you ever been screened for Hepatitis B virus? (a) Yes [ ] (b) No [ ]

If No, go to question 25

24. If Yes, why did you go for hepatitis B virus Screening?(a)Personal decision [ ](b) Prerequisite for wedding[ ] (c)During an illness [ ] (d) Was forcefully screened [ ] (e) My spouse had hepatitis so I got screened [ ] (f) As part of requirement for medical fitness (Employment/ Admission/ Travelling)[ ] (g) Antenatal Booking/ Pregnancy [ ] (h)Others specify----------

25. If No, why have you not been screened? (a) Never heard of hepatitis B virus screening / Lack of knowledge [ ] (b) Screening fee [ ] (c) Non challant attitude [ ] (d) Fear [ ] (e) No Time to go for screening [ ] (f) I have never been sick [ ] (g) Others Specify----------

{Skip questions 26-28 if this is your first pregnancy}

26. Did you seek antenatal care during your previous pregnancy/ pregnancies? (a) Yes[ ] (b) No[ ]

If No, go to question 29

27. Where did you receive antenatal care during your previous pregnancy/ pregnancies?

(i) Federal Government Hospital	(a) Yes [ ]	(b) No [ ]
(ii) State Government Hospital	(a) Yes [ ]	(b) No [ ]
(iii) Private Hospital	(a) Yes [ ]	(b) No [ ]
(iv) Primary Health Center	(a) Yes [ ]	(b) No [ ]
(v) Traditional Birth Attendant	(a) Yes [ ]	(b) No [ ]
(vi) Mission House/ Religious houses	(a) Yes [ ]	(b) No [ ]
(vii) At home	(a) Yes [ ]	(b) No [ ]

(vii) Others Specify----------

28. Which of the following screening/ test was carried out on you during antenatal in your previous pregnancy/ pregnancies?

		YES	NO	DON'T KNOW / CANT REMEMBER
I	Human Immunodeficiency virus (HIV)			
II	Hepatitis B virus			
III	Hepatitis C virus			
IV	PCV (Anaemia)			
V	Genotype			
VI	Blood Group			
VII	Urine analysis			

29. Have you ever heard of hepatitis B virus vaccination? (a) Yes [ ] (b) No [ ]

If No, go to question 31

30. Through which medium did you get your first information about hepatitis B virus vaccination? (a) Television [ ] (b) Radio [ ] (c) Books [ ] (d) Internet [ ] (e) Hospital [ ] (f) School [ ] (g) Others specify ----------

31. Have you received hepatitis B virus vaccine before? (a) Yes [ ] (b) No [ ]

If No, go to question 34

32. If yes, where did you receive the vaccine? (a) Hospital [ ] (b) Non-Governmental Organization [ ] (c) Church [ ] (d) Mosque [ ] (e) School [ ] (f) Others Specify----------

33. What was your reason for receiving the vaccine? (a) Personally decided, to protect myself [ ] (b) Medical practitioners/ others told me to receive the vaccine [ ] (c) Because am at risk/ expose to the infection [ ] (d) Got the vaccination free of charge [ ] (e) The vaccine was brought to me [ ] (f) I was forced to receive the vaccine [ ] (g) Others Specify----------

34. If No, why haven't you received the vaccination? (a) Never knew of the existence of the vaccine / Lack of knowledge [ ] (b) Vaccine fee [ ] (c) Non challant attitude [ ] (d) Am not at risk/ expose [ ] (e) No Time to go for vaccination [ ] (f) Others specify----------

SECTION D: OBSTERIC / CLINICAL DETAILS

{Skip questions 35 to 36 if this is your first pregnancy}

35. Did you experience any complication in your previous pregnancy/ pregnancies (a) Yes [ ]

(b) No [ ]

If No, go to question 37

36. If yes, which of these complications did you experience in your previous pregnancy?

(i) Gestational Diabetes	(a) Yes [ ]	(b) No [ ]
(ii) Ectopic Pregnancy	(a) Yes [ ]	(b) No [ ]
(iii) Pregnancy Loss /Miscarriage	(a) Yes [ ]	(b) No [ ]
(iv) Preterm labour (before 37weeks)	(a) Yes [ ]	(b) No [ ]
(v) Low Birth Weight	(a) Yes [ ]	(b) No [ ]
(vi) Rhesus Negative Diseases	(a) Yes [ ]	(b) No [ ]
(v) High Blood Pressure	(a) Yes [ ]	(b) No [ ]

(vi) Anaemia in Pregnancy

(vii) Jaundice in Pregnancy (a) Yes [ ] (b) No [ ]

(viii) Others Specify (a) Yes [ ] (b) No [ ]

---

37. Any previous use of contraceptive/ family planning methods? (a) Yes [ ] (b) No [ ]

If No, go to question 39

38. If yes, which type of contraceptive/ family planning have you used? (Please tick as applies to you from below)

(i) Oral birth control Pills (a) Yes [ ] (b) No [ ]

(ii) Injectable Contraception (a) Yes [ ] (b) No [ ]

(iii) Condom (a) Yes [ ] (b) No [ ]

(iv) Intrauterine device (Copper T) (a) Yes [ ] (b) No [ ]

(v) Emergency Contraception (Postinor) (a) Yes [ ] (b) No [ ]

(vi) Implants (a) Yes [ ] (b) No [ ]

(vii) Others specify (a) Yes [ ] (b) No [ ]

---

39. Have you ever been circumcised? (a) Yes [ ] (b) No [ ] (c) Don't know [ ]

40. Have you undergone any form of surgical operation in the past? (a) Yes [ ] (b) No [ ]

41. Do you have any history of induced abortion? (a) Yes [ ] (b) No [ ]

42. Have you ever been admitted in the hospital? (a) Yes [ ] (b) No [ ]

43. Do you have a history of the conditions below? (Please tick as applies to you from below)

(i) Sickle Cell disease (a) Yes [ ] (b) No [ ]

(ii)Jaundice (a) Yes [ ] (b) No [ ]

(iii)Sexually transmitted diseases (a) Yes [ ] (b) No [ ]

(iv) Diabetes (a) Yes [ ] (b) No [ ]

(v) Hypertension (a) Yes [ ] (b) No [ ]

(vi) Human Immunodeficiency Virus (HIV) (a) Yes [ ] (b) No [ ]

(vi) Others specify

SECTION E: RISK PERCEPTIVE ASSOCIATED WITH HEPATITIS B VIRUS INFECTION (Please tick the questions below on behaviour and habits)

44. In the last Six months did you share any of the items listed below?

(i) Tooth brush (a) Yes [ ] (b) No [ ]

(ii) Shaving stick (a) Yes [ ] (b) No [ ]

(iii) Razor blade (a) Yes [ ] (b) No [ ]

(iv) Needles (a) Yes [ ] (b) No [ ]

(v)Clipper (a) Yes [ ] (b) No [ ]

45. Do you drink alcohol in the last six months? (a) Yes [ ] (b) No [ ]

46. Do you smoke cigarette in the last six months? (a) Yes [ ] (b) No [ ]

47. Did you inject drugs in the last six months? (a) Yes [ ] (b) No [ ]

48. Does your partner inject drugs? (a) Yes [ ] (b) No [ ]

49.In the last six months did you apply tattoo or incisions on your body? (a)Yes [ ] (b) No [ ]

50. Do you have anyone positive to hepatitis B virus in your household? (a) Yes [ ] (b) No [ ](c) Don't know [ ]

51. Do you have anyone with history of Jaundice in your household? (a) Yes [ ] (b) No [ ](c) Don't know[ ]

52. How many sexual partners did you have in the last six months? ----------

53. Your age at first sexual intercourse? ----------

54. In six months before you became pregnant, did you have sexual intercourse without the use of condom with anyone else apart from your partner? (a) Yes [ ] (b) No [ ]

55. Does your partner have multiple sexual partners? (a) Yes [ ] (b) No [ ] (c) Don't know [ ]

56. Have you received blood transfusion or blood products before? (a) Yes [ ] (b) No [ ]

57. Before you became pregnant have you ever experience any of the following?

i. Vaginal burning/ discomfort (a) Yes [ ] (b) No [ ]

ii. Vaginal itching (a) Yes [ ] (b) No [ ]

iii. Abnormal / offensive vaginal discharge (a) Yes [ ] (b) No [ ]

iv. Lower abdominal pain (a) Yes [ ] (b) No [ ]

58. Did you receive Hepatitis B vaccination as an infant?(a)Yes [ ] (b) No [ ](c) Don't know [ ]

59. Do you have any history of Hepatitis C virus? (a) Yes [ ] (b) No [ ] (c) Don't know [ ]

APPENDIX 3

YORUBA TRANSLATION OF INFORMED CONSENT FORM AND QUESTIONNAIRE

IBEERE

ITANKALE ATI OKUNFA TI O NI NKAN SE PELU IKOLU KOKORO JEDOJEDO B (HEPATITIS B VIRUS (HBV)) LAARIN AWON ABOYUN NI AWON ILE IWOSAN ONI PELE KEJI TI A SA YAN NI INU IBADAN.

FOOMU FUN IFOWOSI

Onikọ mi ni Oshundele Bunmi, akawegboye akeko ni Sakaani ti Imon Arun ati Àlàyé Egbogi, Unifasiti ti Ibadan. Lowoyi, mo nse iwadi lori itankalẹ ati okunfa ti o ni nkan ṣe pẹlu ikolu kokoro jedojedo B (hepatitis b virus (HBV)) laarin awon aboyun ni awon ile iwosan oni pele keji ti a sa yan ni inu ibadan.

Mo fẹ lati beere awon ibeere kan nipa iwuwasi ati ero re lori ikolu kokoro jedojedo b (hepatitis b virus (HBV)). Jọwọ se akiyesi pe idahun re yoo wa ni bonkele. A o fun o ni nomba, oruko re ko si ni si ni ori foomu, nipa bayi, ko si eniti o le mo wipe iwo ni o dahun awon ibeere yi . Esi rẹ ati ti awọn oludahun miiran yio jẹ ohun elo ti awon Olusewadi miran tabi awon ti owa ni idi iseto ilera le lati wa opin si awon isoro ti o fi ara pe eyii.

Nigba ti a nse iwadi yi, a o ye eje re wo dada fun antijeni Ẹdọwíwú B (Hepatitis B surface Antigen). Àjọkolu ti kokoro jedojedo B ati HIV ni ao tun se ayewo re. Awọn esi aba jade ayewo yi ni a le lo fun itoju iwo ati omo inu re ti o ba wu o lati se bee.

Jọwọ, fi ami ti o yẹ si àpótí ti o wa ni isalẹ lati fi ife rẹ han lati kopa.

Ṣe o fẹ lati kopa? Bẹẹni [ ] Beeko [ ]

Ibuwọlu / iteka ti olukopa ----------

Ọjọ iwadi----------

Nomba foomu [ ]

Ile Iwosan / nọmba [ ]

IPIN A: ORO NIPA IGBESI AYE, EYA, ATI IWUWA SI

1. Ojo ori ----------

2. Ipo igbeyawo (a) Apon [ ] (b) ìgbéyàwó [ ] (c) Alajogbe [ ] (d) Pinyà [ ]
(e) ilemoṣu [ ] (f) Opó [ ] (g) Omiran ni pato ----------

3. Eya (a) Yoruba [ ] (b) Igbo [ ] (c) Hausa [ ] (d) Omiran ni pato ----------

4. Esin (a) Kristieniti [ ] (b) Islam [ ] (c) Ibile [ ] (d) Omiran ni pato ----------

5. Iru Ebi (a) Idi igi kan [ ] (b) Idi igi pupọ [ ] (c) Omiran ni pato ----------

6. Ipele ti eko to ga ju (a) Kò si rara [ ] (b) Ile Iwe Alakobere [ ] (c) Ile Iwe Girama [ ] (d) Ile-iwe giga [ ] (e) Atele Ile-iwe giga [ ] (f) Omiran ni pato ----------

7.Iye ọmọ melo lo ni bayi? ----------

8. Ki ni iṣe oojo rẹ? (a) Osise Ilera [ ] (b) Olùkọ / olukọni [ ] (c) Olowo / Oloja [ ] (d) Onise owo [ ] (e) Akeko [ ] (f) Ko ni ise/ Iyawo-ile [ ] (g) Omiran ni pato ----------

9 Kini ni owo oya re oṣooṣu? (a) Kòsi [ ] (b) Kere ju #10,000 [ ] (c) # 10,000- # 30.000 [] (d) # 31,000- # 50.000 [ ] (e) # 51,000- # 70,000 [ ] (f) # 71,000- # 90.000 [ ] (g) Oju # 90.000 lo [ ]

IPIN B: ITAN NIPA OYUN ATI OMO BIBI

10. Oyun inu re yio to bi ose melo bayi ? ----------

11. Ṣaaju ki o to loyun rẹ ti isinyi, nje o ti loyun ri? (a) Bẹẹni [ ] (b) Bẹẹko [ ]

12. Oyun melo lo ti ni ri ? ----------

13. Nje o ti bimo ri ? (a) Bẹẹni [ ] (b)) Bẹẹko [ ]

14. Ikunle ibimo me lo lo ti ni ri? ----------

15. Awọn ọmọ re me lo lo wa laaye? ----------

16. Awọn ọmọ re me lo lo ti ku? ----------

IPIN C: IWADI TI IMO LORI IYEWO ATI AJESARA IKOLU KOKORO JEDOJEDO B (HEPATITIS B VIRUS)

17. Nje o ti gbọ nipa kokoro jedojedo (hepatitis B virus)? (a) Bẹẹni [ ] (b) Bẹẹko [ ]

18. Nje o ti gbọ nipa kokoro jedojedo B (hepatitis B virus)? (a) Bẹẹni [ ] (b) Bẹẹko [ ]

Bi esi re ba je Bẹẹko si Ìbéèrè 18, lọ si Ìbéèrè 22

19. Ti o ba je bẹẹni, nipasẹ ohun alaroye tabi ikede wo ni o ti gbo nipa kokoro jedojedo B (hepatitis B virus)

(i)Telifisonu (a) Bẹẹni [ ] (b) Bẹẹko[ ]

(ii) Radio (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(iii) Iwe Kika (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(iv) Ero Aye lukara (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(v) Ile Iwosan (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(vi) Ile Iwe (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(vii) Ore ati ebi (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(viii) Omiran ni pato ----------

20. Ki ni o le je ohun to o nfi han wipe eniyan ni ikolu kokoro jedojedo B?

(i) Aile jeun ati ailera (a) Bẹẹni [ ] (b) Bẹẹko [ ] (c) nko mọ [ ]

(ii) Eebi (a) Bẹẹni [ ] (b) Bẹẹko [ ] (c)nko mọ [ ]

(iii) Ofinki ati kata (a) Bẹẹni [ ](b) Bẹẹko [ ] (c)nko mọ [ ]

(iv) Ara riro ati iba (a) Bẹẹni [ ](b) Bẹẹko [ ] (c)nko mọ [ ]

(v) Ito Dudu (a) Bẹẹni [ ](b) Bẹẹko [ ] (c)nko mọ [ ]

(vi) Ara pipon ati Oju pipon (a) Bẹẹni [ ](b) Bẹẹko [ ] (c)nko mọ [ ]

21. Kokoro Jedojedo B le wo ara eniyan nipasẹ awọn ọna wọnyi? (Jowo ko ami maaki ti o tọ si awọn asayan isale)

(i) Gbigba eje ti oni arun sara (a) Bẹẹni [ ](b) Bẹẹko [ ] (c)nko mọ [ ]

(ii) Arun lara abere, irun-fifa ati awọn abe (a) Bẹẹni [ ](b) Bẹẹko [ ] (c)nko mọ [ ]

(iii) Ibalopo ajọṣepọ (a) Bẹẹni [ ](b) Bẹẹko [ ] (c)nko mọ [ ]

(iv)Lati ara aboyun si ọmọ inu re (a) Bẹẹni [ ](b) Bẹẹko [ ] (c)nko mọ [ ]

(v) Ounje ati omi (a) Bẹẹni [ ](b) Bẹẹko [ ] (c)nko mọ [ ]

22. Nje o ti gbo nipa ayewo fun kokoro jedojedo B ri? (a) Bẹẹni [ ] (b) Bẹẹko [ ]

23. Nje o ti se ayewo fun Kokoro Jedojedo B ri? (a) Bẹẹni [ ] (b) Bẹẹko [ ]

Ti idahun re ba je Bẹẹko, lọ si Ìbéèrè 25

24.To ba je Bẹẹni, ẽṣe ti iwọ fi lọ fun ayewo Kokoro Jedojedo B?

(a) Ipinnu ara eni [ ] (b) Saaju fun igbeyawo [ ] (c) Nigba aisan [ ] (d) A fi ipa se ayewo fun mi [ ] (e) Oko mi ni Kokoro Jedojedo ni mo se ni lati se ayewo [ ] (f) Gẹgẹ bi ara ti ibeere fun amọdaju ipo ilera ti (Ile iwe / Gbigbani si ise / Irin Ajo) [ ] (g) Itọju fun oyun [ ] (h) Omiran ni pato ----------

25. Ti idahun re ba je Bẹẹko, ẽṣe ti iwọ kò ti se ayewo? (a) Nkò gbo nipa kokoro jedojedo B ri / Ainimo [ ] (b) Owo ati se ayewo po [ ] (c)Ai ni akasi [ ] (d) Ìbẹrù [ ] (e) Ko si asiko lati lọ si fun ayewo [ ] (f) N ko ni aisan ri [ ] (g) Omiran ni pato ----------

{Re ibeere 26-28 kọja ti o ba jẹ akọkọ oyun rẹ ni yi }

26.Nje o wá itọju nigba ti o loyun tẹlẹ? (a) Bẹẹni [ ] (b) Bẹẹko[ ]

Ti idahun re ba je Bẹẹko, lọ si Ìbéèrè 29

27. Nibo ni o ti gba itọju nigba ti o loyun tele?

(i) Ile Iwosan Ijoba apapo (a) Bẹẹni [ ] (b) Bẹẹko[ ]

(ii) Ile Iwosan Ijoba Ipinle (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(iii) Ile Iwosan Aladani (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(iv) Ile Iwosan Ijoba alakoko bere (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(v) Agbebi asa Ibile (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(vi) Ile esin (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(vii) Ni ile (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(vii) Omiran ni pato ----------

28. Ewo ninu awọn ayewo / igbeyewo wọnyi ni a ti se fun o nigba oni oyun ri

		Bẹẹni	Bẹẹko	Mi o mo/ mi o le ranti
I	kokoro (HIV)			
II	kokoro Jedojedo B (Hepatitis B virus)			
III	kokoro Jedojedo C (Hepatitis C virus)			
IV	Ayewo idiwon eje to wa lara (PCV)			
V	Irujini (Genotype)			
VI	Iru ẹjẹ			
VII	Ayewo ito			

29. Nje o ti gbọ nipa abere ajesara kokoro jedojedo B? (a) Bẹẹni [ ] (b) Bẹẹko[ ]

Ti idahun re ba je Bẹẹko, lọ si Ìbéèrè 31

30. Nipasẹ ewo ninu eyi ti o wa nisale yi ni o fi gbo alaye nipa abere ajesara kokoro jedojedo B?

(a) Telifisonu [ ] (b) Radio [ ] (c) Iwe kika [ ] (d) ero aye lu jara [ ] (e) Ile Iwosan [ ] (f) Ile Iwe [ ] (g) Omiran ni pato -------- ----------

31 Ṣé o ti gba abere ajesara kokoro jedojedo B ri ? (a) Bẹẹni [ ] (b) Bẹẹko [ ]

Ti idahun re ba je Bẹẹko , lọ si Ìbéèrè 34

32. Ti o ba je bẹẹni . nibo ni o ti gba ajesara ? (a)Ile Iwosan [ ] (b) Ilese Aladani [ ] (c) Ijọ kritiani [ ] (d) Mossalassi [ ] (e) Ile Iwe [ ] (f) Omiran ni pato ---------- -------

33. Ki ni idi rẹ fun gbigba ajesara ? (a) Tikalarami pinnu , lati dabobo ara mi [ ] (b) Awọn oṣiṣẹ isegun / awọn miran so fun mi lati gba ajesara [ ] (c) Nitori mo le ko arun tabi ikolu aisan [ ] (d Mo gba ajesara yi lofe [ ] (e) Amu ajesara wa fun mi [ ] (f) A fi ipa fun mi ni ajesara [ ] (g)

Omiran ni pato---------- -----

34. Ti idahun re ba je Bẹẹko. ẽṣe ti o kò ti gba ajesara ? (a) N ko gbo nipa abere ajesara kokoro jedojedo B ri / Ai ni imo to [ ] (b) ●wo ati se ayewo po [ ] (c)Ai ni akasi [ ] (d) Mi mo pe mi o le ko tori mi ose ohun ti mo le fi koo [ ] (e) Ko si asiko lati lọ si fun ajesara [ ] (f) Omiran ni pato ---------

IPIN D : AWON ALAYE ISEGUN NIPA OMO BIBI

{ Rekọja si ibeere 35 si 36 ti o ba jẹ akọkọ oyun rẹ }

35. Nje o ni iriri inira eyikeyi ninu awon oyun rẹ ti tẹlẹ (a) Bẹẹni [ ] (b) Bẹẹko [ ]

Ti idahun re baje Bẹẹko, lọ si Ìbéèrè 37

36. Ti o ba je bẹẹni , ewo ninu awon wonyi ni o ti ni ri ?

(i) àtọgbẹ lasiko iloyun (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(ii) Oyun ti ko duro sibi to daa (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(iii) Oyun baje(a) Bẹẹni [ ] (b) Bẹẹko [ ]

(iv) Lilo si ipo ibimo lai pe ojo (ṣaaju ki o to to osc keta di logoji) (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(v) Omo fuye ju bo se ye (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(vi) Arun Rhesus Negetifu (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(v) Ifun pa giga (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(vi)Ai si eje to ninu oyun (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(vii) Arun oju pipon ninu oyun (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(viii) Omiran ni pato ----------

37. Nje o nlo ogun tabi eto ifeto somo bibi ? (a) Bẹẹni [ ] (b) Bẹẹko [ ]

Ti esi re baje Bẹẹko , lọ si Ìbéèrè 39

38. Ti o baje bẹẹni , Iru ti eto ifeto somobibi wo ni o nlo ? (Jowo ko ami maaki si bi kan ti o ba idahun re mu)

(i) Ogun lilo lati enu fun ifetosomobibi (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(ii) Abere ifetosomobibi (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(iii) Rọba idaabobo (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(iv) Alafisi oju ara (Copper T) (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(v) Idaabobo Ibanisepo ojiji (Postinor) (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(vi) Aranmo (a) Bẹẹni [ ] (b) Bẹẹko [ ]

(vii) Omiran ni pato ----------

39. Nje ati koo ni ila ri ? (a) Bẹẹni [ ] (b) Bẹẹko [ ](c) Mi o mọ [ ]

40. Nje ati se ise abe fun o ri? (a) Bẹẹni [ ] (b) Bẹẹko [ ]

41. Nje oti se oyun ri? (a) Bẹẹni [ ] (b) Bẹẹko [ ]

42. Nje a ti da o duro si ile iwosan ri ? (a) Bẹẹni [ ] (b) Bẹẹko [ ]

43. Se o ni itan kan ninu awọn ipo ti o wa ni isalẹ ? (Jowo ko ami maaki si bi ti o kan o)

(i) Àrùn Inú Ẹjẹ (Sickle Cell disease) (a) Bẹẹni [ ] (b Bẹẹko[ ]

(ii) Iba ponju ponto (a) Bẹẹni [ ] (b Bẹẹko[ ]

(iii) Arun ibalopọ (a) Bẹẹni [ ] (b Bẹẹko[ ]

(iv) Atọgbẹ (a) Bẹẹni [ ] (b Bẹẹko[ ]

(v) Ifunpa giga (a) Bẹẹni [ ] (b Bẹẹko[ ]

(vi) Arun HIV (a) Bẹẹni [ ] (b Bẹẹko[ ]

(vi) Omiran ni pato ----------

IPIN E: EWU TI O NI SE PELU IGBE AYE TI O LE FA KOKORO IKOLU JEDOJEDO

B (Jowo ko ami maaki si bi ti o kan o)

44. Ni osu mefa kẹhin nje o ba enikeni pin ninu awọn ohun ti a kojọ si isalẹ ?

(i) Ifoyin (a) Bẹẹni [ ] (b Bẹẹko[ ]

(ii) Ififairungbon (a) Bẹẹni [ ] (b Bẹẹko[ ]

(iii) Abẹfẹlẹ (a) Bẹẹni [ ] (b Bẹẹko[ ]

(iv) Abere (a) Bẹẹni [ ] (b Bẹẹko[ ]

(v) Igerun (a) Bẹẹni [ ] (b Bẹẹko[ ]

45. Ṣe o nmu Ọti ? (a) Bẹẹni [ ] (b) Bẹẹko[ ]

46. Ṣe o nmu siga siga ? (a) Bẹẹni [ ] (b) Bẹẹko[ ]

47. Ṣe o nfi abere fun ara re ni oogun oloro? (a) Bẹẹni [ ] (b) Bẹẹko[ ]

48. Se alabaṣepọ tabi olufe rẹ nfi abere fun ara re ni oogun oloro? (a) Bẹẹni [ ] (b) Bẹẹko[ ]

49. Larin osu mefa ti o koja nje o sin gbere tabi la ara ? (a) Bẹẹni [ ] (b) Bẹẹko[ ]

50. Ṣe ẹnikẹni ni idilé rẹ ni itan arun kokoro jedojedo B? (a) Bẹẹni [ ] (b) Bẹẹko[ ]

(c) n ko mo [ ]

51. Ṣe ẹnikẹni ni idilé rẹ ni itan arun ponju ponto? (a) Bẹẹni [ ] (b) Bẹẹko[ ] (c) n ko mo [ ]

52. Alabasepọ melo ni o ni nibi osu mefa seyin? ----------

53. Omo odun melo ni o nigba ibalopo akọkọ? ----------

54. Ni osu mefa ṣaaju ki o to di wipe olóyún, nje o ti ni ibalopo lai si lilo kondomu pẹlu ẹnikẹni miran yato si oko rẹ ? (a) Bẹẹni [ ] (b Bẹẹko[ ]

55. Se oko rẹ ni ọpọ alabalopo tabi alabaṣepọ? (a) Bẹẹni [ ] (b Bẹẹko [ ] (c) n ko mo [ ]

56. Ṣé o ti gba ẹjẹ sara tabi ohun elo ẹjẹ ri? (a) Bẹẹni [ ] (b) Bẹẹko [ ]

57. Ṣaaju ki o to di pe olóyún nje o ni iriri eyikeyi ninu awọn nnkan wonyi bí?

i . Obo sisun / inira loju abe (a) Bẹẹni [ ] (b) Bẹẹko [ ]

ii . Obo yiyun (a) Bẹẹni [ ] (b) Bẹẹko [ ]

iii . Ohun ajeji / nkan nti oju abẹ yosita (a) Bẹẹni [ ] (b) Bẹẹko [ ]

iv . Irora ni isale iku (a) Bẹẹni [ ] (b) Bẹẹko [ ]

58. Nje o gba ajesara kokoro jedojedo ri gege bi omo ikoko? (a) Bẹẹni [ ] (b) Bẹẹko [ ] (c) n ko mo [ ]

59. Ṣe o ni itan eyikeyi nipa kokoro jedojedo C (Hepatitis C virus)? (a) Bẹẹni [ ] (b) Bẹẹko [ ] (c) n ko mo [ ].

57. Ṣaaju ki o to di pe olóyún nje o ni iriri eyikeyi ninu awọn nnkan wonyi bí?

i . Obo sisun / inira loju abe (a) Bẹẹni [ ] (b) Bẹẹko [ ]

ii . Obo yiyun (a) Bẹẹni [ ] (b) Bẹẹko [ ]

iii . Ohun ajeji / nkan nti oju abẹ yosita (a) Bẹẹni [ ] (b) Bẹẹko [ ]

iv . Irora ni isale iku (a) Bẹẹni [ ] (b) Bẹẹko [ ]

58. Nje o gba ajesara kokoro jedojedo ri gege bi omo ikoko? (a) Bẹẹni [ ] (b) Bẹẹko [ ] (c) n ko mo [ ]

59. Ṣe o ni itan eyikeyi nipa kokoro jedojedo C (Hepatitis C virus)? (a) Bẹẹni [ ] (b) Bẹẹko [ ] (c) n ko mo [ ].

APPENDIX 4

PICTURES OF QUESTIONAIRE ADMINISTRATION, SAMPLE COLLECTION AND SAMPLE PROCESSING

Plate 3.1: The researcher, research assistants and the study participants during questionnaire administration.

Plate 3.2: The researcher, research assistant and study participants during sample collection.

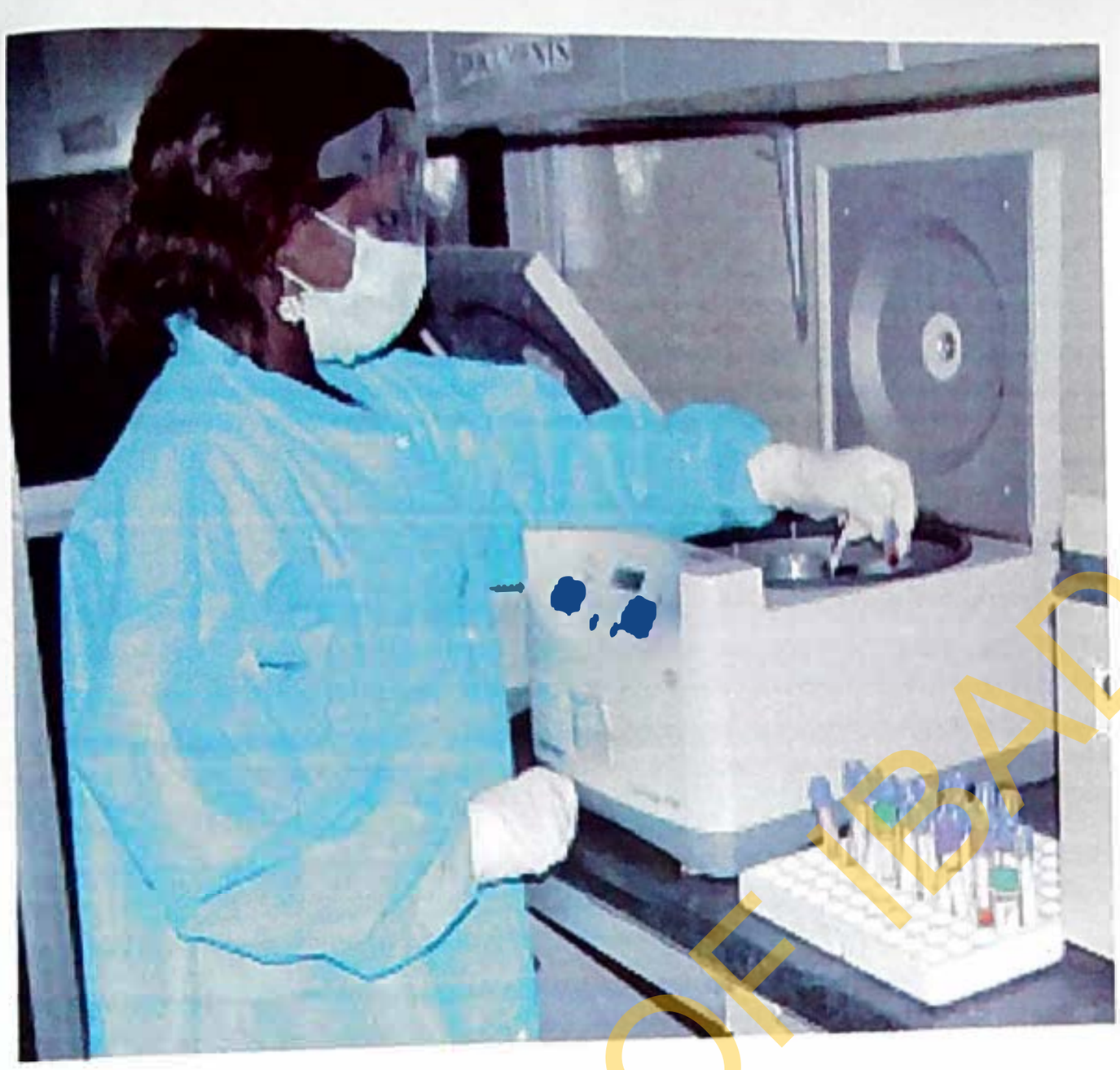

Plate 3.3 Blood samples been arranged into the centrifuge for spinning to separate the plasma.

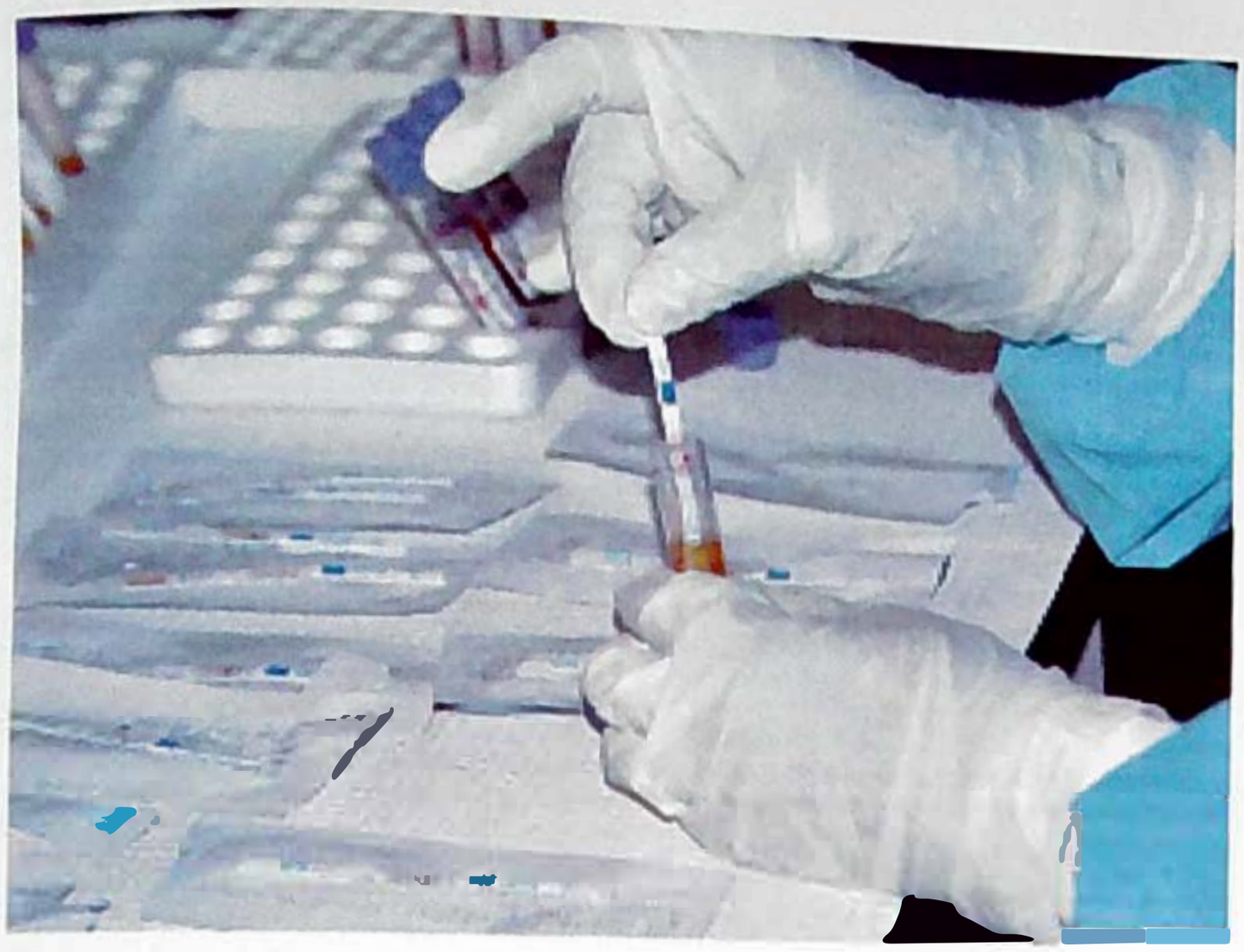

Plate 3.3 Sample analysis to detect Hepatitis B surface antigen (HBsAg) in plasma of study participants.