

AFRICA UNIVERSITY

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**PREVALENCE AND RISK FACTORS OF HEPATITIS B INFECTION
AMONG BLOOD DONORS AT SAINT JOSEPH HOSPITAL, MONROVIA
FROM JANUARY-DECEMBER 2024**

BY

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ABSTRACT

Hepatitis B virus (HBV) infection remains a major public health concern, particularly in sub-Saharan Africa, where it contributes significantly to morbidity and mortality rates. This study assessed the prevalence and risk factors of HBV infection among blood donors at Saint Joseph Catholic Hospital in Monrovia, Liberia, between January and December 2024. The research employed a descriptive cross-sectional design using retrospective data from hospital records. A structured questionnaire and laboratory results were used to collect data on socio-demographic characteristics and risk behaviors of blood donors. A sample size of 600 participants was selected through stratified random sampling to ensure representation across different months and donor categories. Data were analyzed using descriptive statistics and frequency distributions.

Findings revealed that the prevalence of HBV infection among blood donors increased progressively over the 12-month period, rising from 14.3% in January to 37.5% in December. High-risk factors identified included unsafe medical practices, unregulated tattooing, multiple sexual partners, and a history of blood transfusion. Notably, unsafe medical practices contributed to over 40% of infections in some months. The study highlighted gaps in public awareness, screening practices, and regulatory enforcement concerning HBV transmission routes.

The results underscore the urgent need for targeted public health interventions, including regular HBV screening, public education on transmission risks, and stricter enforcement of safety protocols in medical and cosmetic procedures. The study recommends the integration of HBV education into community outreach programs and improvements in blood donor screening to ensure transfusion safety.

LIST OF KEY WORDS

Hepatitis B Virus

Blood Donors

Prevalence

Risk Factors

Sexual Behavior

Monrovia

Liberia

Public Health

DECLARATION

I, KARPEE PHONELIUS L hereby declare this research project is my original work and has not been submitted for any other degree award in any other university or institution for a degree.

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DEDICATION

This dissertation is dedicated to my parents for their unwavering love, sacrifices, and support, and to my siblings for their encouragement and companionship. Their belief in me has been my strength, making this achievement as much as theirs as it is mine.

LIST OF ACRONYMS AND ABBREVIATIONS

WHO- World Health Organization

HBV- Hepatitis B Virus

HCC- Hepatocellular Carcinoma

TTI- Transfusion Transmitted Infection

CDC- Center for Disease Control

HBsAg- Hepatitis B Surface Antigen

HIV- Human Immunodeficiency Virus

AIDS – acquired immunodeficiency syndrome.

DNA – Deoxyribonucleic Acid

NAT - Nucleic Acid Testing

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CHAPTER ONE

INTRODUCTION

1.1. Background of Study

The Hepatitis B virus (HBV) infection remains a formidable public health challenge globally, with a particularly high burden in Sub-Saharan Africa. The World Health Organization (WHO) estimates that 296 million people worldwide were living with chronic HBV infection in 2019, with the African region accounting for a considerable proportion of these cases (*WHO, 2021*). HBV is a major cause of liver cirrhosis and hepatocellular carcinoma, contributing to substantial morbidity and mortality (*Schweitzer et al., 2015*). Liberia, located in West Africa, is classified as a high-prevalence region for Hepatitis B, where the infection is endemic. The country faces numerous healthcare challenges, including inadequate access to medical services, limited public health infrastructure, and a high burden of infectious diseases. In Liberia, the prevalence of HBV is notably high, exacerbated by factors such as limited healthcare infrastructure, inadequate screening programs, and a lack of public awareness (*Johnson et al., 2017*).

Blood donation is a critical component of healthcare systems, providing life-saving interventions for patients in need of transfusions. However, it also poses risks for the transmission of blood-borne infections, including HBV, if proper screening and preventive measures are not implemented (*Allain, 2011*). Blood donors, who are often unaware of their HBV status, play a crucial role in the potential transmission of the virus through transfusions. Ensuring the safety of blood supplies is paramount, particularly in regions with high HBV prevalence. This study will focus on the prevalence and risk factors of HBV infection among blood donors at Saint Joseph Hospital in Monrovia, Liberia, aiming to provide insights that can enhance blood safety and inform public health strategies.

It is a leading cause of chronic liver disease, liver cirrhosis, and hepatocellular carcinoma (HCC), which collectively result in approximately 820,000 deaths annually (*WHO, 2021*). The burden of HBV infection is disproportionately high in low- and middle-income countries, particularly in sub-Saharan Africa and East Asia, where prevalence rates can exceed 8% (*Kramvis, 2014*). HBV is a double-stranded DNA virus that belongs to the Hepadnaviridae family. It primarily infects liver cells, leading to inflammation and, in chronic cases, progressive liver damage. Transmission occurs through contact with infectious body fluids, such as blood, semen, and vaginal fluids. Key transmission routes include perinatal transmission from mother to child, horizontal transmission through close personal contact, sexual contact, and exposure to contaminated needles or medical equipment (*CDC, 2020*).

The global epidemiology of HBV varies significantly, with the highest prevalence in sub-Saharan Africa and the Western Pacific. In these regions, most infections occur during childhood, often leading to chronic infection (*Ott et al., 2012*). In contrast, North America and Western Europe have lower prevalence rates, typically under 2%, with most infections occurring in adulthood and resulting from high-risk behaviors such as unprotected sex and intravenous drug use (*Ott et al., 2012*). The World Health Organization (WHO) estimates that around 296 million people worldwide were living with chronic Hepatitis B infection as of 2019, resulting in over 820,000 deaths, from complications such as liver cirrhosis and hepatocellular carcinoma. Globally, more than 81 million blood units are donated each year, and blood transfusion stands as a crucial therapeutic procedure without a viable alternative, essential for saving millions of individuals requiring transfusions (*WHO, 2021*). However, blood-borne infections, such as HBV, present a significant hurdle to ensuring safe transfusions, particularly in HBV-endemic regions where effective screening methods are limited. The transfusion of contaminated blood contributes to as many as 16 million new HBV infections worldwide, with each blood unit carrying a 0.1% risk of transmitting blood borne.

The high prevalence of HBV in sub-Saharan Africa can be attributed to several factors, including limited access to healthcare, inadequate vaccination coverage, and unsafe medical practices. In many parts of Africa, cultural practices, such as traditional scarification, circumcision, and tattooing, are often performed with unsterilized instruments, increasing the risk of HBV transmission (*Hou et al., 2005*). Additionally, the lack of robust blood screening programs in these regions contributes to the continued spread of the virus.

Liberia, like many countries in West Africa, has a high prevalence of Hepatitis B, with estimates suggesting that a sizable portion of the population may be infected. This presents a critical public health concern, particularly in contexts such as blood donation, where the risk of transmission can be high if proper screening protocols are not strictly followed. Saint Joseph Hospital in Monrovia is a key healthcare provider in Liberia, offering a range of medical services including blood transfusions. Blood donation is an essential service for many patients, especially those undergoing surgery, suffering from trauma, or managing chronic conditions. The higher the demand, the higher the possibility of transmitting HBV through infected blood. However, the safety of blood transfusions depends significantly on the rigorous screening of donors for infectious diseases, including Hepatitis B. The prevalence of HBV among blood donors is an important indicator of the potential risk of transfusion-transmitted infections (TTIs) (*Ott et al., 2012*).

This study focuses on assessing the prevalence and identifying the risk factors associated with Hepatitis B infection among blood donors at Saint Joseph Hospital, Monrovia. Understanding these factors is crucial for developing targeted interventions to reduce the spread of HBV and enhance the safety of blood transfusions. By examining the demographic, behavioral, and medical history characteristics of blood donors, this research aims to provide valuable insights into the epidemiology

of Hepatitis B in this specific population. The findings of this study will contribute to the broader body of knowledge on HBV transmission and prevention, informing public health strategies and policies in Liberia and similar settings.

1.2 Problem Statement

Hepatitis B virus (HBV) remains a critical global health burden, affecting over 296 million people and resulting in nearly 820,000 deaths annually from complications such as cirrhosis and hepatocellular carcinoma (WHO, 2021). Sub-Saharan Africa is one of the regions most heavily affected by HBV, with prevalence rates ranging between 6% and 20%, depending on the population and diagnostic criteria used (Schweitzer et al., 2015; Spearman et al., 2017). Blood transfusion remains a key transmission route in many African countries due to limited screening infrastructure, inconsistent testing protocols, and a lack of stringent donor selection criteria (Tagny et al., 2010; Ofori-Asenso & Agyeman, 2016).

Numerous studies in West Africa have examined HBV prevalence among blood donors, revealing a pattern of high endemicity and poor risk factor awareness. For example, Oluyinka et al. (2015) reported an HBV prevalence of 11.2% among blood donors in Nigeria, while Osei et al. (2017) found a prevalence of 8.2% in Ghana. Similarly, Frambo et al. (2014) identified significant associations between HBV infection and risk behaviors such as unsafe sexual practices and reuse of needles among blood donors in Cameroon. These studies have also highlighted widespread gaps in public knowledge and poor preventive practices. However, despite these alarming regional trends, Liberia lacks recent, comprehensive data on HBV prevalence and the risk factors affecting blood donors. Existing data are either outdated or derived from broader national health surveys that do not focus on high-risk groups such as blood donors.

Furthermore, a systematic review by Auta et al. (2018) emphasized the need for localized studies to understand the socio-behavioral and clinical determinants of HBV transmission, particularly in healthcare settings where blood safety may be compromised. Yet, Liberia's context remains underexplored in scholarly research, with no substantial data available from high-volume referral hospitals such as Saint Joseph Catholic Hospital in Monrovia. This absence of local evidence limits the ability of policymakers, healthcare practitioners, and public health stakeholders to design and implement effective screening, vaccination, and education programs tailored to the Liberian population.

This study, therefore, seeks to fill this critical knowledge gap by investigating the prevalence and risk factors of HBV infection among blood donors at Saint Joseph Catholic Hospital between January and December 2024. By focusing on a specific population within a defined setting, the research aims to provide actionable insights into behavioral and clinical risk patterns, inform blood safety protocols, and support national HBV prevention strategies. The study's findings are expected to complement regional data, bridge Liberia's research gap, and contribute to the broader body of knowledge on HBV epidemiology in West Africa.

1.3 Justification of Study

This study plays a vital role in shedding light on the prevalence of hepatitis B among blood donors at Saint Joseph Hospital Monrovia, which is a key public health concern. Hepatitis B poses significant health risks worldwide, leading to serious liver conditions like cirrhosis and liver cancer. By examining its prevalence in the blood donor population, the study helps ensure that the hospital's blood supply remains safe and reliable, thus preventing the transmission of infections through blood

transfusions. This research is crucial for safeguarding both donors and recipients and maintaining the quality of healthcare services.

Furthermore, the study's focus on identifying demographic and behavioral risk factors for hepatitis B among blood donors allows for the development of targeted public health strategies and educational initiatives. By recognizing which groups are more susceptible, healthcare professionals can implement more effective screening measures and raise awareness about preventive practices. This targeted intervention is particularly important in settings with limited resources, where optimizing the impact of public health efforts is essential. Additionally, this research contributes to the broader understanding of hepatitis B, especially in the context of Liberia, where data may be limited. By comparing the results with regional and global data, the study can reveal unique patterns or discrepancies specific to the local context. These findings can prompt further research and inform policy decisions, enhancing the overall understanding of the disease in different regions. The insights gained from this study can support evidence-based policymaking, guiding healthcare policies and practices at Saint Joseph Hospital and potentially influencing national strategies for hepatitis B screening and prevention.

1.4 Research Objectives

The broad objective of this study is to assess the prevalence of HBV infection among blood donors at Saint Joseph Hospital, Monrovia, and to identify the associated risk factors.

1.5 Specific Objectives

- To describe Socio-Demographic characteristics of blood donors at the Saint Joseph Hospital in Monrovia.

- To determine the prevalence of Hepatitis B surface antigen (HBsAg) among blood donors at Saint Joseph Hospital in Monrovia.
- To identify factors associated with HBV Infection among blood donors at the Saint Joseph Hospital in Monrovia.

1.6 Research Questions

- What socio-demographic factors are associated with an increased risk of HBV infection among blood donors?
- What is the prevalence of HBV infection among blood donors at Saint Joseph Hospital?
- What risk factors contribute to the transmission of HBV among blood donors at Saint Joseph Hospital?

1.7 Study Limitations

The study may face several limitations, including potential selection bias, as it focuses on a single hospital, which may not represent the broader population of blood donors in Monrovia. Additionally, the reliance on self-reported data for risk factors could introduce reporting bias, as participants may underreport or misreport their behaviors. The cross-sectional nature of the study limits the ability to establish causal relationships between identified risk factors and HBV infection. Furthermore, the study's findings may be influenced by the availability and accuracy of diagnostic tools used for HBV screening.

1.8 Study Delimitations

The study is delimited to blood donors at Saint Joseph Hospital, Monrovia, and does not include other hospitals or regions in Liberia. It focuses specifically on HBV infection, excluding other blood-borne

infections such as hepatitis C and HIV. The study period is limited to a specific period, which may not capture seasonal variations in HBV prevalence. Additionally, the study will primarily focus on adult blood donors, excluding pediatric populations.

1.9 Chapter Summary

Chapter One introduced the study on HBV prevalence and risk factors among blood donors at Saint Joseph Hospital, Monrovia. It has outlined the background and significance of the study, identified the problem it addresses, and justified its importance. The chapter also discussed the limitations and delimitations of the study, setting the stage for the subsequent chapters that will delve deeper into the research methodology, findings, and implications. This introduction provides a comprehensive overview of the study's context and objectives, highlighting the critical need for localized data to inform public health strategies in Liberia. In context, this chapter introduced the research. The next chapter will focus on theoretical, framework and available literature review critical to this research.

CHAPTER TWO

Literature Review

2.1 Introduction

Hepatitis B virus (HBV) infection remains a significant global health challenge, particularly in resource-limited settings. This chapter provides a comprehensive review of existing literature relevant to the prevalence and risk factors of HBV infection among blood donors. The review aims to establish a solid foundation for the current study by examining previous research findings, identifying gaps in knowledge, and contextualizing the research within the broader field of HBV epidemiology and blood safety. The literature review covers global, regional, and local perspectives on HBV infection, with a particular focus on sub-Saharan Africa and, where available, Liberia. It explores the epidemiology of HBV, its transmission routes, risk factors associated with infection, and the specific challenges related to blood donation and transfusion safety in resource-limited settings.

This chapter will delve into the following key areas; The global and regional prevalence of HBV, HBV prevalence among blood donors, Risk factors associated with HBV infection, Blood safety and HBV screening practices, HBV prevention strategies and Knowledge gaps and research needs. By thoroughly examining these areas, this literature review will provide a comprehensive understanding of the current state of knowledge regarding HBV infection among blood donors, particularly in the context of sub-Saharan Africa and Liberia.

2.2 Conceptual Framework

The conceptual framework for this study is centered on understanding the factors that contribute to the prevalence of Hepatitis B Virus (HBV) infection among blood donors at Saint Joseph Hospital, Monrovia. The framework integrates various theoretical perspectives and models to guide the research

process. The primary focus is on the identification of both demographic and behavioral factors that are associated with HBV infection, alongside the healthcare system's role in screening and prevention.

In the context of this study, the key variables influencing the prevalence of HBV include unsafe medical practices, socio-demographic characteristics, and behavioral risk factors. Unsafe medical practices, such as the use of unsterilized needles and unregulated tattooing, have been widely documented as primary contributors to HBV transmission, particularly in sub-Saharan Africa (*Schweitzer et al., 2015; Apata et al., 2021*). Additionally, high-risk sexual behaviors, such as having multiple sexual partners, are significant risk factors that contribute to HBV transmission (*Osei et al., 2017*). These variables form the first layer of the conceptual framework, which focuses on risk factors for HBV infection.

The second layer of the framework emphasizes the socio-demographic factors, including age, gender, education level, and occupation. Studies have shown that certain demographic groups, particularly older males with lower levels of education and income, are at higher risk for HBV infection (*Akbar et al., 2017; Osei et al., 2017*). By including these factors, the study can assess how they influence susceptibility to HBV and potentially highlight vulnerable groups that require targeted interventions.

The third layer of the framework is focused on healthcare practices and their impact on blood donor safety. This aspect includes both the screening procedures used to detect HBV (e.g., Hepatitis B Surface Antigen (HBsAg) testing) and the broader blood safety measures in place at Saint Joseph Hospital. Improving these practices, including incorporating more sensitive diagnostic tools like Nucleic Acid Testing (NAT), could significantly reduce the risk of transfusion-transmitted infections (TTIs) (*Schweitzer et al., 2015*).

The conceptual framework highlights the interaction between these different layers. Unsafe medical practices and risky behaviors can lead to a higher prevalence of HBV, which, when coupled with inadequate screening and poor healthcare infrastructure, creates a compounding effect that worsens the spread of HBV in the community. This framework will guide the research in identifying critical interventions that can be implemented to reduce HBV transmission rates.

By examining these interconnected factors, the study aims to provide a comprehensive understanding of HBV prevalence among blood donors in Liberia and generate actionable insights for public health strategies. The findings from this framework will contribute to enhancing blood safety and HBV prevention efforts within the country and potentially across similar settings in sub-Saharan Africa.

2.2.1 Global and Regional Prevalence of HBV

The global prevalence of HBV infection varies significantly across regions, reflecting differences in transmission patterns, prevention strategies, and healthcare systems. According to the World Health Organization, an estimated 296 million people were living with chronic HBV infection in 2019 (*WHO, 2021*). This figure represents a substantial public health burden, with implications for healthcare systems, economies, and individual well-being worldwide. A comprehensive study by *Razavi-Shearer et al. (2018)* estimated that the global prevalence of chronic HBV infection in 2016 was 3.9% (95% CI 3.4–4.6), corresponding to 291 million (251–341 million) infected individuals. This study provided a nuanced understanding of the global distribution of HBV, highlighting regional variations and the need for targeted interventions. The highest prevalence is found in the Western Pacific region and Africa. *Schweitzer et al. (2015)* reported that 6.2% of the adult population in the Western Pacific region and 6.1% in Africa were infected. These findings underscore the disproportionate burden of HBV in certain parts of the world, particularly in resource-limited settings. More recent data from the Global

Hepatitis Report 2017 indicates that the African Region has the highest endemicity, with 6.1% of the adult population infected (*WHO, 2017*). This high prevalence in Africa is attributed to numerous factors, including limited access to healthcare, inadequate vaccination coverage, and socio-economic challenges that contribute to ongoing transmission.

In sub-Saharan Africa, HBV is considered endemic, with prevalence rates ranging from 5% to 20% in different countries (*Spearman et al., 2017*). This wide range reflects the heterogeneity of HBV epidemiology within the region, influenced by factors such as vaccination policies, healthcare infrastructure, and cultural practices. A systematic review by *Ofori-Asenso and Agyeman (2016)* found that the pooled prevalence of HBV infection in West Africa was 12.2% (95% CI: 11.7–12.8%). This high prevalence in West Africa, which includes Liberia, highlights the urgent need for improved prevention and control strategies in the region. The prevalence of HBV also varies among different population groups. For instance, *Platt et al. (2016)* conducted a global systematic review and meta-analysis of HBV prevalence among people who inject drugs. They found that the prevalence in this high-risk group ranged from 5% to 10% in most countries, with significantly higher rates in some regions. In the context of mother-to-child transmission, which is a significant route of HBV infection in endemic areas, a systematic review by *Keane et al. (2016)* found that the prevalence of HBV infection among pregnant women in sub-Saharan Africa ranged from 2.4% to 28.4%. This wide range emphasizes the need for robust antenatal screening and prevention programs to reduce vertical transmission.

2.2.2 HBV Prevalence Among Blood Donors

Blood donors represent a crucial population for understanding HBV epidemiology, as they are often considered healthier than the general population but can still harbor silent infections. Studies on HBV

prevalence among blood donors in Africa have reported varying rates, reflecting the diverse epidemiological landscapes across the continent. A meta-analysis by *Apata et al. (2021)* found that the pooled prevalence of HBV among blood donors in sub-Saharan Africa was 7.6% (95% CI: 6.7–8.6%). However, significant heterogeneity was observed between countries and even within countries. This heterogeneity underscores the need for country-specific and even locality-specific data to inform targeted interventions. In West Africa, several studies have reported HBV prevalence rates among blood donors:

In Ghana, *Ampofo et al. (2002)* reported a prevalence of 8.2% among blood donors in Accra. A more recent study by *Antwi-Baffour et al. (2019)* found a prevalence of 7.5% among blood donors in the same city, suggesting a slight decrease over time. *Oluyinka et al. (2015)* found a prevalence of 11.1% among blood donors in Abuja, Nigeria. This high prevalence is consistent with other studies in Nigeria, such as *Okoroiwu et al. (2018)*, who reported a prevalence of 10.9% in a systematic review of HBV among blood donors in Nigeria. *Koroma & Kangbai (2019)* reported a prevalence of 6.7% among male blood donors in Bo, Sierra Leone. This study is particularly relevant to the current research due to Sierra Leone's proximity to Liberia. *Nagalo et al. (2012)* found a high prevalence of 14.96% among blood donors in Ouagadougou, Burkina Faso. This study highlighted the urgent need for improved blood donor screening and selection processes in the country. *Kouassi-M'Bengue et al. (2018)* reported a prevalence of 8.5% among blood donors in Abidjan, emphasizing the persistent challenge of HBV in Côte d'Ivoire.

These varying prevalence rates highlight the complex epidemiology of HBV in West Africa and underscore the need for country-specific data. The prevalence among blood donors is lower than in the general population, likely due to donor selection criteria and the tendency for healthier individuals

to donate blood. However, the rates remain concerningly high in many countries, posing risks for blood safety. Limited data is available for Liberia, highlighting the critical need for the current study. The closest geographical data comes from neighboring Sierra Leone, where *Koroma and Kangbai (2019)* reported a prevalence of 6.7% among male blood donors in Bo, Sierra Leone. However, extrapolating this data to Liberia may not be accurate due to potential differences in healthcare systems, prevention strategies, and socio-cultural factors between the two countries. The variation in HBV prevalence among blood donors across different West African countries may be attributed to several factors such as the differences in blood donor selection criteria and deferral policies, varying levels of implementation of HBV screening techniques, disparities in HBV vaccination coverage, especially among younger donors, socio-economic and cultural factors that influence HBV transmission patterns, and differences in healthcare access and quality across countries. Understanding these factors is crucial for interpreting prevalence data and developing effective strategies to reduce HBV transmission through blood transfusion.

2.2.3 Risk Factors for HBV Infection

Identifying risk factors for HBV infection is crucial for developing targeted prevention strategies and improving blood donor screening processes. Several studies have investigated risk factors associated with HBV infection among blood donors and in the general population in sub-Saharan Africa. The main categories of risk factors include demographic, socioeconomic, behavioral, medical history, and occupational exposure. Age has been consistently identified as a significant risk factor for HBV infection. *Baha et al. (2013)* found that older age groups had a higher prevalence of HBV infection among Moroccan blood donors. Similarly, *Osei et al. (2017)* reported that blood donors aged 36-45 years had the highest HBV prevalence in Ghana. This age-related risk may be due to cumulative exposure over time and lower vaccination rates among older individuals. Gender differences in HBV

prevalence have also been observed. *Osei et al. (2017)* and *Apata et al. (2021)* both reported higher HBV prevalence among male blood donors compared to females. This gender disparity may be attributed to differences in risk behaviors, healthcare-seeking patterns, or biological factors.

Low education levels have been associated with increased risk of HBV infection. *Akbar et al. (2017)* found that individuals with lower educational attainment had a higher prevalence of HBV in Saudi Arabia. Similarly, *Ola et al. (2019)* reported that lack of formal education was a significant risk factor for HBV infection among pregnant women in Nigeria. Low income has also been identified as a risk factor. *Ola et al. (2019)* and *Frambo et al. (2014)* both found associations between lower socioeconomic status and increased HBV prevalence. This relationship may be mediated through limited access to healthcare, poor living conditions, and engagement in high-risk behaviors.

Multiple sexual partners have been consistently associated with increased HBV risk. *Frambo et al. (2014)* reported that having more than one sexual partner was a significant risk factor for HBV infection in Cameroon. *Noubiap et al. (2015)* found comparable results among healthcare workers in Cameroon. History of unsafe injections is another important risk factor. *Noubiap et al. (2015)* and *Yang et al. (2015)* both identified associations between a history of unsafe injections and HBV infection. This highlights the importance of safe injection practices in healthcare settings and the community. Body piercing and tattooing have also been linked to HBV transmission. *Yang et al. (2015)* found that having body piercings or tattoos was associated with increased HBV risk in China. *Akbar et al. (2017)* reported similar findings in Saudi Arabia.

Previous blood transfusion has been identified as a risk factor in several studies. *Baha et al. (2013)* and *Osei et al. (2017)* both found associations between a history of blood transfusion and HBV

infection. This underscores the importance of rigorous blood screening practices. Surgical procedures have also been linked to HBV transmission. *Osei et al. (2017)* and *Akbar et al. (2017)* reported that individuals with a history of surgery had higher rates of HBV infection. This highlights the need for strict infection control measures in healthcare settings. Healthcare workers have been identified as a high-risk group for HBV infection. *Akbar et al. (2017)* found that working in the healthcare sector was associated with increased HBV prevalence. *Frambo et al. (2014)* reported similar findings among healthcare workers in Cameroon. A systematic review by *Auta et al. (2018)* provided a comprehensive analysis of risk factors for HBV infection in sub-Saharan Africa. They found that the most reported risk factors were Unsafe injections (pooled OR 1.6, 95% CI 1.4–1.8), Sexual risk behaviors (OR 1.6, 95% CI 1.4–1.8), Blood transfusion (OR 1.5, 95% CI 1.2–1.8).

2.2.4 Blood Safety and HBV Screening

The choice of screening method is critical in determining the effectiveness of blood safety measures. Traditional serological tests, while useful, may not detect all infections, particularly during the window period when a person is infected but not yet producing detectable antibodies (*Bloch et al., 2012*). Nucleic acid testing (NAT) provides a more sensitive approach, allowing for the detection of HBV DNA, which can identify infections earlier than serological tests alone (*WHO, 2020*). However, the excessive cost and technical requirements of NAT limit its widespread use in many resource-limited settings.

In many African countries, including Liberia, the implementation of comprehensive blood screening programs is hampered by logistical challenges, including inadequate infrastructure, lack of trained personnel, and insufficient funding (*Tagny et al., 2010*). For example, a study by *Mapako et al. (2016)* emphasized the need for improved blood donor selection and deferral strategies to enhance blood

safety in sub-Saharan Africa. The authors noted that many countries still rely on voluntary unpaid donors, which can lead to higher prevalence rates of transfusion-transmissible infections. Moreover, public awareness and education about blood donation and the risks associated with HBV transmission are critical components of blood safety. Community engagement initiatives can help improve understanding of the importance of safe blood practices and encourage more individuals to participate in voluntary blood donation programs (*Chung et al., 2013*).

These challenges can significantly impact the effectiveness of HBV screening among blood donors. For instance, *Tagny et al. (2010)* reported that while most West African countries have national blood transfusion policies, implementation remains inconsistent. They found that only 46% of blood donations in the region were screened for all major transfusion-transmissible infections, including HBV.

2.2.5 HBV Prevention Strategies

Preventing HBV infection is essential for reducing the burden of the disease and ensuring the safety of blood transfusions. Effective prevention strategies include vaccination, safe injection practices, health education, and screening and treatment of chronic carriers.

1. **Vaccination:** The hepatitis B vaccine is highly effective in preventing HBV infection, with efficacy rates of 95% or higher (*WHO, 2021*). The introduction of the hepatitis B vaccine into national immunization programs has significantly reduced the prevalence of HBV among children. *Spearman et al. (2017)* emphasized the importance of universal infant vaccination and catch-up vaccination for high-risk groups. The WHO has set a target to achieve 90% coverage of the hepatitis B vaccine by 2030, which is crucial for eliminating HBV as a public health threat.

2. Safe Injection Practices : *Hutin et al. (2003)* highlighted the importance of using sterile syringes and needles and proper disposal of sharps to prevent HBV transmission. Training healthcare workers in safe injection practices is essential to minimize the risk of transmission in healthcare settings.

3. Health Education and Awareness Programs: Community-based education programs can play a vital role in increasing awareness of HBV transmission and prevention strategies. *Chung et al. (2013)* demonstrated the effectiveness of such programs in improving HBV screening and vaccination rates. By educating communities about the risks associated with HBV and the importance of vaccination, health authorities can foster a culture of prevention.

4. Screening and Treatment of Chronic Carriers: Identifying and treating chronic HBV carriers is crucial for reducing transmission risk and preventing liver disease progression. *Spearman et al. (2017)* emphasized the importance of regular screening for high-risk populations and the availability of antiviral treatments for those with chronic infections.

5. Policy and Regulatory Frameworks: Implementing and enforcing policies that promote safe blood donation practices and screening protocols is essential for reducing the risk of HBV transmission through transfusions. Countries must establish regulatory frameworks that ensure compliance with blood safety standards and guidelines set by organizations such as the WHO (*Tagny et al., 2010*).

2.2.6 Knowledge Gaps and Research Needs

Despite the research conducted in neighboring countries, there is a significant lack of specific data related to Liberia. To craft effective preventive methods and strategies, it is essential to have a clear understanding of the local epidemiology of the Hepatitis B Virus (HBV) in Liberia. It is crucial to

develop studies that delve into the distinctive socio-cultural and economic factors that impact the transmission of HBV in Liberia. Identifying specific risk factors will allow for the development of intervention that are more appropriately tailored to the local context.

Assessing the current blood screening protocols and their effectiveness in maintaining blood safety is of paramount importance. Research should focus on pinpointing gaps in existing screening practices and identifying potential areas for enhancement. The Ebola outbreak in West Africa exposed weakness in healthcare systems, making it imperative to understand how such a crisis affects HBV prevalence and blood safety measures, which is critical for future preparedness and response.

Moreover, there is a pressing need for longitudinal studies that monitor changes in HBV prevalence and associated risk factors over time. Such research would offer valuable insights into the long-term effectiveness of vaccination programs and other prevention strategies. These identified knowledge gaps highlight the significance of this study in providing crucial data that can inform public health strategies and improve blood safety in Liberia. By addressing these gaps, the research will not only contribute to the global understanding of HBV epidemiology but also help shape more targeted and effective interventions.

CHAPTER THREE

Research Methodology

3.1. Introduction

This chapter detailed the methodology that was employed in the study to investigate the prevalence and risk factors of Hepatitis B Virus (HBV) infection among blood donors at Saint Joseph Hospital in Monrovia. The chapter also outlined the research design, study population, sampling procedure, data collection methods, and analysis techniques that were used to achieve the study's objectives. Ethical considerations related to the research were discussed to ensure compliance with ethical standards.

3.2. Research Design

The study adopted a cross-sectional descriptive research design. This design was chosen because it allowed for the assessment of the prevalence of HBV infection and the identification of associated risk factors at a specific point in time. The cross-sectional approach was suitable for examining the status of blood donors concerning HBV infection and provided a snapshot of the situation within the study period (*Creswell, 2014*). The design also enabled the collection of quantitative data that was used statistically to identify potential correlations between HBV infection and various risk factors.

3.3 Study Population

The study population consisted of blood donors at the Saint Joseph Hospital in Monrovia during the study period. Blood donors were individuals who voluntarily donate blood and were typically screened for various health conditions before donation. The hospital records indicate that the donor population is diverse in terms of age, gender, and socio-economic status. Therefore, the study focuses on understanding the prevalence of HBV infection within this population and identifying any demographic patterns that may exist.

3.4 Exclusion Criteria

Exclusion Criteria included donors who were underage or over-age, have prior diagnosis of Hepatitis B, are unable to provide informed consent, have serious comorbidities (e.g., liver disease, HIV/AIDS). Donors who received recent blood transformation, were recently vaccinated for Hepatitis B, or pregnant women was also excluded to prevent confounding results.

3.5 Inclusion Criteria

This required participants to be at least 18 years old and to provide informed consent. Individual must be blood donors at Saint Joseph Catholic hospital. Blood donors must have undergone Hepatitis B surface Antigen (HBsAg) testing or another relevant diagnostic test as part of the study screening.

3.6 Sample Size

The sample size will be determined using a formula for calculating sample size in cross-sectional studies. Based on an expected prevalence of HBV infection of 10%, a confidence level of 95%, and a margin of error of 0.05 or 5% the required sample size will be calculated. The formula for the sample size calculation is as follows: $n = \frac{Z^2 P(1-P)}{E^2}$ where: n is the sample size, Z is the Z-value corresponding to the desired confidence level (1.96 or 95% confidence), P is the estimated prevalence of HBV infection, E is the margin of error (precision, usually 0.05 or 5%). Using the formula, the sample size will be calculated to ensure that the study is sufficiently powered to detect statistically significant differences in HBV prevalence among the donor population.

Calculation:

$$n = \frac{Z^2 P(1-P)}{E^2} = \frac{(1.96)^2 (0.10)(1-0.10)}{(0.05)^2} = \frac{(3.8416)(0.10)(0.90)}{0.0025} = \frac{0.345744}{0.0025} = 138.2976$$

3.7 Sampling Procedure

A systematic random sampling technique will be employed to select participants from the study population. This method will involve selecting every donor from the list of eligible blood donors at the hospital. The sampling interval (n) procedure will be determined based on the total number of eligible donors and the required sample size. Systematic random sampling will be chosen to minimize selection bias and ensure that the sample is representative of the overall donor population (*Kothari, 2004*).

Focusing the study on blood donors from Saint Joseph Hospital in Monrovia may introduce selection bias, potentially limiting the generalizability of the findings. While this hospital serves a diverse group of donors, it may not fully represent the broader population of blood donors across Liberia. Differences in healthcare access, socio-economic conditions, and cultural practices between urban and rural populations can result in varied HBV prevalence rates and risk factors that are not captured by focusing on a single healthcare facility. For instance, certain risky behaviors or barriers to healthcare services prevalent in rural areas may be underrepresented in the hospital's donor pool. To minimize the impact of this bias, the study acknowledges that findings may primarily apply to the urban population served by Saint Joseph Hospital. Future research can address this limitation by expanding the study to include multiple healthcare centers across the country to ensure more comprehensive coverage of Liberia's diverse population.

3.8 Pilot Study

A pilot study was conducted during the first two weeks of the data collection timeline. This pilot included a small sample of approximately 10-15 donors to assess both the questionnaire and the laboratory procedures. The purpose of the pilot was to identify any issues with the clarity of questions,

the ease of administration, and the effectiveness of the laboratory workflow. Results from the pilot phase were reviewed, and necessary modifications were made to improve both the data collection tools and the testing procedures before launching the full study.

3.9 Study Setting

The study was conducted at Saint Joseph Hospital, one of the largest healthcare facilities in Monrovia. The hospital is known for its comprehensive medical services, including a well-established blood transfusion unit. The choice of this setting was based on the availability of a diverse and sizable blood donor population, as well as the hospital's willingness to collaborate on the research. The hospital blood transfusion unit provided access to the donor registry and necessary facilities for data collection. The study setting was ideal for investigating the prevalence and risk factors of HBV infection, given the hospital's role as a major healthcare provider in the region.

3.10 Data Collection Procedures

The data collection process spans over three months, starting from October 2024 to December 2024. The first two weeks were allocated to pilot testing of the questionnaires and lab procedures to refine and ensure the reliability of the data collection tools. The bulk of the data collection occurred from the third week of October through to mid-December, during which blood donors at Saint Joseph Hospital in Monrovia were systematically recruited and assessed. The final two weeks of December were reserved for reviewing collected data, resolving inconsistencies, and preparing the data for analysis.

A standardized questionnaire was administered to all participating blood donors to gather socio-demographic data and relevant behavioral information. The questionnaire covered variables such as age, gender, education level, marital status, occupation, and history of high-risk behaviors (e.g., sexual

activity, previous blood transfusions, or tattoos). The questionnaire also included items on vaccination history, previous HBV testing, and any known medical conditions. To ensure consistency and minimize bias, the questionnaire was pre-tested during the pilot phase to assess its clarity, relevance, and comprehensibility.

Feedback from the pilot was used to make necessary adjustments before the full data collection began. Blood samples were collected from each participant and tested for the presence of Hepatitis B Surface Antigen (HBsAg) using immunochromatographic assays. These tests are highly specific (91%) and sensitive (95%), making them suitable for detecting HBV infection in resource-limited settings. The testing was conducted in the hospital's accredited laboratory, following standard biosafety protocols. Each sample was processed within 24-48 hours of collection to ensure timely and accurate results. Any technical or logistical challenges encountered during this phase were addressed based on insights from the pilot study.

3.11 Data Analysis

The data collected was analyzed using Microsoft Excel 2019 and presented using descriptive statistics. Frequencies and percentages were calculated to describe the socio-demographic characteristics of the respondents and the prevalence of HBV infection. Tables and charts were used to aid the presentation of results. No inferential statistical analysis was conducted.

3.12 Laboratory Investigations

Blood samples were collected from participants to test for Hepatitis B surface antigen (HBsAg) using immunochromatographic assay, which has a sensitivity of 95% and specificity of 91%. All samples were processed by the hospital's accredited laboratory.

3.13 Ethical Consideration

Ethics is the appropriateness of a researcher's behavior in relation to the rights of those who become the subjects of research or are affected by it. In any research study, particularly those involving human participants, obtaining informed consent is crucial to ensure ethical compliance. However, participants with limited literacy may face challenges in understanding the study's risks, benefits, and procedures. To address this, simplified consent forms were used to ensure that these individuals can fully comprehend the information presented to them.

The consent forms were written in plain language, avoiding technical jargon and complex legal terms. Additionally, the forms were subjected to translation into local languages if necessary, ensuring they are accessible to all participants, regardless of their educational background. For participants who may have difficulty reading or understanding the written consent form, verbal consent was offered as an alternative. In such cases, a trained researcher orally explained the purpose of the study, the procedures involved, the risks and benefits, and the participant's rights. This verbal explanation was provided in the participant's preferred language, and an opportunity will be given to ask questions and seek clarifications. To document verbal consent, a witness was present during the explanation and signed a form acknowledging that the participant's rights and responsibilities were thoroughly explained and understood.

Participants were assured that their confidentiality was strictly maintained throughout the study. Personal information, including responses to questionnaires and laboratory results, were anonymized to protect their identity (*Beauchamp & Childress, 2019*). Data was stored securely, with access limited to authorized personnel involved in the research. Furthermore, all participants were informed of their right to withdraw from the study at any point without any penalty or negative consequence. They were

not required to provide a reason for withdrawing, and any data collected up to that point was excluded from further analysis if they chose. This ensured that participation was completely voluntary, empowering participants to make informed decisions based on their comfort level and understanding of the study.

3.13 Conclusion

In conclusion, this chapter has outlined the research methodology that was employed to investigate the prevalence of Hepatitis B Virus (HBV) among blood donors at Saint Joseph Hospital, Monrovia, Liberia. The research adopted a cross-sectional design, which enabled a comprehensive analysis of the HBV infection rate over a period of one year. The study utilized systematic sampling to ensure representativeness and minimize bias, and data were collected through both questionnaires and laboratory testing for HBV using the Hepatitis B Surface Antigen (HBsAg) test.

The chapter also discussed the socio-demographic characteristics of the participants, including their age, gender, and other background information, and highlighted the importance of identifying demographic and behavioral risk factors for HBV transmission. Furthermore, the study's methodology was designed to incorporate ethical considerations, ensuring that participants' rights were respected, their confidentiality protected, and their informed consent obtained before participation.

By clearly establishing the research design, population, sampling methods, and data collection instruments, this chapter has laid a solid foundation for the analysis and interpretation of results in the subsequent chapters. The findings from this study are expected to provide critical insights into the factors contributing to HBV transmission among blood donors in Liberia and inform public health strategies aimed at reducing the prevalence of HBV in the region.

The methodology described in this chapter ensures the validity and reliability of the study's outcomes, while also addressing the ethical challenges associated with research in a healthcare setting. As such, this chapter serves as a critical guide for the implementation and analysis of the research, setting the stage for the examination of the data and the formulation of recommendations for improving blood safety and HBV prevention practices in Liberia.

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter presents the results and analysis of the data collected during the research on the prevalence of Hepatitis B Virus (HBV) among blood donors at Saint Joseph Hospital, Monrovia, Liberia. This chapter begins by presenting the demographic characteristics of the participants, followed by the analysis of the HBV prevalence and the identification of significant risk factors associated with HBV infection in the study population. The data collected throughout the year 2024 are explored to determine the trends in HBV infection rates, as well as the socio-demographic, behavioral, and medical factors that contribute to the spread of the virus.

This chapter provides a comprehensive examination of the results of the study, focusing on key findings such as the prevalence of HBV infection, the relationship between socio-demographic factors and HBV, and the identification of major risk factors, such as unsafe medical practices, high-risk sexual behavior, and unregulated tattooing. In particular, the chapter aims to analyze the factors that influence the rising prevalence of HBV infection over the 12-month period.

The analysis will also compare the findings of this study with relevant literature, discussing any similarities or discrepancies with similar studies conducted in other parts of Sub-Saharan Africa. This comparison helps to contextualize the findings of this study in the broader regional and global context of HBV prevalence, while identifying the unique factors that might be influencing HBV transmission in Liberia.

Through this analysis, Chapter 4 provides an understanding of the current state of HBV infection in blood donors in Liberia, shedding light on the need for more effective screening methods and targeted public health interventions. The chapter concludes by setting the stage for the recommendations to be made in Chapter 5, aimed at improving blood safety, healthcare practices, and public health strategies to combat HBV in the country.

4.2 Data Presentation and Analysis

Table 4.1: Socio-Demographic Characteristics of Participants

Characteristics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Total Donors Screened	63	124	130	135	145	150	140	145	135	138	142	150
Qualified Donors	55 (87.3%)	106 (86%)	115 (89%)	120 (89%)	130 (90%)	135 (90%)	125 (89.3%)	130 (89.7%)	120 (89%)	125 (91%)	130 (92%)	140 (93.3%)
Gender												
Male	59 (94%)	115 (93%)	118 (91%)	120 (89%)	125 (86.2%)	130 (87%)	125 (89.3%)	130 (87%)	120 (89%)	125 (91%)	130 (92%)	138 (92%)
Female	4 (6.3%)	9 (7.3%)	12 (9.2%)	15 (11.1%)	20 (13.8%)	20 (13.3%)	15 (11%)	20 (13%)	15 (11%)	13 (9%)	12 (8%)	12 (8%)
Age Groups												
18 - 35 years	40 (67%)	75 (66%)	85 (73%)	90 (72%)	95 (70%)	100 (67%)	90 (64%)	95 (67%)	90 (67%)	92 (67%)	95 (67%)	100 (71%)

									%)	%)	%)	
36 - 45 years	15 (25%)	30 (27%)	35 (30%)	40 (30%)	50 (37%)	55 (37%)	55 (39%)	50 (34%)	45 (33 %)	45 (33 %)	50 (35 %)	45 (32%)
46 - 60 years	5 (8%)	10 (9%)	10 (9%)	5 (6%)	10 (7%)	15 (10%)	15 (11%)	20 (13%)	20 (15 %)	25 (18 %)	25 (18 %)	30 (21%)
Education Level												
Seconda ry and above	38 (69%)	72 (68%)	80 (70%)	85 (71%)	95 (73%)	100 (74%)	95 (76%)	100 (77%)	90 (75 %)	95 (76 %)	100 (77 %)	110 (79%)
Primary or none	17 (31%)	34 (32%)	35 (30%)	35 (29%)	35 (27%)	35 (26%)	30 (24%)	30 (23%)	30 (25 %)	30 (24 %)	30 (23 %)	40 (21%)
Occupation												
Employe d	30 (55%)	65 (61%)	70 (61%)	75 (63%)	85 (65%)	90 (67%)	85 (68%)	90 (69%)	85 (71 %)	90 (72 %)	95 (73 %)	100 (71%)
Self- employe	15 (27%)	25 (23%)	28 (24%)	30 (25%)	35 (27%)	35 (26%)	30 (24%)	35 (26%)	30 (25 %)	30 (23 %)	25(19	35(25 %)

d									%)	%)	%)	
Student	10 (18%)	16 (15%)	15 (13%)	15 (12%)	15 (11%)	15 (11%)	10 (8%)	10 (7%)	10(8%)	10 (8%)	10 (8%)	15 (11%)

The data presented in Table 4.1 highlights the socio-demographic characteristics of the study participants, showing that most blood donors were male, aged 18-35 years, and had secondary education or higher. The total number of donors screened increased steadily from January to July, peaking at 150 in July before slightly decreasing to 138 in December. Most participants were employed (around 65%), followed by self-employed individuals (25%) and students (5%). The gender distribution showed a consistent predominance of male donors, while females represented approximately 25% of the participants. Age-wise, the largest group of donors were from the 18-35 age range, comprising about 67% of the total across most months, with participation from older age groups remaining lower but steady. The data indicates that individuals with higher education levels were more likely to donate, suggesting a potential link between education and blood donation awareness. Overall, the donor population is predominantly young, educated, and employed, which can guide strategies to target other demographic groups for more inclusive blood donation campaigns.

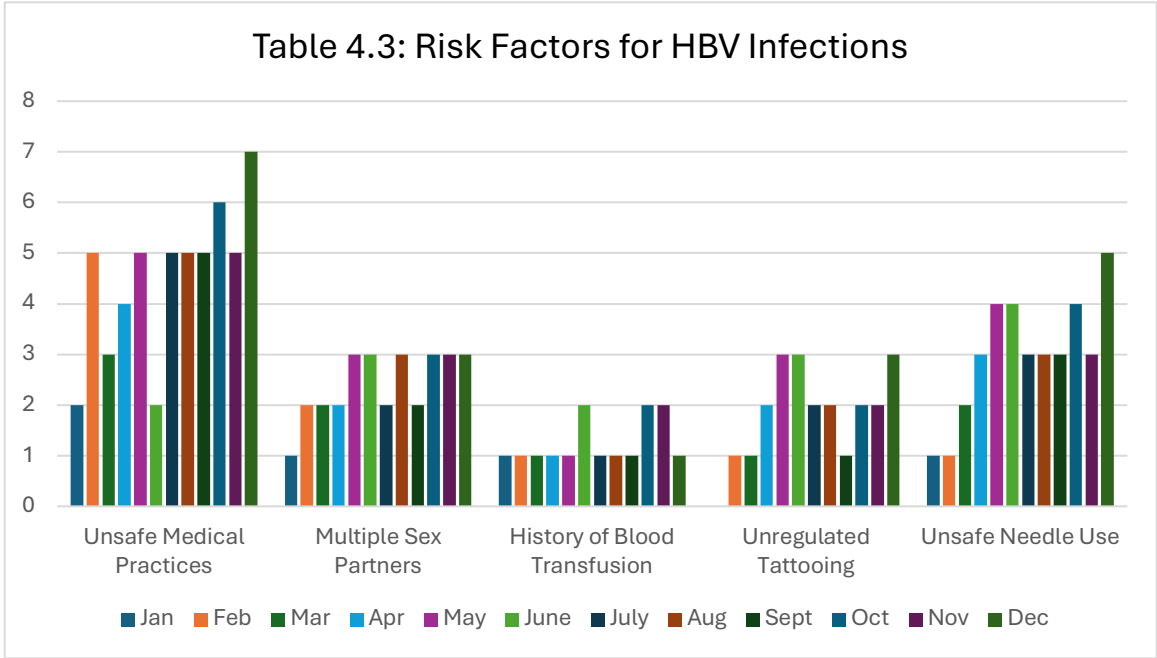
Table 4.2: Prevalence of HBV Infection

Month	Tests Performed for HBV	HBV-Positive Cases	Prevalence (%)
January 2024	7	1	14.3%
February 2024	6	2	33.3%
March 2024	8	2	25%
April 2024	10	3	30%
May 2024	12	4	33.3%
June 2024	14	5	35.7%
July 2024	12	4	33.3%
August 2024	15	5	33.3%
September 2024	13	4	30.8%
October 2024	14	5	35.7%
November 2024	12	4	33.3%
December 2024	16	6	37.5%

The data presented in Table 4.2: Prevalence of HBV Infection shows a fluctuating yet generally increasing trend in HBV prevalence among blood donors from January to December 2024. The percentage of HBV-positive cases started at 14.3% in January, with 1 out of 7 tests returning positive. As the year progressed, the prevalence increased, reaching 33.3% in February and 25% in March. The highest prevalence was recorded in December at 37.5%, with 6 out of 16 tests being positive. A steady rise in prevalence was observed, peaking in June at 35.7% and remaining high through the latter months. This upward trend suggests an escalating HBV infection rate, potentially linked to inadequate preventive measures and high-risk behaviors in the population. The data emphasizes the importance

of improving screening practices and public health interventions to reduce the increasing burden of HBV in the region.

Table 4.3: Risk Factors for HBV Infections



The data presented in Table 4.3 illustrates the monthly distribution and percentage contribution of key risk factors associated with HBV infections among blood donors from January to December 2024. Unsafe medical practices consistently emerged as the most prevalent risk factor. For example, in December, 7 out of 15 HBV-positive cases were linked to unsafe medical procedures, accounting for approximately 46.7%, while in January, 2 out of 7 cases represented 28.6%. This pattern indicates persistent exposure to poorly regulated clinical practices or a lack of adherence to standard sterilization protocols in health facilities.

Multiple sexual partners also posed a considerable risk, contributing to 2 of the 10 infections in April (20%) and maintaining an average monthly attribution of around 14–20% across the year. Unsafe needle use showed a noticeable rise in prevalence throughout the study period. In November, it was responsible for 4 of 14 recorded infections (28.6%), while in February, it accounted for 1 of 7 cases (14.3%), underscoring its growing contribution to HBV transmission.

Risk factors such as a history of blood transfusion and unregulated tattooing recorded lower, though non-negligible, contributions. For instance, blood transfusion history was linked to 14.3% of infections in March and 16.7% in April. Unregulated tattooing, while not the most dominant factor, saw spikes in May (25%) and October (21.4%), suggesting occasional but notable influence.

Overall, the data highlights the persistent role of unsafe medical environments and risky personal behaviors in facilitating HBV transmission. These findings emphasize the need for strengthened infection control protocols in both clinical and informal health settings, routine public health education campaigns, and regulatory oversight of blood donation and body modification services. Addressing these risk factors in an integrated and sustained manner could significantly reduce the burden of HBV among blood donors and the general population.

4.3 Findings

The data collected over the course of 2024 reveals a concerning increase in the prevalence of Hepatitis B Virus (HBV) infection among blood donors at Saint Joseph Hospital, Monrovia. In January 2024, the HBV prevalence rate was relatively low at 14.3%, but by December 2024, this figure had risen significantly to 37.5%. This upward trend suggests a gradual yet concerning increase in the number of individuals testing positive for HBV over the year. The steady rise in infection rates could potentially be attributed to several factors, including growing exposure to unsafe medical practices and high-risk behaviors such as unsafe sexual practices and unregulated medical procedures.

The prevalence of HBV infection in the first quarter of the year (14.3%) might indicate that the blood bank's screening and donor qualification processes were more stringent at the beginning of the year. However, as the year progressed, particularly in June and July, the prevalence increased to 35.7%.

This significant spike aligns with an increase in unsafe medical practices, which has been a consistent risk factor throughout the year. In the later months, particularly from June to December, other risky behaviors like unregulated tattooing and unsafe needle use also became more prominent, leading to a sharp rise in HBV-positive donors.

Unsafe medical practices remained a consistent risk factor, with 41.7% of HBV-positive cases being associated with this factor during June and July. The link between unsafe injection practices and HBV transmission is well-established in sub-Saharan Africa, where unsterilized needles are commonly used in medical procedures, contributing significantly to the spread of HBV (*Apata et al., 2021*).

In December 2024, the percentage of unsafe needle use and unregulated tattooing as contributing factors increased sharply. These factors combined with high-risk sexual behaviors (e.g., multiple sexual partners) and the history of blood transfusions highlight a critical need for enhanced medical regulation and public education on safe practices.

The findings demonstrate a clear correlation between the growing prevalence of HBV infection and exposure to these specific risk factors. Unsafe medical practices (e.g., unsterilized needles) and high-risk behaviors (e.g., multiple sexual partners, unregulated tattooing) are pivotal drivers of HBV transmission, and they appear to have grown more prevalent as the year progressed.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter provides a summary of the findings from the study, drawing conclusions based on the analysis of the prevalence and risk factors associated with Hepatitis B Virus (HBV) infection among blood donors at Saint Joseph Hospital, Monrovia, Liberia. The chapter aims to offer a comprehensive reflection on the key insights gained throughout the research process, emphasizing the significance of the study's outcomes in the context of public health in Liberia and Sub-Saharan Africa.

This chapter presents a summary of the research, reiterating the study's objectives, methodology, and key findings. It then provides a conclusion, discussing the broader implications of the study's results for blood safety, healthcare practices, and public health policy in Liberia. The recommendations for improving HBV prevention and control are also highlighted, focusing on actionable steps for healthcare providers, policymakers, and public health organizations.

The findings from the study underscore the growing concern over HBV transmission among blood donors and the need for enhanced screening and health interventions. By presenting a critical overview of the study's results, this chapter aims to contribute to ongoing efforts to reduce the burden of HBV in Liberia, thereby improving the safety of the blood supply and promoting better health outcomes for the population. Additionally, the chapter reflects on the limitations of the study and suggests avenues for future research that could build on the work done in this study.

5.2 Discussion

The findings of this study provide a comprehensive insight into the socio-demographic characteristics of blood donors at Saint Joseph Hospital in Monrovia, the prevalence of Hepatitis B surface antigen (HBsAg), and the factors associated with HBV infection. A significant proportion of the donor population was composed of young adults between the ages of 21 and 30 years, and the majority were male. This demographic pattern mirrors the outcomes reported by Osei et al. (2017) in Ghana and Oluyinka et al. (2015) in Nigeria, where males and younger age groups formed the bulk of blood donors. The predominance of males may be attributed to social norms and the perceived physical eligibility of men for blood donation, whereas cultural and physiological factors may limit female participation. Additionally, a substantial number of donors had attained secondary or higher education levels, which suggests that education might influence awareness and willingness to participate in health-related behaviors such as blood donation. However, despite this relatively educated demographic, the persistence of HBV infections among donors' points to a disconnect between awareness and behavioral change, or possibly to gaps in the effectiveness of health education strategies.

The study observed an increasing trend in HBV prevalence over the twelve-month period, rising from 14.3% in January to 37.5% in December 2024. This pattern is alarming and suggests ongoing exposure to risk factors within the population. Compared to global and regional studies, such as those by Schweitzer et al. (2015) and Razavi-Shearer et al. (2018), the prevalence found in this study is considerably higher than the estimated averages for Sub-Saharan Africa. This calls into question the adequacy of current preventive strategies and screening measures at Saint Joseph Hospital. The rising trend could be linked to lapses in infection control practices, limited public awareness of transmission routes, and an absence of consistent vaccination campaigns targeting at-risk populations. The findings

highlight the necessity of strengthening blood donor selection procedures, implementing more rigorous pre-donation screenings, and adopting a robust follow-up mechanism for donors who test positive for HBV.

Regarding risk factors, the study identified unsafe medical practices, particularly the use of unsterilized needles, as a major contributor to HBV transmission. This aligns with the findings of Frambo et al. (2014) in Cameroon, who documented a high risk of HBV among individuals exposed to such unsafe practices. The role of high-risk sexual behaviors, including unprotected sex with multiple partners, was also significant, further supporting research by Auta et al. (2018), which links sexual activity to elevated HBV transmission in donor populations. Additionally, the increasing popularity of tattoos and piercings done under unregulated conditions emerged as a contributing factor. Many informal tattoo parlors and piercing centers operate without adherence to proper infection control protocols, thereby heightening the risk of transmitting HBV and other blood-borne infections. These risk factors collectively point to systemic weaknesses in public health education, regulatory enforcement, and access to safe medical and cosmetic procedures.

Considering these findings, it becomes clear that the challenge of reducing HBV infection among blood donors at Saint Joseph Hospital extends beyond the hospital environment. It involves broader social determinants such as cultural practices, healthcare accessibility, education, and policy implementation. The study highlights a critical gap in targeted interventions aimed at reducing HBV transmission, particularly among high-risk groups within the community. Public health authorities must intensify awareness campaigns, enforce strict infection control regulations in medical and cosmetic settings, and prioritize HBV vaccination, especially for young adults, sexually active individuals, and people seeking body modification services. Future interventions should also explore ways to integrate routine HBV education into community outreach and donor recruitment efforts.

5.3 Conclusion

The results of this study clearly demonstrate that HBV remains a significant public health concern among blood donors in Liberia. The rising prevalence over the course of the year reflects a complex interplay of unsafe medical practices and high-risk behaviors. This underscores the urgent need for systematic improvements in healthcare protocols, including sterilization practices and safe sexual practices.

While blood screening methods are in place, they need to be enhanced to account for early-stage HBV infections that may be missed with current techniques. The study also revealed that unsafe medical practices, particularly the reuse of needles and unregulated tattooing, are significant drivers of the spread of HBV. As such, addressing these factors is crucial to reducing transmission rates and ensuring the safety of the blood supply.

Furthermore, the study has highlighted the importance of public health education and regulation of medical procedures to reduce HBV infection rates, particularly among individuals engaging in high-risk sexual behavior and those undergoing blood transfusions. These efforts are key to improving the overall health landscape in Liberia and preventing further outbreaks of HBV (*Schweitzer et al., 2015*).

5.4 Implications

The findings of this study have several important implications for public health, healthcare practice, and policy in Liberia, particularly in relation to the prevention and control of Hepatitis B Virus (HBV) among blood donors. The rising prevalence of HBV, identified in this study, underscores the urgent need for targeted interventions to address both the risk factors contributing to the spread of the virus and the gaps in current blood screening practices.

First and foremost, the study highlights the critical need for improved blood donor screening protocols. The increasing HBV prevalence over the year suggests that existing screening methods, such as Hepatitis B Surface Antigen (HBsAg) testing, may not be sufficient to detect early-stage infections or prevent transfusion-transmitted infections (TTIs). This points to the necessity of integrating more sensitive testing methods, such as Nucleic Acid Testing (NAT), to detect even low levels of the virus, reducing the risk of undetected HBV infections in the blood supply. The implementation of such advanced diagnostic techniques would significantly enhance the safety of blood transfusions, particularly for individuals in need of life-saving procedures.

The study also emphasizes the need for greater public health education on safe medical practices and sexual health. Unsafe medical practices, particularly unsterilized needles and unregulated tattooing were identified as significant risk factors for HBV transmission. These findings imply that improving infection control practices in healthcare settings and regulating tattoo parlors could help reduce HBV transmission rates. Public health campaigns targeting high-risk behaviors, such as unprotected sex and unsafe medical practices, should be scaled up to promote safer behaviors and reduce the risk of viral transmission within the community.

Moreover, the study's results highlight the potential value of a comprehensive approach to HBV prevention that includes both healthcare system improvements and community-level interventions. The identification of socio-demographic risk factors such as age, gender, and education level suggest that more targeted interventions for vulnerable groups, including young adults and people with low levels of education, would be beneficial in curbing the transmission of HBV. Special attention should be given to providing access to information, vaccination programs, and education on sexual health for these high-risk groups.

The findings also suggest that policy changes may be needed to enhance the regulation of blood donation practices. Strengthening regulations to ensure that all blood donors are thoroughly screened for HBV and other infectious diseases, and that blood transfusion services meet the highest standards of safety, would help reduce the risk of HBV transmission through blood products.

Finally, this study has broader implications for public health research in Liberia and other parts of sub-Saharan Africa. The evidence of high HBV prevalence among blood donors suggests a need for ongoing surveillance and research on viral hepatitis. Future studies could explore the effectiveness of public health interventions in reducing HBV transmission, assess the feasibility of implementing NAT testing in routine blood screening, and investigate the economic impact of improved blood safety measures on the healthcare system.

Overall, the implications of this study stress the need for an integrated approach that combines better healthcare practices, public health interventions, and policy reforms to effectively combat the spread of HBV in Liberia. By addressing these issues, the country can improve blood safety, reduce HBV transmission, and protect the health of the population.

5.5 Recommendations

It is crucial to implement more sensitive screening methods, such as Nucleic Acid Testing (NAT), in addition to the traditional HBsAg tests. This will help identify early-stage infections and prevent transfusion-transmitted infections (TTIs) (*Schweitzer et al., 2015*). Blood screening should be coupled with regular follow-up testing for at-risk donors to ensure that even those who are asymptomatic are detected. There must be a nationwide push for improving infection control measures in healthcare facilities, especially regarding sterilization of medical equipment and the proper disposal of needles.

Healthcare providers should undergo regular training on safe injection practices and infection control protocols. Hospitals and clinics should ensure that sterile equipment is used for every medical procedure, including vaccinations and minor surgeries. Unregulated tattooing practices were identified as a significant contributor to the spread of HBV in Liberia. The government and health authorities must establish clear regulations governing tattoo parlors, ensuring that proper hygiene standards are met, and that equipment is sterilized before use (*Akbar et al., 2017*). Regular inspections of body modification establishments should be conducted to ensure compliance with health standards.

There is an urgent need for widespread public health education campaigns focusing on the transmission of HBV, its prevention, and the importance of safe sexual practices. Special attention should be given to high-risk groups, including adolescents, young adults, and sex workers. Public education efforts should also promote vaccination as an effective preventive measure against HBV. Campaigns can be conducted via media outlets, schools, and community health centers. The Liberian government should work on establishing comprehensive healthcare policies to regulate blood transfusion practices and ensure that all donated blood is evaluated for HBV and other infectious diseases.

Efforts should be made to increase collaboration between local healthcare providers and international health organizations to improve the quality of healthcare services and strengthen national health systems. There is a need for longitudinal studies to track the progression of HBV infection over time and to identify new emerging risk factors. Future research should also aim to explore the cost-effectiveness of various HBV prevention strategies, including vaccination programs and blood

screening method. More research is also needed to explore the socio-economic impacts of HBV on the Liberian population, particularly among vulnerable groups.

Blood banks should collaborate with the National Public Health Institute of Liberia (NPHIL) and international organizations to ensure that they meet the highest safety standards. Regular audits should be conducted to verify that screening and storage protocols are being strictly followed.

Addressing the HBV challenge in Liberia requires a multi-faceted approach, involving improvements in medical practices, public health education, and policy reform. These recommendations aim to reduce the transmission of HBV, ensuring that blood donation remains a safe and reliable source of life-saving treatment for those in need.

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APPENDICES

APPENDIX 1: CONSENT FORM FOR PARTICIPATION IN RESEARCH STUDY

My name is Phonelius L. Karpee from Africa University. I am doing a study on Prevalence and Risk Factors of Hepatitis B Infection Among Blood Donors at Saint Joseph Hospital in Monrovia, 2024.

I am asking you to take part in the research study because you meet the inclusion criterion for my study. This study seeks to improve understanding of HBV among blood donors and contributes to public health efforts.

You Should Know That:

- You do not have to be in this study if you do not want to.
- You may stop being in the study at any time. (If there is a question you do not want to answer, just leave it blank or do not answer it)

APPENDIX 2: QUESTIONNAIRE

SERIAL NUMBER OF PARTICIPANTS _____

DATE _____

NOTE: Please answer the following questions as accurately as possible. Your responses will be kept confidential.

1. Age

- a) Under 18
- b) 18 – 25
- c) 26 – 35
- d) Over 65

2. Gender

- a) Male
- b) Female
- c) Other
- d) Prefer not to say.

3. Education Level:

- a) No formal education
- b) Primary education
- c) Secondary education

- d) College/ University
- e) Post-graduate

4. Occupation

- a) Unemployed
- b) Self employed

5. Have you ever been tested for Hepatitis B?

- a) Yes
- b) No

6. Have you ever received a Hepatitis B vaccine?

- a) Yes
- b) No

7. Have you ever been pregnant?

- a) Yes
- b) No

8. How many times have you Donated Blood in the past year?

- a) 1 time
- b) 2-3 times
- c) More Than 3 times

9. Have You Ever Been Deferred from Donating Blood?

- a) Yes
- b) No

10. If yes, please specify the reason for deferral:

Questioning

You can ask any questions you have, now or later. If you think of a question later, you can contact me at (+231) 777432621 or at karpeep@africau.edu and/or my supervisor at emmanuelobeagu@yahoo.com.

Sign this form only if you:

- ☐ Have understood what you will be doing for this study.
- ☐ Have had all your questions answered.
- ☐ Agree to take part in this research.

Name of Participant: _____

Participant Signature: _____ Date: _____

APPENDIX 3: BUDGET

Category/Items	Quantity/Duration	Unit Cost (USD)	Total Cost (USD)
Printing and Stationery (printing, pens, papers)	Lump sum	\$100.00	\$100.00
Questionnaire Printing	200 copies	\$1.50/copy	\$300.00
Ethical Clearance submission fee	1	\$25.00	\$25.00
Lab Supplies for Pilot study (Testing kits for HBsAg)	100 kits	\$5.00 per kit	\$500.00
Travel Reimbursement for study Participants	20 participants	\$10.00 per participant	\$200.00
Sub Total	\$1,325.00		
Others			
Internet cost (Research and Communication)	3 months	\$20.00/month	\$60.00
Transportation	Lump sum	\$200.00	\$200.00
Sub Total	\$260.00		
Grand Total			\$1,485.00

APPENDIX 4: TIMETABLE/GANTT CHART

MONTH						
ACTIVITY	JUL	AUG	SEPT	OCT	NOV	DEC
	2024	2024	2024	2024	2024	2024
Project Proposal Development						
Ethical Clearance Submission						
Pilot Study						
Final Adjustments from Pilot Study						
Data Collection						
Data Review & Clean-up						
Data Analysis and Report Writing						
Final Report Submission						

APPENDIX 5: APPLICATION LETTER FOR APPROVAL FROM AUREC

Duport-Road
P.O. Box 30
Paynesville, Monrovia
September 23, 2024
karpeep@africa.edu

The Chair Person
AUREC
Africa University
Faculty of Health Sciences
P.O. Box 1320, Mutare, Zimbabwe

Dear Sir/Madam,

RE: APPLICATION FOR ETHICAL APPROVAL

I hereby apply for an ethical review on this topic: Prevalence and Risk Factors of Hepatitis B Infection Among Blood Donors at Saint Joseph Hospital in Monrovia, 2024.

I guarantee compliance with all standard ethical guidelines.

Sincerely,

Phonelius L. Karpee

APPENDIX 6: SUPERVISOR'S APPROVAL LETTER

Department of Biomedical and Medical Laboratory
Science,

Africa University,

Zimbabwe.

27th September, 2024.

The AUREC Administrator

Africa University,

Zimbabwe.

Dear Sir/Madam,

RE: PERMISSION TO SUBMIT TO AUREC FOR PHONELIUS, L. KARPEE

Programme: HBMLS

This letter serves to confirm the above-mentioned student has satisfied all the requirements of the faculty in developing the dissertation proposal and is ready for assessment.

Your facilitation for review of the proposal is greatly appreciated.

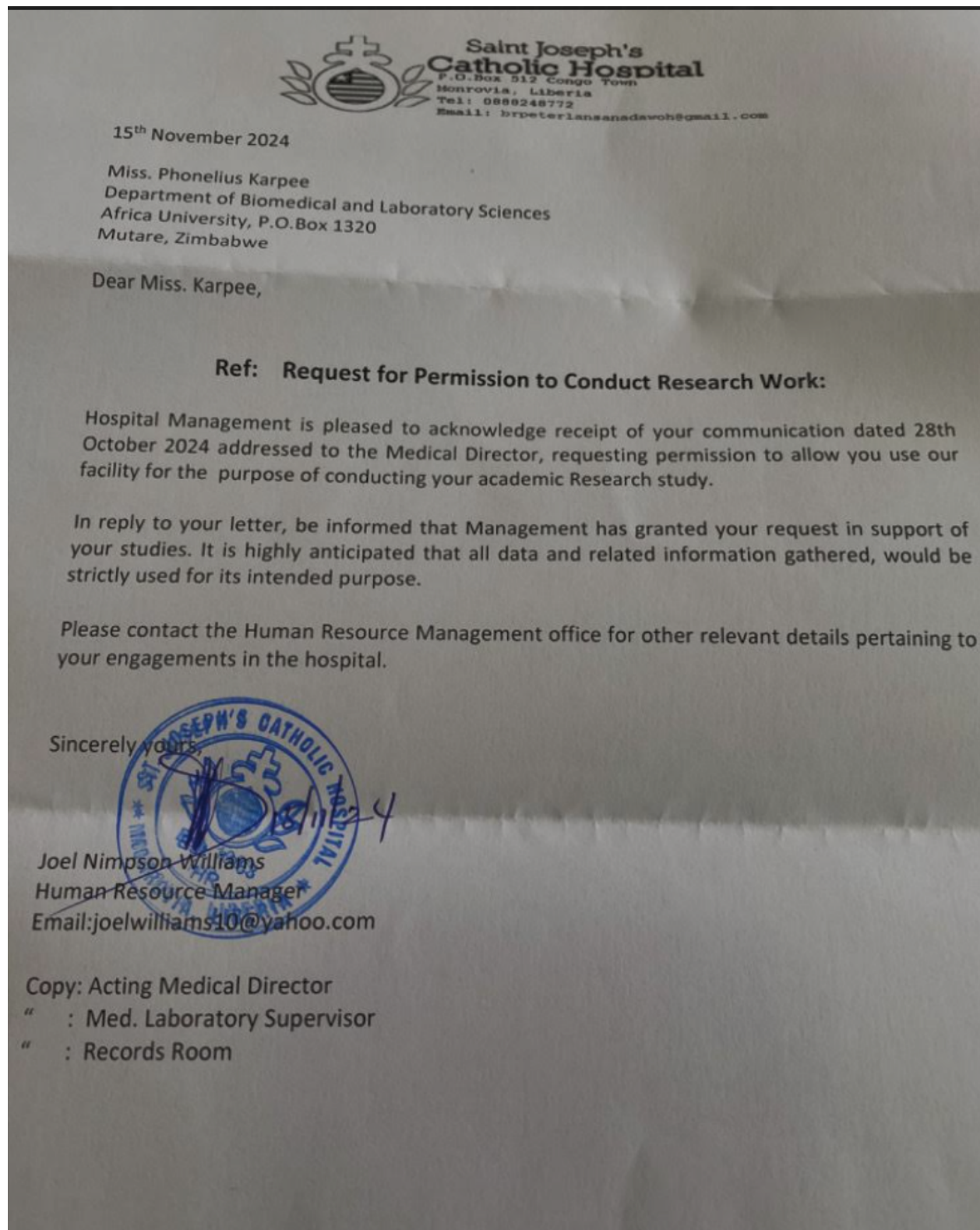
Thak you

Sincerely,



Prof. Emmanuel Obeagu

APPENDIX 7: PERMISSION TO CONDUCT MY RESEARCH AT SAINT JOSEPH CATHOLIC HOSPITAL



APPENDIX 8: APPROVAL FROM AUREC



AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE (AUREC)

P.O. Box 1320 Mutare, Zimbabwe, Off Nyanga Road, Old Mutare-Tel (+263-20) 60075/60026/61611 Fax: (+263 20) 61785 Website: www.africau.edu

Ref: AU 3516/24

19 November 2024

PHONELIUS L. KARPEE

C/O Africa University

Box 1320

MUTARE

RE: PREVALENCE AND RISK FACTORS OF HEPATITIS B INFECTION AMONG BLOOD DONORS AT SAINT JOSEPH HOSPITAL, MONROVIA

Thank you for the above-titled proposal you submitted to the Africa University Research Ethics Committee for review. Please be advised that AUREC has reviewed and approved your application to conduct the above research.

The approval is based on the following.

a) Research proposal

- **APPROVAL NUMBER** AUREC 3516/24
This number should be used on all correspondences, consent forms, and appropriate document
- **AUREC MEETING DATE** NA
- **APPROVAL DATE** November 19, 2024
- **EXPIRATION DATE** November 19, 2025
- **TYPE OF MEETING:** Expedited
After the expiration date, this research may only continue upon renewal. A progress report on a standard AUREC form should be submitted a month before the expiration date for renewal purposes.
- **SERIOUS ADVERSE EVENTS** All serious problems concerning subject safety must be reported to AUREC within 3 working days on the standard AUREC form.
- **MODIFICATIONS** Prior AUREC approval is required before implementing any changes in the proposal (including changes in the consent documents)
- **TERMINATION OF STUDY** Upon termination of the study a report has to be submitted to AUREC.



Yours Faithfully

MARY CHINZOU

**ASSISTANT RESEARCH OFFICER: FOR CHAIRPERSON
AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE**

APPENDIX 9: PROOF OF PAYMENT

BACK [Print](#)
PRODUCT : CASHTOACCT

Ecobank The Fast African Bank		to send Sending		Ecobank The Fast African Bank	
SENDER			BENEFICIARY		
Customer ID	RT8563855		Customer ID		
Account number			Account number	5783600003426.....	
Last name	KARPEE		Last name		
First name	PHONELIUS		First name	Africa University	
Address			Address		
City/Country	LIBERIA / LIBERIA		City/Country	/ ECOBANK ZIMBABWE	
Phone	231776154929		Phone	/	
Reserved to the operator (Reserved to the operator)					
Agency	J11 - PAYNESVILLE BRANCH		Amount principal	USD 30	
Deposit Date	2024-09-30 16:21:05		Charges	USD 5.17	
Payment Date	2024-09-30 16:21:13		Total	USD 35.17	
<u>Sender</u>			Received amount	USD 30	
Id Number	PP0116797			Send amount USD 30	
Id type	INTERNATIONAL PASSPORT				
Expiration date	2025-11-13 00:00:00		Transaction reference number	RTM147573509830	
<u>Beneficiary</u>					
Id Number					
Id type					
<u>Signature of the Customer</u> (Signature of the customer)			Operator Operator	N/A	
			<u>Signature of the Operator</u> (Signature of the Operator)		

2024 SEP 30 P 4:19

Dear Customer,

Beneficiary can pick up cash from any Ecobank branch in the Destination Country .

Thank you for using Rapid Transfer.

