SEROPREVALENCE AND TYPES OF TRANSFUSION TRANSMISSIBLE INFECTIONS AMONG BLOOD DONORS IN THE BLOOD BANK OF UNIVERSITY OF BENIN TEACHING HOSPITAL

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BEING A RESEARCH WORK SUBMITTED TO THE DEPARTMENT OF MEDICAL LABORATORY SCIENCE, SCHOOL OF BASIC MEDICAL SCIENCES, COLLEGE OF MEDICAL SCIENCES, UNIVERSITY OF BENIN, BENIN CITY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF MEDICAL LABORATORY SCIENCE (B.MLS) DEGREE IN MEDICAL LABORATORY SCIENCE

SEPTEMBER, 2023

CERTIFICATION

This is to certify that this seminar work was carried out by **Akpan Paul Akaninyene** with the matriculation number of **BMS1702065** under the supervision of **Dr. Mrs J. C. Otikor** in partial fulfilment for the award of Bachelor of Medical Laboratory Science degree (BMLS) Degree.

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EXTERNAL SUPERVISOR DATE

DEDICATION

I dedicate this seminar work to The Almighty and the memory of my late father, Mr. Akaninyene Okon Akpan; continue to rest in peace.

ACKNOWLEDGEMENT

I give thanks to God almighty for His grace upon my life and for seeing me through this project work.

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ABSTRACT

Transfusion Transmissible Infections (TTIs) pose a significant risk to the safety of blood transfusions and public health. This therefore, underscores the need for stringent blood safety measures to mitigate potential infection transmission risks. The aim of this study was to assess the seroprevalence and types of transfusion-transmissible infections among prospective donors in the blood bank of the University of Benin Teaching Hospital. This study utilized a retrospective study design to investigate the seroprevalence of TTIs over a 12-month period. Coordination was established with the blood bank staff and hospital administration to gain access to the required blood bank records. Specific variables were identified for analysis, including donor ID, donation date, and test results for HIV, HBsAg, HCV, and VDRL, and demographic information such as age and gender. During the initial laboratory investigations, Donor samples were subjected to rapid testing kits and the ABBOTT machine was used to re-affirm positive cases. During the 12 month study period from July 2022 to June 2023, a total of 3241 blood donors were registered. Testing showed an infection-positive test of 248, which gives an overall prevalence of 7.65%. The seroprevalence of Transfusion-Transmissible infections were found to be 0.93%, 2.35%, 1.85% and 2.53%, for HIV, HBsAg, HCV and syphilis as respectively. There was no statistically significant difference in the trend of donors over the months. Of the 2707 male donors recorded the seroprevalence of HIV, HBsAg, HCV and syphilis were found to be 0.99%, 2.11%, 1.81%, and 2.66% respectively. While 534 female donors recorded, the prevalence of HIV, HBsAg, HCV and syphilis was found to be 0.75%, 3.56%, 2.05%, and 1.87% respectively. Correlation analysis showed no statistically significant association between TTI rates and Gender groups ($p>0.05$). Correlation Analysis shows a significant association ($p = 0.01$) between the prevalence of TTI and donor categories considered to be replacement donors and voluntary donors. The findings underscore the importance of continuous vigilance in maintaining blood safety standards and highlight the variable prevalence rates of HIV, HBsAg, HCV, and syphilis among different demographic groups. This study emphasizes the critical role of targeted interventions to mitigate infection transmission, ensuring the safety of the blood supply and the well-being of recipients. Efforts should be continually intensified in ensuring maximum safety of blood for transfusion. This can be achieved by screening, counselling and creating awareness on the need for regular testing of TTIs to reduce transmission among prospective donors

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF STUDY

The procedure of donating blood, either as a complete unit or as separate components, for the purpose of transfusion is known as blood donation. Donating blood is crucial in the medical field since transfusing blood is both a life-sustaining and life-saving process. As a first line of treatment, it has been likened to therapeutic phlebotomy (Ingwu *et al*., 2018).

In the early 17th century, doctors attempted animal to human blood transfusions. These first attempts failed and were disastrous. They laid the groundwork for future transfusion studies. In the 1900s, Karl Landsteiner discovered the ABO blood grouping system and performed the first successful blood transfusion. In the 1930s, blood banks were established as the central location for collecting and distributing blood for transfusion in medical emergencies or wartime (Learoyd 2012). Improvements in donor screening and blood preservation techniques have also contributed to the safety of transfusions today. The worldwide practise of donating blood has helped save countless lives (Caram-Deelder *et al*. 2017).

A person who donates his blood or blood components willingly is known as a blood donor; this is often done for the purpose of providing a transfusion to another individual, as well as for the purpose of using the blood in research or apheresis (Owusu-Ofori *et al*., 2020).

The World Health Organization (WHO) recognizes three distinct types of blood donors based on their motivations and circumstances (Adejoh *et al*., 2020). Voluntary donors, the first category, selflessly offer their blood without any expectation of financial gain or rewards, solely driven by their desire to contribute to the welfare of others. Family replacement donors, the second group, are typically family members, friends, or acquaintances of the recipient who willingly provide blood to meet the recipient's specific needs (Ergen *et al*., 2022). These donors act out of love, compassion, and the desire to support their loved ones in times of medical necessity. Finally, the third category comprises commercial donors, individuals who receive payment or other incentives for their blood contributions (Ibegbulam *et al*., 2018). While these donors may help meet blood supply demands, the WHO acknowledges the need for careful regulation and ethical

considerations to ensure the safety, quality, and sustainability of the blood supply from all donor types (Khan *et al*., 2023).

It is impossible to overstate the significance of blood donation due to its life-saving function. The knowledge of apheresis enables the separation of blood into various components, such as red blood cells, platelets, and plasma, which can be used to address the unique requirements of individual patients (Wadge *et al*., 2021). Red blood cells, for instance, are used to replace blood lost during surgery or in the treatment of patients with anaemia, while platelets are essential for the management of bleeding disorders and can also be used to treat cancer. Plasma is essential for patients with coagulation factor deficiencies or immune disorders. In cases of emergencies usually with patients with chronic diseases like Sickle cell disease, Thalassemia, patients are reliant on the donations from donors to manage their condition (Braester *et al*., 2021).

Transfusion Transmissible Infections (TTIs) occupies a critical aspect in the realm of blood donation by safeguarding the health and well-being of both donors and recipients. TTIs are infections that can be transmitted through the transfusion of blood or blood products (Bartonjo *et al*., 2019). The stringent screening of donated blood for TTIs holds immense significance as it serves as a critical barrier against the transmission of potentially harmful infections during the blood transfusion process.

One of the paramount reasons for prioritizing TTI screening is the safety of the recipients (Ehsan *et al*., 2020). Blood transfusions are often administered to individuals who are already vulnerable due to surgical procedures, medical conditions, accidents, or other health challenges. By meticulously screening for TTIs, the risk of introducing infections like Human Immunodeficiency Virus (HIV), hepatitis B, hepatitis C, syphilis, and other pathogens into their bloodstream is significantly mitigated (Bartonjo *et al*., 2019). This approach ensures that the intended medical treatment does not inadvertently lead to additional health complications for the recipient.

Equally important is the protection of blood donors themselves. Rigorous TTI screening enables the identification of donors who might unknowingly carry infections (Aabdien *et al*., 2020). These donors can then be informed of their health status and provided with appropriate medical guidance and support. By identifying and addressing potential health concerns, the process

maintains the well-being of donors and prevents the unwitting spread of infections through their donated blood (Aabdien *et al*., 2020).

Preventing the transmission of diseases is a core objective of TTI screening. Blood banks and transfusion centres implement thorough testing protocols to identify and eliminate blood units contaminated with TTIs. This proactive approach ensures that blood products are safe for use in medical procedures and treatments (Ehsan *et al*., 2020). It's a critical aspect of maintaining an uninterrupted and reliable blood supply, which is vital for addressing emergencies, surgeries, and on-going medical needs.

From a legal and ethical standpoint, health authorities and blood donation organizations have a responsibility to uphold the safety of blood products. This involves adhering to rigorous TTI screening practices that align with regulatory standards and ethical guidelines. By doing so, they establish trust within the community, reinforcing the notion that the healthcare system is dedicated to ensuring the welfare of both donors and recipients (Aabdien *et al*., 2020).

Advancements in medical technology have played a significant role in enhancing TTI screening accuracy and efficiency (Ehsan *et al*., 2020). Modern testing methods enable the early detection of infections, even during their nascent stages. This contributes to the overall safety of the blood supply and reinforces the commitment to maintaining the integrity of the transfusion process (Warneke *et al*., 2019).

Blood donation advanced modern transfusion treatment. This improves blood collection and storage. Blood donation has increased the specificity and sensitivity of screening and testing blood and its products to avoid the transfusion of tainted blood (Gandhi *et al*., 2018).

The significance of blood donation and transfusion as a crucial treatment cannot be overstated in contemporary medical science. It is however not without repercussions, as it facilitates the transmission of blood-borne diseases. These infections include HIV, Syphilis, Hepatitis B, Hepatitis C, Chagas Disease, Cytomegalovirus and Malaria, among others. This study will focus solely on TTIs (HIV, Syphilis, Hepatitis B and Hepatitis C) among voluntary and family replacement donors.

1.2 STATEMENT OF THE PROBLEM

Blood transfusion is an important medical practise since it has saved many people's lives. Blood transfusions save lives, but they may potentially spread dangerous illnesses called transfusion-transmissible infections (TTIs). The seroprevalence and types of transfusion transmissible infections among blood donors in Benin City is mostly unknown and this information gap constitutes a serious challenge as it inhibits attempts to improve the safety and quality of blood transfusion practises in the area (Ehsan *et al*., 2020).

1.3 JUSTIFICATION OF STUDY

Transfusing safe and accessible blood is critical. The seroprevalence and types of TTIs among blood donors in the blood banks of the University of Benin Teaching Hospital should be studied. First, this study emphasises the necessity for current and relevant TTIs seroprevalence data in Benin City. Second, TTI frequency among these donors will reveal the donor population's infection burden (Ehsan *et al*., 2020). This study will inform blood safety policies in Benin City. The findings can be applied to TTIs in blood donors in similar contexts and locations beyond Benin City.

1.4 SCOPE OF STUDY

This study focuses on the University of Benin Teaching Hospital (UBTH), located in Ugbowo, Benin City. This investigation will examine the seroprevalence and categories of transfusion transmissible infections among voluntary and family replacement donors in the blood bank of the University of Benin Teaching Hospital between July 2022 and June 2023.

1.5 STUDY AIM

The aim of this study is to assess the seroprevalence and types of transfusion-transmissible infections among blood donors in the blood bank of the University of Benin Teaching Hospital.

1.6 RESEARCH OBJECTIVES

Its specific objectives include:

1. To determine the seroprevalence of Transfusion transmissible infection, including HIV, Hepatitis B, Hepatitis C, and Syphillis among blood donors in the blood bank of the University Of Benin Teaching Hospital.

2. To determine any possible relationship between the TTIs and donor characteristics such as age, gender and donation history

1.7 RESEARCH QUESTIONS

1. What is the seroprevalence of Transfusion transmissible infection, including HIV, Hepatitis B, Hepatitis C, and Syphilis among blood donors in the blood bank of the University Of Benin Teaching Hospital?
2. Is there any possible relationship between the TTIs and donor socio demographic characteristics?

1.8 RESEARCH HYPOTHESIS

Null hypothesis (H_0): There is no significant prevalence of transfusion-transmissible infections among blood donors in the blood bank of University Of Benin Teaching Hospital.

CHAPTER TWO

LITERATURE REVIEW

2.1 REVIEW OF BLOOD DONATION

Definition and Importance of Blood Donation

Blood donation refers to the act of giving a portion of one's blood for medical use. It plays a crucial role in healthcare systems worldwide, as donated blood and its components are essential for a range of medical procedures and treatments. Blood donation is an altruistic act that has the potential to save lives, improve health outcomes, and contribute to medical research (Barhoom, 2019)

1. **Lifesaving Capability:** Blood donation is often the difference between life and death for individuals facing medical emergencies, such as trauma, surgery, childbirth complications, and various medical conditions that require blood transfusions. Donated blood provides a lifeline to patients who are critically ill or injured (Chandler *et al*., 2021).

2. **Medical Procedures:** Many medical procedures, including surgeries, organ transplants, and cancer treatments, often require blood transfusions to replenish blood loss and maintain stable health conditions during and after the procedures.

3. **Chronic Illness Management:** Individuals with chronic diseases, such as thalassemia and sickle cell anaemia, rely on regular blood transfusions to manage their conditions and lead better quality lives (Enawgaw *et al*., 2019).

4. **Support for Patients with Blood Disorders:** Patients with various blood disorders, such as haemophilia and immune deficiencies, benefit from donated blood products that provide missing factors or strengthen their immune systems (Chang *et al*., 2020).

5. **Emergency Situations:** Blood donation becomes critical during natural disasters, accidents, and emergencies that lead to a sudden influx of patients needing immediate medical attention (Enawgaw *et al*., 2019). A readily available and well-stocked blood supply is essential to respond effectively to such situations.

6. **Advancements in Medical Science:** Donated blood also plays a role in medical research and scientific advancements. It supports studies on blood-related diseases, develops new treatments, and contributes to a deeper understanding of human health (Barhoom, 2019).

7. **Community Support:** Blood donation fosters a sense of community and solidarity. People come together to help one another, promoting a culture of compassion and goodwill.

8. **Blood Banking:** Blood banks collect, test, process, and store donated blood and its components, ensuring that a safe and stable supply is available when needed. Blood banking practices contribute to the efficient and safe distribution of blood products.

9. **Sustainable Healthcare:** By donating blood, individuals actively contribute to maintaining a sustainable healthcare system. Regular blood donors are crucial to ensuring a continuous and sufficient supply of blood products for medical facilities (Barhoom, 2019).

2.1.1 Historical Context And Evolution Of Blood Donation Practices

The practice of blood donation has a rich and fascinating history that has evolved over centuries. From ancient rituals to modern medical procedures, the journey of blood donation reflects both cultural beliefs and advancements in medical science (Enawgaw *et al*., 2019).

Ancient civilizations, such as the Egyptians and Greeks, believed that blood was linked to life force and vitality. Bloodletting rituals were performed as a means of balancing the body's humours. Various cultures practiced blood sacrifices to appease gods or spirits, with the belief that offering blood would ensure protection or favour (Chang *et al*., 2020).

In the middle Ages, bloodletting continued as a medical treatment to balance the body's humours and cure ailments (Chang *et al*., 2020). This practice was based on the ancient concept of the four humours (blood, phlegm, black bile, yellow bile). Early attempts at blood transfusion often led to unsuccessful outcomes due to challenges like blood clotting and incompatibility.

Landsteiner's discovery of blood types in 1901 marked a turning point, allowing for safer blood transfusions by matching donor and recipient blood types. The 20th century saw significant breakthroughs. World War I and World War II highlighted the need for efficient blood

transfusion practices on the battlefield, leading to the establishment of blood banks and better preservation techniques (Enawgaw *et al*., 2019).

The shift towards voluntary blood donation gained momentum in the mid-20th century, moving away from paid donors and focusing on community engagement. The Red Cross and other organizations played a pivotal role in coordinating blood donation efforts during emergencies and natural disasters.

Modern blood donation practices prioritize donor safety, including rigorous disease screening, infectious agent testing, and stringent quality control. Technological advancements have streamlined blood collection, processing, and testing, enhancing the efficiency of blood banks and ensuring safer transfusions. Automation, mobile blood donation units, and online scheduling have made it easier for donors to contribute (Chang *et al*., 2020).

2.1.2 Types Of Blood Donation

Blood donation practices have evolved to include various methods and approaches to meet different medical needs and donor preferences (Enawgaw *et al*., 2019). Understanding the different types of blood donation is essential to ensure a stable and diverse blood supply for various medical treatments (Chang *et al*., 2020). Here are the key types of blood donation:

1. **Whole Blood Donation**

Whole blood donation involves collecting a unit of whole blood, which includes red blood cells, white blood cells, platelets, and plasma. This type of donation is commonly used for various medical procedures and transfusions (Goette and Stutzer, 2019). After donation, the blood is typically separated into its components for specific medical needs.

2. **Apheresis Donation**

Apheresis is an advanced donation method that allows for the selective collection of specific blood components while returning the remaining components to the donor. During apheresis, blood is drawn through a machine that separates it into components like red blood cells, platelets, or plasma (Ferguson *et al*., 2019). This method is particularly useful for donors with certain blood types that are in high demand, such as platelet donors.

3. **Autologous Donation:**

Autologous donation involves individuals donating their own blood for planned medical procedures, such as surgeries or treatments that might require blood transfusions. This type of donation ensures compatibility and reduces the risk of transfusion reactions (Enawgaw *et al*., 2019).

4. **Directed Donation:**

Directed donation occurs when a donor specifically donates blood for a particular patient, often a family member or friend. While directed donations were more common in the past, most blood banks now focus on community-based voluntary donations to maintain an adequate and diverse blood supply (Chang *et al*., 2020).

5. **Donor-Substitute Donation:**

Some countries or regions have faced challenges in obtaining sufficient voluntary blood donations. In response, policies allowing monetary compensation or replacement donations have been implemented to address blood shortages. However, these approaches raise ethical and safety concerns and are not widely endorsed by international health organizations (Goette and Stutzer, 2019).

6. **Specialized Donations:**

Beyond the primary types of blood donation, specialized donation programs exist to meet specific medical needs. For example, some blood banks encourage individuals with rare blood types to become regular donors to ensure a steady supply for patients with the same rare blood type.

2.1.3 Donor Eligibility And Screening

Before individuals can donate blood, they undergo a comprehensive eligibility assessment and screening process to ensure the safety of both the donor and the recipient. This critical step helps prevent the transmission of infectious diseases and ensures that only suitable donors contribute to the blood supply. The donor eligibility and screening process include the following components:

1. **Medical and Health Criteria**

Donors undergo a thorough medical assessment to identify any conditions or factors that might impact the safety of the donation. Essential aspects include checking the donor's haemoglobin level to ensure adequate iron levels for donation. Blood pressure is also assessed to screen for hypertension or other blood pressure-related issues. The donor's health history is scrutinized to ascertain the presence of chronic diseases, recent infections, or any risk factors that could affect the quality of the donated blood.

2. **Lifestyle and Behavioural Criteria**

Understanding the donor's lifestyle and behaviours is critical to assess their potential impact on blood safety. This includes querying about recent travel history to regions with a high prevalence of infectious diseases. Donors are also questioned about high risk behaviours that could lead to the transmission of infections, such as engaging in unprotected sex or injecting drugs. Honesty and accurate information from donors are essential for making informed decisions regarding their eligibility.

3. **Travel History and Risk Assessment**

Recent travel history is a key consideration, as different geographic areas carry varying risks of infectious diseases. Donors who have travelled to regions with on-going disease outbreaks might face temporary deferral from donation. This precautionary measure ensures that any potential risks associated with travel-related infections are minimized.

4. **Donor Deferral**

Based on the assessment, potential donors might be temporarily deferred due to health conditions, recent travel, or other factors. Deferrals are enacted to guarantee that only individuals who meet the safety criteria donate blood. Donor deferral serves as a preventive measure, safeguarding both donors and recipients from potential risks.

The donor eligibility and screening process is a crucial aspect of blood donation that guarantees the quality and safety of the collected blood. It enables healthcare professionals to identify suitable donors and ensure that donated blood is free from potential infectious agents. By

adhering to strict screening protocols, blood banks maintain the integrity of the blood supply and contribute to the health and well-being of both donors and recipients.

2.1.4 DONATION PROCEDURE

1. **Whole Blood Donation Process**

The process of whole blood donation is a structured and well-coordinated series of steps designed to collect a unit of whole blood from a willing donor. This process ensures the safety of both the donor and the recipient while contributing to the vital supply of blood for medical treatments and emergencies.

- **Donor Registration and Identification**

The journey begins with the donor's registration at the blood donation centre. Donors provide identification and complete a brief questionnaire that includes health and eligibility-related questions. This initial step verifies the donor's identity and helps determine whether they meet the necessary criteria for donation.

- **Venepuncture and Blood Collection**

Once the health assessment is complete and the donor is deemed eligible, the actual blood donation process begins. A trained phlebotomist inserts a sterile needle into a vein, usually in the arm. Blood is collected into a specialized bag designed for blood donation. The collected blood includes red blood cells, white blood cells, platelets, and plasma, making it a valuable resource for various medical treatments.

- **Monitoring and Comfort**

Throughout the blood collection process, healthcare professionals closely monitor the donor's well-being. Donors are encouraged to relax during the procedure, and their comfort and safety remain a priority. If a donor experiences any discomfort or unusual sensations, healthcare staff is readily available to address concerns and provide assistance.

2. **Blood Components Preparation**

Blood is a complex fluid composed of various components, each with distinct roles and medical applications. The process of preparing blood components involves separating whole blood into

its individual parts to maximize their utility for different medical treatments. This method allows healthcare professionals to match specific patient needs with the appropriate blood components. Here's an overview of the blood components preparation process:

- **Separation of Blood Components**

After blood donation, the collected whole blood is processed to separate it into its primary components: red blood cells, platelets, plasma, and occasionally, white blood cells.

- **Red Blood Cell Concentrates (RBCs)**

Red blood cell concentrates are prepared by removing most of the plasma and some platelets from the whole blood. RBCs are essential for patients who require increased oxygen-carrying capacity due to conditions like anaemia, surgery, or trauma.

- **Platelet Concentrates**

Platelet concentrates are obtained by centrifuging the blood to separate platelets from other blood components. Platelets play a crucial role in blood clotting and are used for patients with bleeding disorders, cancer treatments, and surgeries.

- **Fresh Frozen Plasma (FFP)**

Fresh frozen plasma is obtained by freezing the liquid portion of the blood, plasma, at a very low temperature. FFP contains clotting factors and is used to treat patients with clotting disorders or those undergoing major surgeries.

- **Cryoprecipitate**

Cryoprecipitate is derived from FFP and contains high levels of clotting factors. It is often used to treat patients with bleeding disorders, such as haemophilia, or those requiring quick clotting in emergency situations.

- **White Blood Cells (Leukocytes) Removal**

In some cases, white blood cells are removed from blood components, especially red blood cell concentrates and platelet concentrates. This process, called leukoreduction, reduces the risk of adverse reactions and transfusion related complications.

- **Quality Control and Storage**

Once the blood components are prepared, they undergo rigorous testing and quality control procedures to ensure they are free from infections and meet safety standards. The components are then stored at controlled temperatures to maintain their viability until they are needed for transfusion.

- **Matching Patients' Needs**

Healthcare professionals match the appropriate blood component to the specific medical needs of patients. This personalized approach ensures that patients receive the exact components required for their condition, minimizing the risk of adverse reactions and optimizing treatment outcomes.

3. Apheresis Donation Process

Apheresis donation, a more specialized method of blood donation, involves the collection of specific blood components while returning the remaining components to the donor. This process allows for targeted donation of components like platelets, plasma, or other specialized elements that are crucial for various medical treatments. Donors are comfortably positioned, and their arm is prepared for venepuncture. A sterile needle is inserted into a vein, and the donor is connected to an apheresis machine. This machine separates the blood into its individual components. As the blood circulates through the apheresis machine, the targeted component is collected while the rest of the blood components, such as red blood cells, are returned to the donor. The collected component can be platelets, plasma, or other specific elements, depending on the medical need. The apheresis machine cycles multiple times to ensure an adequate amount of the desired component is collected. The duration of the process varies based on the component being collected and the donor's specific circumstances. Throughout the donation process, healthcare professionals closely monitor the donor's well-being. Donors are typically in a relaxed and reclined position to ensure their comfort. Once the required amount of the specific blood component is collected, the donor is disconnected from the apheresis machine. Similar to other donation methods, donors are directed to a recovery area where they can rest and receive refreshments to restore fluids and energy levels.

4. **Autologous Donation Procedures**

Autologous donation involves individuals donating their own blood in preparation for planned medical procedures, such as surgeries or medical treatments. The donated blood is stored for the donor's use during the procedure. This method ensures compatibility and reduces the risk of adverse reactions during transfusion.

2.1.5 Post-Donation Care and Recovery

After the blood donation process is completed, donors enter the crucial phase of post-donation care and recovery. This stage is designed to ensure the well-being, comfort, and safety of donors as they transition back to their normal routines. Post-donation care is not only about addressing immediate physical needs but also about fostering a positive experience that encourages donors to continue their valuable contributions in the future.

1. **Immediate Rest and Rehydration**

Immediately after donating blood, donors are guided to a designated recovery area where they can rest and recover from the donation process. Here, they are offered refreshments such as water, juice, and light snacks. These refreshments help replenish fluids and maintain blood sugar levels, alleviating any potential feelings of light-headedness or fatigue. While donors can resume their daily activities hours later, it is recommended to avoid heavy lifting, strenuous exercise, or any activities that might strain the body for the rest of the day. Engaging in gentler physical activities or simply resting helps the body recover more effectively.

2. **Observation and Monitoring**

During the recovery period, the scientist is expected to keep a watchful eye on donors. This monitoring ensures that any immediate adverse reactions, however rare, are promptly identified and addressed. The attentive care provided during this time helps donors feel safe and supported, reducing any concerns they might have. Donors are strongly encouraged to continue hydrating themselves in the hours following donation. Drinking water and fluids helps maintain blood volume and circulation, reducing the risk of dizziness or low blood pressure. Additionally, donors are advised to consume a balanced meal that includes iron-rich foods to help replenish nutrients lost during the donation process.

3. **Potential Side Effects**

Donors may experience mild side effects such as slight dizziness or bruising at the needle site. These effects are usually temporary and subside on their own within a short time. Donors are reassured that such effects are normal and are educated on self-care measures to manage them. In cases of rare, more severe adverse reactions can occur after donation. Donors are informed about the signs of such reactions, such as excessive bleeding at the needle site or signs of allergic reactions. They are encouraged to communicate any discomfort to the scientist, who is prepared to provide immediate assistance.

4. **Long-Term Care and Gratitude**

Donors receive information on maintaining their health and well-being in the days following donation. Blood donation centres often follow up with donors to inquire about their recovery and thank them for their contribution. This continued communication expresses gratitude and further strengthens the donor-donation centre relationship.

5. **Encouragement for Future Donations**

Donors are thanked for their altruistic act, which significantly contributes to saving lives and supporting medical treatments. They are encouraged to continue donating in the future, highlighting the on-going impact of their contributions and their role in their community's well-being.

2.1.6 Benefits of Blood Donation

Blood donation is a selfless act that not only contributes to saving lives but also offers a range of benefits for both the donors and the community at large. These benefits encompass medical advantages as well as positive impacts on society, making blood donation a cornerstone of healthcare and community support.

1. **Medical and Health Benefits**

Blood donation offers various medical advantages that positively impact the health and well-being of donors. Regular blood donation helps regulate the donor's blood volume. The body replaces the donated blood, leading to the production of new blood cells and enhancing cardiovascular health.

Iron Regulation and Anaemia Prevention: Blood donation can help reduce excess iron levels in the body, lowering the risk of conditions related to iron overload. Additionally, by promoting the production of fresh red blood cells, donors can contribute to preventing iron deficiency anaemia. In addition to this, blood donation has been associated with potential cardiovascular benefits, including a reduced risk of heart disease. Donors may experience improved blood flow and reduced risk factors for cardiovascular conditions due to the body's natural compensatory mechanisms.

2. **Community and Societal Impact**

Blood donation extends its positive impact beyond the individual donor to the broader community and society:

Donated blood plays a critical role in emergency medical situations, such as accidents, surgeries, and trauma cases. Rapid access to a stable blood supply can mean the difference between life and death for patients in critical conditions.

Individuals undergoing treatments like chemotherapy, radiation therapy, and surgeries often require blood transfusions to manage their conditions effectively. Blood donors provide essential support for these patients, enhancing their quality of life.

3. **Contributions to Research and Medical Advancements**

Blood donations enable medical researchers to study blood-related diseases, develop new treatments, and advance medical knowledge. Donors indirectly contribute to the development of innovative medical solutions and therapies. Blood donation cultivates a sense of unity and empathy within society. Donors recognize their role in supporting fellow community members, creating a shared purpose and fostering a culture of compassion and mutual assistance. Blood donation proves particularly crucial during natural disasters and emergencies, where the demand for blood rises due to accidents, injuries, and medical evacuations. By donating blood, individuals contribute to disaster preparedness and response efforts.

2.2 HISTORY OF HIV

HIV (Human Immunodeficiency Virus) primarily attacks and debilitates the immune system. In 1983, two distinct research teams made the initial discovery. The virus was identified and described by both Dr. Robert Gallo of the National Cancer Institute in the United States and Dr. Luc Montagnier of the Pasteur Institute in France. Gallo's group named it Human T-cell Leukaemia Virus-III (HTLV-III), while Montagnier's group called it Lymphadenopathy-Associated Virus (LAV). Later, it was determined that these viruses should be referred to as HIV since they were identical (Wang *et al*., 2023).

The discovery of the virus that causes acquired immunodeficiency syndrome, or AIDS, led to a deeper understanding of this condition. AIDS, a more advanced stage of HIV infection, is characterised by a severely compromised immune system. The virus primarily targets CD4+ T cells, a type of immune cell that is essential for fighting off infections. When HIV infection is not correctly treated, it can progress to AIDS, which increases a person's susceptibility to opportunistic infections and cancers. In the early years of the epidemic, HIV/AIDS was associated with pervasive dread, misinformation, and stigma. In the 1980s and early 1990s, the number of HIV cases worldwide increased dramatically. During this time, significant efforts were made to develop HIV diagnostic assays, and the first HIV antibody test was developed. This test's development facilitated the screening of blood donations, resulting in a significant decrease in HIV transmission via blood transfusions (Olose 2021).

Significant progress was made in 1996 with the introduction of highly active antiretroviral therapy (HAART). HAART consists of multiple antiretroviral medications that target different phases of the HIV replication cycle. This treatment strategy substantially reduced HIV-related morbidity and mortality, effectively transforming HIV infection into a chronic condition that can be managed. However, in many regions of the globe, access to HAART is restricted due to expensive costs and inadequate healthcare infrastructure (Lu *et al*., 2017).

Recent advances have improved HIV prevention and treatment. Due to the advancement of preventive methods, HIV-negative people may now utilise antiretroviral drugs for pre-exposure prophylaxis (PrEP). PrEP is recommended for high-risk HIV carriers because it works. "Treatment as Prevention" is now increasingly acceptable. Regardless of CD4+ T cell count, HIV patients begin antiretroviral treatment immediately. It's this way. Lowering the virus's blood

level to undetectable levels eliminates HIV transmission. This strategy has reduced HIV infections in various locations (Cohen *et al*., 2016).

Even though there has been growth, there are still problems in the fight against HIV. Access to care and prevention programmes is still a big problem, especially in countries with low wealth. Stigma and abuse against people with HIV/AIDS are still around, which makes it harder to fight the disease successfully. To reach the goal of stopping the HIV/AIDS pandemic, researchers are working on new antiretroviral drugs, medicines, and ways to avoid infection that haven't been tried before.

2.2.1 Epidemology of HIV

HIV remains a significant global public health concern. In 2020, UNAIDS projects that 38 million people worldwide will be HIV-positive. Due to significant advances in HIV prevention and treatment, the number of new HIV infections and AIDS-related fatalities has decreased in recent years. Sub-Saharan Africa, followed by Asia and Eastern Europe, has the highest rate of new infections (Carvalho *et al*., 2022).

The HIV epidemic has disproportionately affected Africa. About two-thirds of the world's HIV-positive population resides in sub-Saharan Africa. The difficulty of combating the HIV/AIDS pandemic in this region is exacerbated by a number of factors, such as the disease's prevalence, inadequate medical treatment, poverty, gender inequality, and stigma. Nigeria, as one of the most populous nations in Africa, endures a disproportionate amount of the continent's HIV burden. According to the Nigeria HIV/AIDS Indicator and Impact Survey (NAIIS), the HIV prevalence rate among Nigerians aged 15–64 was estimated to be 1.4% in 2018. However, the prevalence varies significantly among Nigerian states, with some having much higher rates than the rest of the country (Ogbuabor *et al*., 2023).

In recent years, Nigeria has invested heavily in HIV testing and treatment programmes, as well as prophylactic measures. Access to antiretroviral therapy (ART) has grown throughout the country. Poor healthcare infrastructure, stigma, and a lack of financing are just a few of the issues that have prevented HIV prevention and treatment from reaching their full potential.

2.2.3 Pathophysiology of HIV

HIV is spread by blood, sperm, vaginal fluids, and breast milk. HIV is spread via unprotected sexual contact, intravenous drug users sharing needles, and nursing and delivery. HIV targets CD4+ T cells, which coordinate immunological responses to infections. The virus infiltrates CD4+ T cells via binding to the CD4 receptor and CCR5 or CXCR4. HIV replicates quickly in cells, producing new virus particles that may infect CD4+ T cells and other immune cells. The immune system's reaction to HIV's rapid replication and spread during acute infection (primary infection) causes flu-like symptoms. The blood contains the virus, and the afflicted person is very contagious (Lederman 2017).

CD8+ cytotoxic T cells and B cells are stimulated by HIV infection. B cells make antibodies to fight HIV, whereas CD8+ T cells find and kill infected cells. Mutation and hiding in latently infected cells are two ways HIV might elude the immune system. Untreated HIV infection will become chronic. Chronic HIV infection slowly but steadily depletes CD4+ T cells. The immune system is subject to opportunistic infections, cancer, and other issues. Understanding HIV pathogenesis and finding new therapy targets has been a key scientific focus in recent years. Due to technical and methodological advances, viral reservoir studies—groups of latently infected cells that survive ART—are simpler. These reservoirs make HIV curing difficult since the virus may swiftly return if medication is halted (Wan *et al*., 2022).

The role of gut-associated lymphoid tissue (GALT) in HIV pathogenesis has also been highlighted recently. HIV replication and immune cell interaction depend on GALT. Early GALT alteration worsens HIV-induced immune dysfunction and inflammation. HIV's pathophysiology enabled very effective antiretroviral therapies. At various stages of HIV's life cycle, ART prevents replication, lowers viral load, and protects CD4+ T cell counts (Kelesidis *et al*., 2015). Starting ART early reduces immune system damage, risks, and long-term repercussions.

2.3.4 Clinical Significance of HIV

HIV causes several health issues. Untreated HIV disease worsens the immune system. This makes fighting diseases, cancer, and other issues difficult for the body. HIV patients frequently get opportunistic diseases such Pneumocystis jirovecii pneumonia (PCP), tuberculosis, candidiasis and cytomegalovirus.

HIV affects health and may spread, making it clinically relevant. Physical contact, contaminated medications, and mother-child interaction transmit HIV. HIV prevention requires education, condom use, harm reduction, and ART. Hospital reforms have improved HIV patients' futures. HIV is becoming a chronic illness because to antiretroviral treatment (ART). ART employs medication combinations to inhibit HIV spread and boost the immune system. Starting ART shortly after diagnosis improves health, reduces parasite infections, and extends life. (Oliveria *et al*., 2020).

ART suppresses viral replication and prevents infection. "Treatment as prevention" shows that HIV-negative people on successful ART have a very low risk of spreading HIV to sexual partners. "Undetectable = Untransmittable" (U=U) enhances ART adherence and lowers HIV stigma due to this understanding. Despite HIV management advances, difficulties persist. In resource-limited environments and marginalised groups, HIV testing, treatment, and care are major issues. HIV stigma prevents testing and treatment. Drug resistance and viral reservoirs complicate HIV cures. Research is improving HIV treatment and prevention. To improve treatment choices and minimise drug adherence, long-acting antiretroviral formulations, widely neutralising antibodies, and therapeutic vaccinations are being investigated. Innovative HIV preventive techniques, such as pre-exposure prophylaxis (PrEP) for high-risk persons, are also being developed (Cohen *et al*., 2016).

HIV's clinical relevance affects health and transmission. HIV is now a treatable chronic disease because to antiretroviral medication. However, stigma, medication resistance, access to treatment, and the search for a cure continue. Addressing HIV's clinical importance and resolving the HIV/AIDS epidemic requires ongoing research and comprehensive initiatives.

2.3 HISTORY OF HEPATITIS B

HBV causes the common liver illness hepatitis B. The Hepatitis B virus's roots date back to prehistoric times. "Serum hepatitis" was created after World War II military reports of significant jaundice and liver damage. Our knowledge of Hepatitis B improved with the identification of the virus and the development of diagnostic methods. Dr Baruch Blumberg identified the Hepatitis B surface antigen (HBsAg) in the 1960s and isolated and characterised the virus. This finding led

to the development of HBV screening tests, which reduced blood transfusion-related HBV transmission (Chang and Liaw, 2020).

Over the decades, scientists discovered more about Hepatitis B origins, distribution and prevention. Hepatitis B vaccinations have advanced medicine. In 1981, the US authorised the first pure HBsAg-based Hepatitis B vaccine. Immunisation initiatives have reduced Hepatitis B and its effects. Over the decades, scientists discovered more about Hepatitis B's origins, distribution, and prevention. Hepatitis B vaccinations have advanced medicine. In 1981, the US authorised the first pure HBsAg-based Hepatitis B vaccine. Immunisation initiatives have reduced Hepatitis B and its effects (Talbird *et al*.,2023).

Even with these developments, Hepatitis B remains a global health issue, particularly in areas where it is widespread. The World Health Organisation reports that chronic Hepatitis B is most prevalent in sub-Saharan Africa, East Asia, and the Pacific Islands. Cirrhosis and HCC may result from chronic Hepatitis B infection. Globally, it causes liver disease and mortality (St Jean *et al*., 2023).

2.3.1 Epidemology of Hepatitis B

The global public health problem of chronic Hepatitis B virus (HBV) infection affects 296 million people. Chronic Hepatitis B is more common in Asia and sub-Saharan Africa. 60 million Africans have chronic Hepatitis B. It is most common in West Africa, although its range is quite changeable. Hepatitis B is prevalent in Africa due to vertical transmission from mothers to children, early infection, and a lack of vaccinations. Nigeria has a major hepatitis B problem. 6.2% of people are HBV-positive. Prevalence may vary by area and demographic subgroup within a nation (Akintule *et al*., 2018).

Nigeria spreads hepatitis B largely via mother-to-child transmission during birth and horizontal transmission through blood or body fluids. Poor healthcare, infection control, cultural practises like scarification and traditional circumcision, and high HIV and TB rates put Nigerians at risk for Hepatitis B. Nigeria and other African nations reduced Hepatitis B. These include encouraging safe injection and blood transfusion practises and immunising neonates and high-risk populations against Hepatitis B (Atilola *et al*., 2018).

Preventing, diagnosing, and treating hepatitis B has improved. Viral indicators and molecular testing may now diagnose HBV infection. Antiviral medications decrease liver damage and viral replication in chronic Hepatitis B patients. Global and regional projects seek to eradicate Hepatitis B through increasing vaccination coverage, reducing new infections, and decreasing liver-related deaths.

2.3.2 Pathophysiology of Hepatitis B

Hepatitis B is transferred through blood or other body fluids such semen, vaginal secretions, and saliva. Sharing needles or syringes, unprotected sexual contact, and mother-to-child transmission during birth or breastfeeding are major transmission routes.

Hepatitis B, a partially double stranded DNA virus, targets liver cells. HBV enters hepatocytes through binding to hepatocyte-specific cellular receptors with HBV surface antigen (HBsAg). After entering the hepatocyte, viral DNA goes to the nucleus to replicate and transcribe viral proteins and new viral particles. The human immune response to infection strongly affects hepatitis B pathogenesis. HBV antigens stimulate innate and adaptive immune system cells such natural killer cells, dendritic cells, and T cells. This immunological reaction causes hepatocyte destruction, pro-inflammatory cytokines, and immune cell recruitment. The immune reaction eliminates viruses, but it may inflame the liver. Chronic hepatitis, which promotes immunological activation, may lead to fibrosis, cirrhosis, and hepatocellular carcinoma (HCC) (Kuipery *et al*., 2020).

Recent study has illuminated Hepatitis B pathogenesis. Recent studies have highlighted the host immune response, particularly the role of immune cells and cytokines in sickness. HBV-specific CD8+ T lymphocytes, which remove viruses, also damage the liver by producing cytotoxic chemicals and pro-inflammatory cytokines (Khuder 2021).

Recent research have examined how host genetic factors cause Hepatitis B. Host-viral genetic variations may alter chronic infection risk, liver disease development, and treatment response. Genetics affect immunity, viral replication, and liver function. Hepatitis B pathophysiology is more understood, improving diagnosis and therapy. PCR and other molecular technologies may identify and quantify viral DNA and RNA in patient samples, improving Hepatitis B diagnosis and follow-up. Several antiviral drugs decrease virus multiplication, reduce liver inflammation and halt disease (Shih and Liu, 2020).

2.3.3 Clinical Significance of Hepatitis B

It has been estimated that 296 million people have chronic Hepatitis B virus (HBV) infection worldwide. Hepatitis B may induce cirrhosis and hepatocellular carcinoma (HCC), making it clinically significant. Many people recover from acute Hepatitis B within months. Chronic infection may cause liver damage and health issues in certain people. Chronic Hepatitis B symptoms vary. Others may have prolonged weariness, stomach discomfort, jaundice, and liver malfunction. Ascites, hepatic encephalopathy, and gastrointestinal bleeding may develop as the condition advances. Chronic Hepatitis B may also damage non-liver organs. Membranous nephropathy, glomerulonephritis, porphyria cutanea tarda, and rheumatoid arthritis are examples of these symptoms (Chien *et al*., 2019).

Hepatitis B prevention and treatment reduce clinical relevance. Many nations have launched universal Hepatitis B immunisation programmes, reducing incidence and preventing new infections. Early identification and treatment of chronic Hepatitis B infection avoid disease development and consequences.

Antiviral medication has improved chronic Hepatitis B infection outcomes in recent years. Oral nucleoside/nucleotide analogues may decrease viral replication, reduce liver inflammation, and stop disease progression. These medicines inhibit viruses, avoid liver problems, and enhance long-term results. Access to Hepatitis B testing, treatment, and healthcare services, especially in resource-limited settings remains an issue. Antiviral medication resistance and covalently closed circular DNA (cccDNA) in infected hepatocytes prevent a full cure for Hepatitis B. Hepatitis B is clinically significant since it may cause serious liver problems and death (Obeagu and Adike, 2023).

Preventing, diagnosing, and treating Hepatitis B early reduces its clinical effect. Vaccination, antiviral medication, and healthcare initiatives have improved Hepatitis B clinical results, but access to care and full cure remain obstacles.

2.4 HISTORY OF HEPATITIS C

Hepatitis C was not traditionally recognised as a distinct viral infection. Transfusion-associated non-A, non-B hepatitis before the discovery of Hepatitis C (HCV) was suggested as an infectious agent. The HCV genome was cloned and sequenced by a team led by Michael Houghton in 1989. This discovery led to increased understanding of HCV and the development of diagnostic techniques to detect it. Before accurate diagnostic tests were available, Hepatitis C was sometimes referred to as "non-A, non-B hepatitis." Treatment was limited by difficulties in identification and distinction from other viral hepatitis, such as Hepatitis A and B. Since the discovery of HCV and the emergence of serological diagnostics like antibody testing and PCR assays, HCV diagnosis and screening have changed drastically (Ergen *et al*., 2022).

After HCV was discovered, epidemiology and transmission routes were well understood. HCV spreads most often via needles, blood transfusions, and organ transplants. Intravenous drug usage, dangerous medical procedures, and mother-to-child virus transmission after delivery are additional risk factors.

In the 1990s, researchers found effective Hepatitis C antiviral medicines. Interferon-based drugs were the gold standard then, but they were useless and dangerous. In recent years, new direct-acting antiviral (DAA) medications have altered Hepatitis C treatment (Shih and Liu, 2020).

2.4.1 Epidemology of Hepatitis C

Chronic HCV infection affects 71 million people globally. HCV infection rates vary by demographic and place. Hepatitis C spreads differently throughout Africa with 3.9% HCV prevalence. However, prevalence rates vary among countries and within groups (Wondmagegn *et al*., 2022). Nigeria, Africa's most populous country, bears the virus's brunt. HCV infects 2.2% of Nigerians, according to the Federal Ministry of Health in 2017. Prevalence rates vary by region and demographic. Unsafe medical procedures, blood transfusions, intravenous drug use, and, to a lesser degree, sexual transmission and mother-to-child transmission spread Hepatitis C throughout Africa and Nigeria. These conditions transmit HCV quickly because to poor infection control, unsafe injection practises, and a lack of screening and preventive efforts (Ibegbulam *et al*., 2018)

Africa and Nigeria have handled Hepatitis C. They include improving blood safety, infection control, safe injections, and testing and treatment in hospitals.

2.4.2 Pathophysiology of Hepatitis C

Hepatitis C is transmitted by needle pricks, drug users sharing needles, inappropriate blood management, blood transfusions, organ transplants, and, rarely, mother-to-child transmission during delivery.

HCV, a single-stranded RNA virus, attacks hepatocytes. After entering the host cell, viral RNA is released to produce viral proteins. HCV's replication membrane web is closely linked to the host cell's interior membranes. HCV pathophysiology depends on host immunology. After viral infection, the innate immune system releases pro-inflammatory cytokines and recruits immune cells to the liver. The adaptive immune response activates T, B, and antibody production. HCV avoids host immune responses, hence most patients remain infected. Genetic alterations, host immunological responses, and viral reservoirs in immune-privileged locations let the virus cause long-term infections. Immunological reactions against infected hepatocytes produce liver inflammation in hepatitis C. Interferon-gamma and TNF-alpha-producing immune cells assault the liver. T lymphocytes are CD4+ and CD8+. These cytokines produce liver inflammation and fibrogenesis (Yutaka *et al*., 2023).

Over time, liver fibrosis may occur due to persistent inflammation and hepatocellular damage, and it is characterised by the excessive deposition of extracellular matrix components. Cirrhosis, in which the liver's architecture and function are severely compromised, may result from fibrosis's unchecked advancement. In addition, those who have had a persistent HCV infection are more likely to develop hepatocellular carcinoma (HCC), the major form of liver cancer. Direct oncogenic features of the virus, chronic inflammation, and the activation of oncogenic signalling pathways are all contributors to the development of HCC in Hepatitis C. In light of recent progress in Hepatitis C pathophysiology, direct-acting antiviral (DAA) medicines have been developed. Treatment with these drugs is very effective because they target viral proteins necessary for viral replication. DAA treatments may stop the course of illness by preventing immune-mediated liver harm and establishing sustained virologic response (SVR) (Khan *et al*., 2023).

2.4.3 Clinical Significance of Hepatitis C

Over 71 million individuals worldwide have chronic HCV. Health is affected by hepatitis C. Chronic HCV infection causes liver damage that may last decades. HCV-induced liver fibrosis, cirrhosis, portal hypertension, ascites, hepatic encephalopathy, and HCC may occur from persistent inflammation and hepatocellular destruction. HCC, a primary liver cancer, kills the most people globally. Chronic HCV infection is a substantial risk factor for HCC, especially in those with severe liver fibrosis or cirrhosis. HCC risk is higher in long-term HCV carriers. Chronic HCV infection has been linked to extrahepatic symptoms, affecting tissues other than the liver. Extrahepatic symptoms include mixed cryoglobulinemia, glomerulonephritis, autoimmune diseases, cardiovascular disease, insulin resistance, and non-liver-related malignancies.

Hepatitis C treatment has changed due to very efficient direct-acting antiviral (DAA) drugs. With cure rates above 95%, DAA treatments are very effective. DAA therapy may eradicate viruses, stop disease progression, and lower the risk of liver consequences such cirrhosis and HCC by achieving sustained virologic response (SVR) (Khan *et al*., 2023).

DAAs enhance long-term clinical results and decrease death in Hepatitis C patients. To maximise DAA therapy effects, early identification and treatment are essential. Hepatitis C's clinical importance is still difficult to address despite extremely effective medications. Diagnosis, connection to care, and treatment services are crucial in resource-limited situations. To guarantee broad testing, boost treatment availability and offer continuing monitoring and care for Hepatitis C patients, comprehensive public health policies are needed (Ergen *et al*., 2022).

In conclusion, Hepatitis C may cause serious liver problems and death. Chronic HCV infection may cause extrahepatic symptoms, liver fibrosis, cirrhosis, and hepatocellular cancer. Highly powerful direct-acting antiviral medicines have revolutionised Hepatitis C treatment, allowing viral elimination and better clinical results.

2.5 HISTORY OF SYPHILIS

Historians and experts dispute on where syphilis originated. Columbus and his crew are thought to have brought syphilis back to Europe in 1493. Other theories imply that syphilis was

previously present in Europe but spread due to changing social and environmental factors. The 16th and 17th century syphilis pandemics devastated Europe. Primary syphilis was recognised by a painless ulcer called a chancre, secondary by a rash and mucocutaneous lesions, and tertiary by potentially lethal systemic sequelae including neurosyphilis and cardiovascular involvement (Becker *et al*., 2022).

Significant advancements were achieved in both the aetiology and treatment of syphilis in the late 19th and early 20th century. August Paul von Wassermann, a German scientist, developed the Wassermann test in 1905 to diagnose syphilis by the detection of antibodies after infection with T. pallidum. Future developments in syphilis serological testing may be directly attributed to this assay. The treatment of syphilis with the antibiotic penicillin has been shown to be successful. Alexander Fleming's 1940s discovery of penicillin has been used effectively to treat syphilis. Penicillin is the medicine of choice for the treatment of syphilis until today (Tsan and Claiborne, 2021).

2.5.1 Epidemology of Syphilis

An estimated 6.3 million new cases of syphilis were reported in 2016 (World Health Organisation, 2016), making it a major public health concern globally. Certain places have a greater syphilis burden than others due to higher reported prevalence rates. The spread of syphilis has become an epidemic throughout Africa. According to the World Health Organisation (WHO), there were an estimated 1.5 million pregnant women with active syphilis infection in Africa in 2016, putting both mothers and their newborns at risk of serious health problems. From less than 1% to over 10%, syphilis prevalence among pregnant women in Africa varies greatly by nation and sub-region (Hussen and Tadesse, 2020).

Syphilis is also a major health problem in Nigeria. According to a 2020 study by Adejoh and colleagues, 2.5% of pregnant women in Nigeria had syphilis. Prevalence rates may be higher or lower in certain parts of the nation or among certain subsets of the population. Congenital syphilis, which is transmitted from an infected woman to her unborn child, is a major health problem in Africa and Nigeria. Stillbirth, neonatal mortality, low birth weight, and congenital abnormalities are just few of the negative consequences that may occur if syphilis is left untreated throughout pregnancy. Congenital syphilis has been found to be anywhere from 0.5% to 6.1% prevalent in Nigeria (Adejoh *et al*., 2020).

Vaginal, anal, and oral intercourse are the primary routes of syphilis transmission. High-risk sexual behaviours, insufficient screening and treatment facilities, and a lack of knowledge and education all contribute to the prevalence of syphilis in Africa and Nigeria.

2.5.2 Pathophysiology of Syphilis

Syphilis is transmitted via sexual contact (Vaginal, anal or oral), from mother to child during childbirth and also from blood transfusion. Typical syphilis symptoms result from a complicated interaction between the bacteria *Treponema pallidum* and the human immune response. *Treponema pallidum* is a spirochete bacteria that is the causative agent of syphilis. There are many phases of syphilis pathophysiology, including primary, secondary, latent, and tertiary. Sexual contact with an infected person is the most common route for T. pallidum to enter the body. Skin, mucous membranes, lymph nodes, liver, spleen, and the central nervous system are just some of the places the germs may quickly spread to through the circulation (Purnamasari *et al*., 2023).

A painless ulcer called a chancre forms at the site of infection during the primary phase of syphilis. By attracting immune cells including lymphocytes and plasma cells, the chancre symbolises the local immunological response to T. pallidum. Repeated bacterial multiplication in one area creates a stable source of infection. Syphilis progresses to a systemic infection when T. pallidum spreads throughout the body in the secondary stage. Skin rashes, mucous membrane lesions, systemic lymphadenopathy, and constitutional symptoms including fever and malaise are all possible during this phase. More immune complexes are formed and the complement system is activated as part of the robust immunological response against T. pallidum at this time (Lubis and Susilawati, 2023).

In other people, the infection becomes dormant, or latent, and they show no outward signs of illness, but the bacteria are still there. During the many years that latent syphilis may remain dormant, serological testing are the primary means of identifying the infection. T. pallidum, on the other hand, may become active again in certain people and develop into the tertiary stage. The most severe type of syphilis, known as tertiary syphilis, develops several years after infection but before treatment. Destructive lesions form throughout several organ systems, including the cardiovascular system, the central nervous system, the bones, and the skin. Tertiary

syphilis develops via a mix of immune-mediated mechanisms and T. pallidum direct tissue destruction (Pradhan and Jain, 2020).

T. pallidum and the host immune response play an intricate role in the progression of syphilis, and recent studies have sought to better understand these interactions. Several methods of immune evasion used by T. pallidum have been investigated. These include antigenic variation, avoiding complement-mediated death, and modulating host immunological responses.

2.5.3 Clinical Significance of Syphilis

Due of its ability to induce many organ system problems, syphilis is clinically important. It is caused by *Treponema pallidum*. Syphilis may develop and cause serious problems if neglected. Syphilis is clinically significant since it may impact several organ systems. In the basic and tertiary phases, individuals may have painless chancres, skin rashes, mucous membrane lesions, and systemic symptoms. These phases are very contagious and may be passed on via sexual contact or pregnancy. Untreated syphilis may become dormant and asymptomatic. Late or tertiary syphilis may lead to life-threatening consequences if untreated (Tsan and Claiborne, 2021).

Tertiary syphilis may impair the eyes, bones, skin, central nervous system, and cardiovascular system. Neurosyphilis may cause meningitis, dementia, stroke, and optic nerve involvement, whereas cardiovascular syphilis can cause aortitis, aneurysms, and valvular disorders. Late-stage syphilis may produce skin ulcers, gummatous lesions, and severe bone alterations. Another clinical component of syphilis is congenital. Congenital syphilis may develop from inadequately treating pregnant mothers with syphilis. Congenital syphilis may lead to stillbirth, preterm, low birth weight, developmental abnormalities, and long-term neurologic or physical disability (Becker *et al*., 2022).

Antibiotics, especially penicillin, are the principal therapy for syphilis. Preventing disease development, transmission, and consequences requires early diagnosis and treatment. Regular follow-up and testing are essential to guarantee treatment success and detect treatment failure or reinfection. Early diagnosis, increased access to testing and treatment, and comprehensive sexual health education are recent advances in syphilis clinical care. Syphilis screening and treatment in normal prenatal care has also been prioritised to avoid congenital syphilis. However, syphilis clinical treatment remains difficult. These include poor awareness and information of syphilis,

stigma associated with testing and treatment and *Treponema pallidum* strains' drug resistance (Rodriguez *et al*., 2020).

Syphilis may cause several organ system issues, making it clinically relevant. Syphilis may be prevented, reduced, and managed through early diagnosis, treatment, and management.

CHAPTER THREE

METHODOLOGY

3.1 STUDY CENTRE

The present study was carried at the Blood transfusion science laboratory (Blood bank) of the University of Benin Teaching Hospital (UBTH). Data was obtained from the University of Benin Teaching Hospital, Benin City, Edo State, Nigeria. The data collected will be from July 2022 to June 2023.

The University of Benin Teaching Hospital was taken over by the Federal Government on 1st April, 1975 as the fifth teaching hospital coming after Ibadan Teaching Hospital and Lagos Teaching Hospital. The Institution has been decisively responding to the challenge that arises to the extent that UBTH could boastfully say that it has effectively discharged to its mandate. For fifty years, it has been widely acknowledged as a Centre for Excellence; it has remarkably and effectively served as the last port of call for expert management of diverse and varied disease conditions in Edo, Delta, part of Kogi and Ondo state which largely form its catchment area and sometimes further away.

Today, UBTH boasts of a Dialysis Centre, CT Scanning Service, a fully integrated Accident centre and a fully functional Oxygen production plant to effectively meet the need of the hospital. In areas of training and research, University of Benin Teaching Hospital is at the forefront in West Africa. After 35 years of incredible medical advancements, UBTH will keep leading the way in research, clinical services, and compassionate care.

3.2 STUDY DESIGN

The research project utilized a retrospective study design to investigate the seroprevalence of TTIs among prospective donors in the blood bank of UBTH. By utilizing a retrospective study design and analysing data from the blood bank, this research project will provide valuable insights into the seroprevalence and types of TTIs among prospective donors. The study involved the collection and analysis of data from blood bank records and databases.

3.3 SELECTION CRITERIA

Inclusion Criteria:

1. **Blood Donation Dates:** blood donors whose donation dates fall within the specified 12-month period of July 2022 to June 2023.
2. **Available Test Results:** donors for who test results for HIV, HBsAg, HCV, and VDRL are available in the blood bank records.
3. **Gender and Age:** donors of all genders and within a specified age range, such as 18 to 65 years old.
4. **Tested Donors:** Included donors who underwent testing for all four TTIs (HIV, HBsAg, HCV, and VDRL).

Exclusion Criteria:

1. **Out-of-Date Test Results:** Excluded donors whose test results are from dates outside the specified 12-month period of July 2022 to June 2023.
2. **Incomplete Data:** Excluded donors for whom essential demographic or test result data is missing in the records.
3. **Duplicate Records:** Excluded any duplicated entries, which might occur if a donor's information appears multiple times in the records.
4. **Known TTI Cases:** Excluded donors who are already known to be positive for any of the TTIs under study, as they might not represent the general donor population.
5. **Pregnant Donors:** Excluded pregnant individuals, as their test results might be affected by physiological changes related to pregnancy.
6. **Unclear Donor Status:** Excluded donors with unclear or ambiguous information about their blood donation or testing status.

3.4 ETHICAL CONSIDERATION

Ethical approval (Appendix I) was sorted and obtained from the Ethics and Research Committee of UBTH before commencement of this study. While sorting the data needed through the blood

bank archives, confidentiality will be maintained as patients information will only accessed when necessary and it will not be discussed to anybody.

3.5 DATA COLLECTION

Coordination was established with the blood bank staff and hospital administration to gain access to the required blood bank records. Permission was obtained to extract the necessary data for the study.

Specific variables were identified for analysis, including donor ID, donation date, test results for HIV, HBsAg, HCV, and VDRL, and demographic information such as age and gender. This process was conducted with careful attention to accuracy and completeness.

The extracted data underwent thorough verification to identify errors, inconsistencies, and missing values. The dataset was cleaned to rectify data quality issues that were detected.

Measures were taken to ensure the security and anonymity of the data.

3.6 LABORATORY METHODS EMPLOYED

The blood bank employs rapid testing kits for the initial screening of HIV, HBsAg, HCV and VDRL. These kits are affixed with specific antigen designed to quickly detect the presence of specific antibodies to the antigens related to each infections in blood samples.

The procedure for screening HIV involves the following steps:

- A small amount of the donor's serum was collected and applied to the test strip containing reagents specific to each infection.
- The test strip reacts with the blood, and results are obtained within a short timeframe, usually around 15-20 minutes.
- A visible indicator, such as a coloured band, appears on the test strip if the corresponding antibodies or antigens are detected.
- Positive or reactive results from the rapid test are considered presumptive and require further confirmation. Presumptive positive results from the rapid testing kits are then subjected to further confirmatory tests such as ABBOTT machine, PCR to validate the initial findings.

The procedure for screening HBsAG involves the following steps:

- A small amount of the donor's serum was collected and applied to the test strip containing reagents specific to each infection.
- The test strip reacts with the blood, and results are obtained within a short timeframe, usually around 15-20 minutes.
- A visible indicator, such as a coloured band, appears on the test strip if the corresponding antibodies or antigens are detected.
- Positive or reactive results from the rapid test are considered presumptive and require further confirmation. Presumptive positive results from the rapid testing kits are then subjected to further confirmatory tests such as ABBOTT machine, PCR to validate the initial findings.

The procedure for screening HCV involves the following steps:

- A small amount of the donor's serum was collected and applied to the test strip containing reagents specific to each infection.
- The test strip reacts with the blood, and results are obtained within a short timeframe, usually around 15-20 minutes.
- A visible indicator, such as a coloured band, appears on the test strip if the corresponding antibodies or antigens are detected.
- Positive or reactive results from the rapid test are considered presumptive and require further confirmation. Presumptive positive results from the rapid testing kits are then subjected to further confirmatory tests such as ABBOTT machine, PCR to validate the initial findings.

The procedure for screening VDRL involves the following steps:

- A small amount of the donor's serum was collected and applied to the test strip containing reagents specific to each infection.

- The test strip reacts with the blood, and results are obtained within a short timeframe, usually around 15-20 minutes.
- A visible indicator, such as a coloured band, appears on the test strip if the corresponding antibodies or antigens are detected.
- Positive or reactive results from the rapid test are considered presumptive and require further confirmation. Presumptive positive results from the rapid testing kits are then subjected to further confirmatory tests such as ABBOTT machine, PCR to validate the initial findings.

Positive results are confirmed with the use of ABBOTT machine. The machine has its reagent which gets to react with the sample and thereafter displays the result on a monitor. The procedure for screening these positive results involves the following steps:

- With the aid of calibrated pipette, the required volume of serum sample was transferred into the machine's sample container.
- The donor's information and also the specific tests to be confirmed were inputted into the machine's interface.
- The serological test was initiated and after 20-30 minutes, the result was displayed on the monitor and the results are confirmed. The extent of infection also gets displayed.

3.7 STATISTICAL ANALYSIS

Data obtained from this research were documented into Microsoft excel spreadsheet and analysed using statistical package for social sciences (SPSS) version 20.0 (IBM Inc. USA).expressed in means and line graph as it may occur. Basic descriptive statistics of the seroprevalence rate were calculated for each TTI (HIV, HBsAg, HCV, VDRL). Potential relationships or demographic risk factors between variables were explored using correlation test such as chi-squared test. $P \leq 0.05$ were considered significant.

A total of 3241 blood donors were registered of which 2435 were family replacement donors while the remaining 806 were voluntary donors.

CHAPTER FOUR

RESULTS AND ANALYSIS

This study aimed to determine retrospectively, the seroprevalence of HIV(Human immune-Virus), HBsAg (Hepatitis B surface antigen), HCV (Hepatitis B virus), and VDRL (Venereal Disease Research Laboratory/ Syphilis) among prospective donors at the blood bank laboratory of the University of Benin Teaching hospital. During the 12 month study period from July 2022 to June 2023 considered in this study, a total of 3241 registered donors were tested. Donors comprised of 2707 (83.52%) males and 534 (16.48%) females. During the 12 month study period from July 2022 to June 2023, 3241 total donors were recorded. Testing showed an infection positive test of 248, which gives an overall prevalence of 7.65%

Table 4.1: Shows the monthly prevalence of Transfusion Transmissible Infection (TTI) recorded in the study period. In this study, the number of samples which tested positive for TTI was found to be 30 samples for HIV, 76 samples for HBsAg, 60 samples for HCV, and 82 for VDRL. This corresponds to an overall prevalence of 0.93%, 2.35%, 1.85% and 2.53%, for HIV, HBsAg, HCV and syphilis as respectively. There was no statistically significant difference in the trend of donors over the months. Co-infection of HIV and Syphilis were seen in 4 donors, co infection of HBsAg and Syphilis were also seen in 5 donors

Table 4.2: Shows the prevalence of Transfusion Transmissible Infection across different age groups.

The age range in this study was 18-57 years. It was observed that highest prevalence of seropositive donors was found within the age group 26-33 years consisting of 12(0.99%), 29(2.39%), 18(1.49%) and 32(2.64%) cases of HIV, HBsAg, HCV and Syphilis respectively.

The overall cumulative seroprevalence was notably lower in donors of ages 18-25 years which was found to be 9(1.02%), 18(2.04%), 13(1.47%) and 17(1.93%). Correlation analysis using chi squared test shows that the difference in prevalence of Transfusion Transmissible Infection and age, was not statistically significant (x^2 =11.267, p = 0.31)

Table 4.2: Shows the prevalence of Transfusion Transmissible Infection across the male and female gender categories.

Of the 2707 male donors recorded, the overall prevalence of TTI was found to be 205 corresponding to 7.57% prevalence. Among the male donors, the prevalence of HIV, HBsAg, HCV and syphilis were found to be 0.99%, 2.11%, 1.81%, and 2.66% respectively. Out of the 534 female donors recorded, the prevalence of HIV, HBsAg, HCV and syphilis was found to be 0.75%, 3.56%, 2.05%, and 1.87% respectively.

This study also compared the prevalence of TTI with the documented marital status of the donors in the singles, married and divorced/widowed/ widower groups. For the donors who were reportedly single, a high HIV, HBsAg, HCV and syphilis seroprevalence rate of 0.78%, 2.85%, 2.41% and 2.95% were recorded. The seroprevalence rate among the married was 0.56%, 1.21%, 1.02% and 1.77% for HIV, HBsAg, HCV and syphilis respectively. Correlation analysis using bivurate test showed a statistical significance p value of 0.02. This indicates that unmarried donors had a higher prevalence rate

During the study period, 2435(75.13%) of the donors were replacement donors and remaining 806(24.86%) were voluntary donors. The distribution of reactive HIV, HBsAg, HCV and syphilis cases among replacement donors were 24, 59, 52 and 6 respectively. This corresponds to an HIV, HBsAg, HCV, and syphilis seroprevalence of 0.99%, 2.42%, 2.14%, and 2.83%

respectively. While the prevalence of HIV, HBsAg, HCV and syphilis among voluntary donors is 0.744%, 2.11%, 0.99%, and 1.62% respectively. Correlation Analysis shows a significant association (p 0.01) between these donor groups and prevalence of TTI. This indicates that replacement donors tend to present higher frequency of positive cases.

Table 4.1: Showing the seroprevalence rates recorded among donors over a 12-month study period

Month	Total Samples Tested	HIV Prevalence		HBsAg Prevalence		HCV Prevalence		VDRL Prevalence	
		n	%	n	%	n	%	n	%
Jul (2022)	290	1	0.3	4	1.30	7	2.41	7	2.41
Aug (2022)	310	4	1.2	9	2.90	4	1.30	12	3.87
Sep (2022)	188	0	0.0	4	2.10	5	2.66	6	3.19
Oct (2022)	279	3	1.0	9	3.22	3	1.08	4	1.43
Nov (2022)	266	1	0.3	5	1.88	4	1.50	5	1.87
Dec (2022)	282	2	0.7	7	2.48	5	1.77	5	1.77
Jan (2023)	301	3	0.9	7	2.33	10	3.32	6	1.99
Feb (2023)	179	2	1.1	5	2.80	4	2.24	4	2.23
Mar (2023)	292	5	1.7	8	2.74	9	3.08	12	0.41
Apr (2023)	315	0	0.0	11	3.45	4	1.26	8	2.53
May (2023)	216	4	1.8	7	3.24	3	1.39	7	3.24
Jun (2023)	323	5	1.5	5	1.54	2	0.62	6	1.86
Prevalence	3241	30	0.93	76	2.35	60	1.85	82	2.53

Table 4.2: Showing seroprevalence of TTI across age group and among male and female gender groups

Age Group	Total tested	HIV		HBV		HCV		VDRL		Cum	p-value
		n	(%)	N	%	n	%	n	%	%	
18-25	880	9	1.02	18	2.04	13	1.47	17	1.93	6.48	
26-33	1211	12	0.99	29	2.39	18	1.49	32	2.64	7.51	
34-41	697	6	0.86	16	2.29	19	2.73	19	2.73	8.61	0.31
42-49	365	3	0.08	12	3.29	7	1.92	12	3.28	8.57	
50-57	88	0	0.00	1	1.14	3	3.41	2	2.27	6.82	
Gender											
Male	2707	27	0.99	57	2.11	49	1.81	72	2.66	7.57	0.89
Female	534	4	0.75	19	3.56	11	2.05	10	1.87	8.23	

Figure 4.3: Seroprevalence of Transfusion Transmissible Infection across other donor socio-demographic categories

Marital Status	Total of tested (N=3241)	HIV Prevalence		HBV Prevalence		HCV Prevalence		VDRL Prevalence		p-value
		n	(%)	n	(%)	n	(%)	n	(%)	
Single	2036	16	0.78	58	2.85	49	2.41	60	2.95	0.21
Married	1075	6	0.56	13	1.21	11	1.02	19	1.77	
Divorced/ widow/widower	130	10	0.92	6	3.85	0	0.00	3	2.31	
Donor Category										
Voluntary	806	6	0.744	17	2.11	8	0.99	13	1.62	0.01
Replacement	2435	24	0.99	59	2.42	52	2.14	69	2.83	

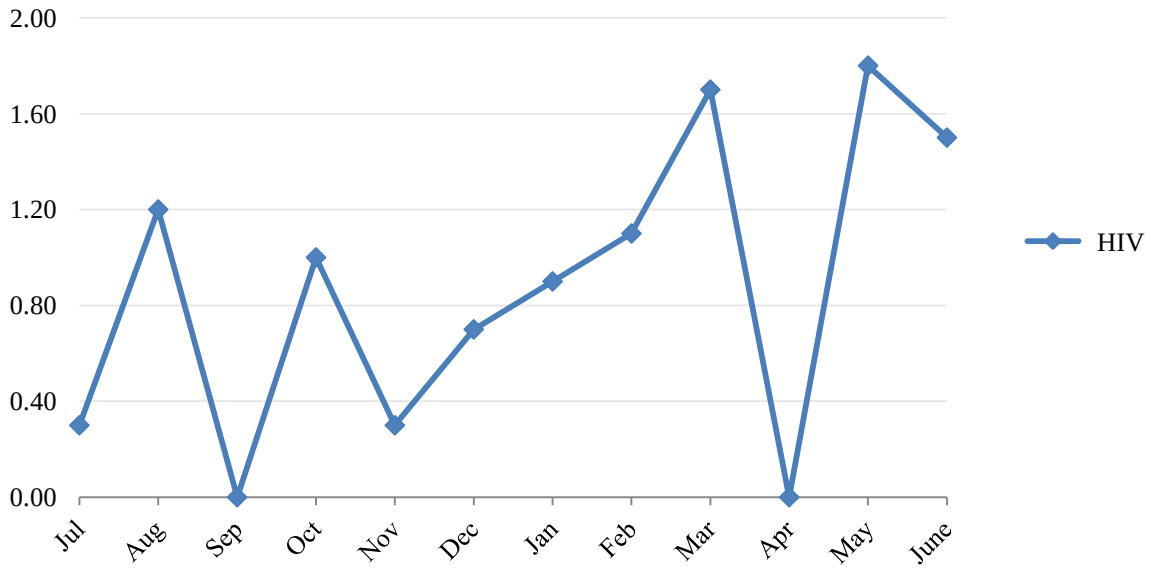

Figure 4.1: line chart Shows seroprevalence of HIV reactivity among prospective donors at the blood bank of UBTH.

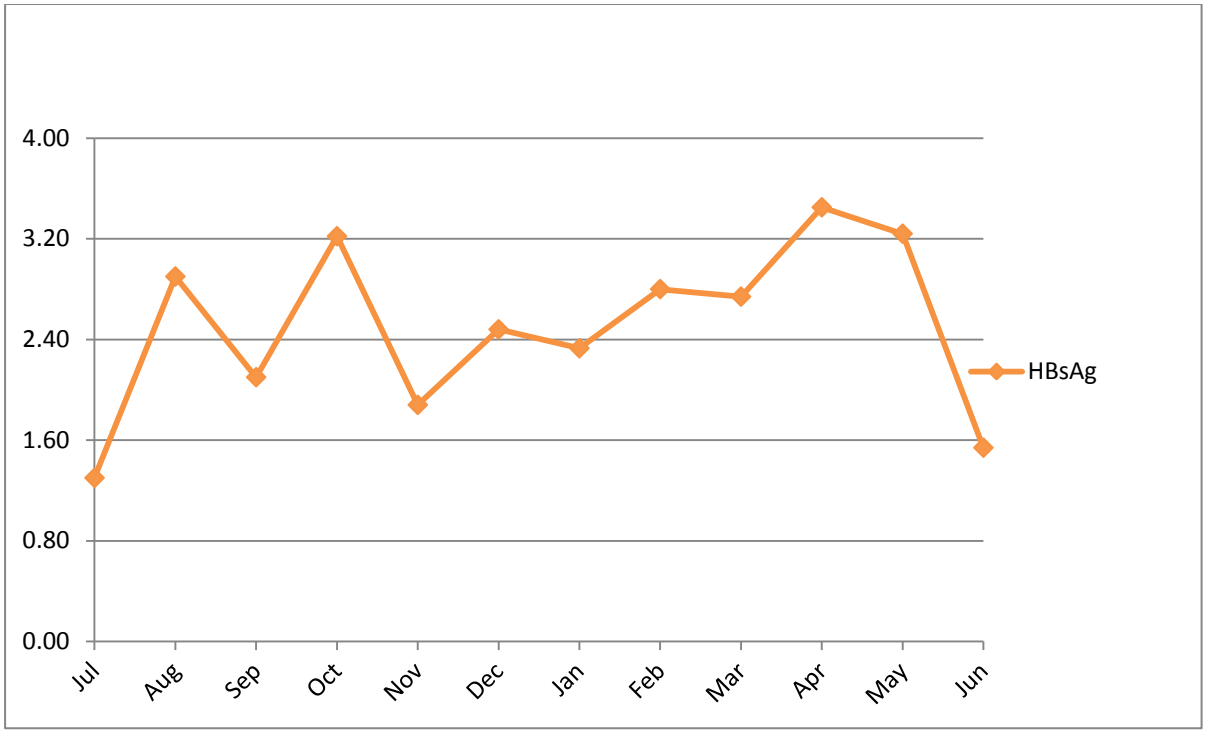

Figure 4.2: line chart Shows seroprevalence of Hepatitis B virus reactivity among prospective donors at the University of Benin blood bank.

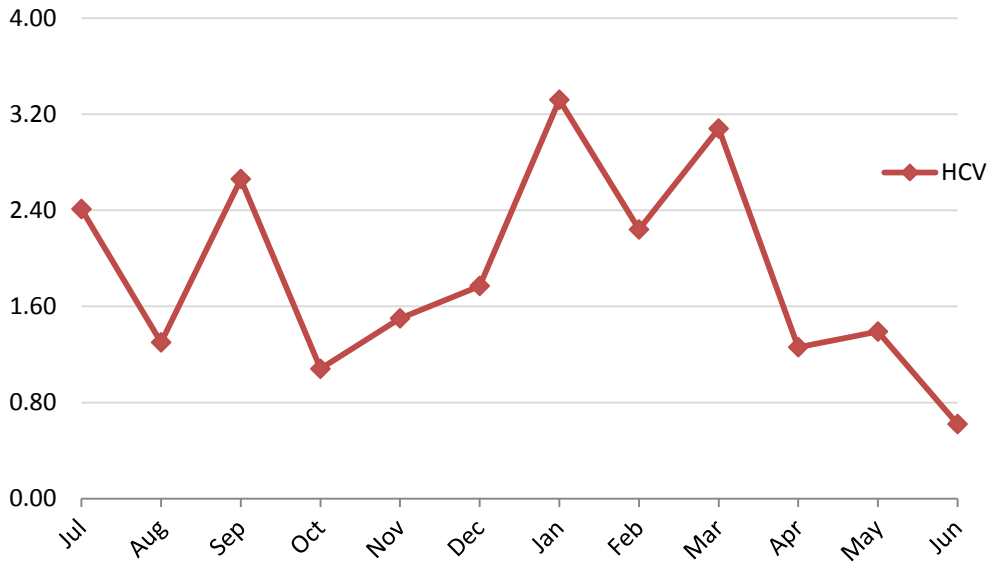

Figure 4.3: line chart Shows seroprevalence of Hepatitis C virus reactivity among prospective donors at the blood bank of UBTH.

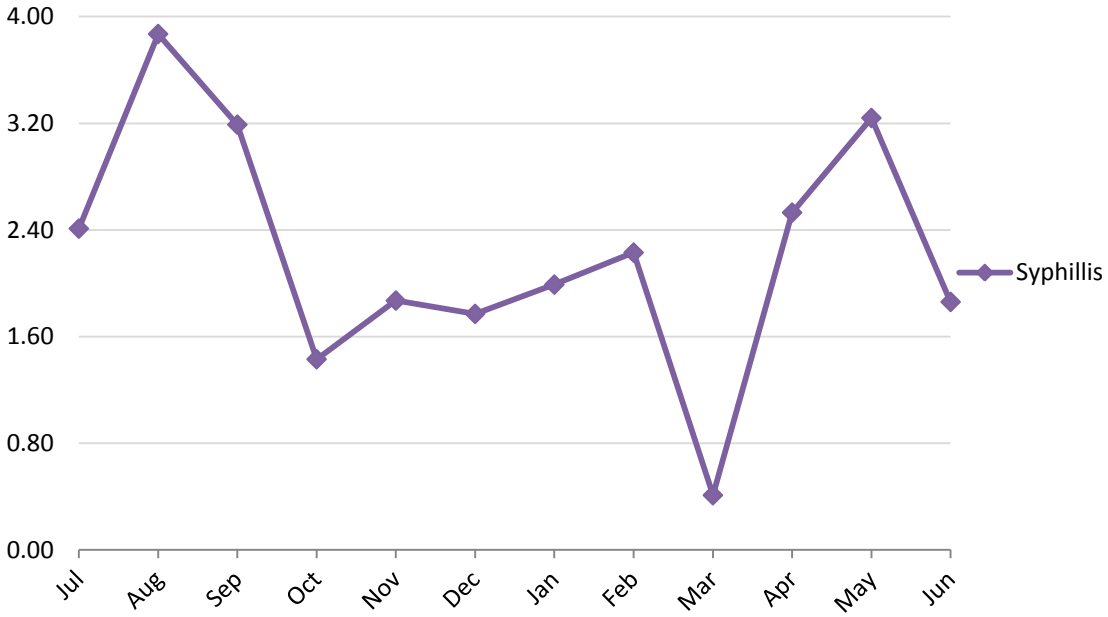

Figure 4.4: line chart Shows seroprevalence of Syphilis reactivity among prospective donors at the blood bank of UBTH.

CHAPTER FIVE

DISCUSSIONS

Blood transfusion is an important lifesaving procedure in treatment of patients, yet it carries the risk of transmission of life threatening infections. HIV, Hepatitis B Hepatitis C and Syphilis, are major public health concerns in developing countries. They can be transmitted sexually, vertically or through high risk behaviours among one of which is blood transfusion.

The transfer of unsafe blood exposes millions of individuals each year to preventable, life-threatening hazards. As per a global database, out of 81 million units of blood collected annually in 178 countries, 6 million are not well screened for transfusion transmissible infections (WHO, 2008)

This study delved into the epidemiology of Transfusion-Transmissible Infections (TTIs) by studying the recent monthly prevalence rates of HIV, HBsAg, HCV, and VDRL over a 12-month study period at the University of Benin Teaching Hospital.

Table 4.1 provides an overview of the monthly distribution of TTI cases recorded throughout the study duration. The identification of 30 HIV-positive samples, 76 HBsAg-positive samples, 60 HCV-positive samples, and 82 VDRL-positive samples over the course of the study highlights the continuous risk of these infections among prospective donors. These prevalence rates, when analysed collectively, reveal an overall prevalence of HIV, HBsAg, HCV, and syphilis as 0.93%, 2.35%, 1.85%, and 2.53%, respectively. The identified prevalence rates of TTIs are vital indicators of the potential risks associated with blood transfusions. Even seemingly low prevalence rates, as observed in this study, carry significant public health implications due to the large number of blood units that are transfused annually. The occurrence of these infections

among blood donors underscores the on-going need for vigilant screening protocols to mitigate the risk of transmitting infections to recipients, especially given the potentially severe consequences of TTI transmission.

The Seroprevalence of HIV in this study was found to be 0.93%. This is comparable with a prevalence of 1% and 2.8% in Nigerian studies recorded in Sokoto (Erhabor *et al*., 2014) and Kano (Imoru *et al*., 2003) respectively. However it is lower than 4.2% reported by a study in Calabar by Okoroiwu *et al*. (2018) and 4.9% recorded in Ghana (Walana *et al*., 2014). . Higher prevalence rates in these studies may be attributed to the fact that these studies included findings from previous years in the HIV endemic era whereas this study only considered an apparent 12-month period.

The seroprevalence of Hepatitis B virus found in this study was 2.35%. This is in line with a 4.1% finding by Okoroiwo *et al*. (2018). It is also comparable with a 1.67% prevalence rate reported by Ejele and Ojule (2004) in Port Harcourt. However it is far lower than those reported as 11.59% and 14.96% reported in Ghana (Julius *et al*., 2016), and Burkina Faso (Bala *et al*., 2012), respectively. Prevalence of hepatitis B observed in this study emphasizes the incidence of non-symptomatic infections as most donors who tested positive were not found to show any apparent sign of illness. This is so, inspite the chances of being able to transmit the infection to other people. Hepatitis B possesses serious health implications and the prevalence rate underscore the significance of comprehensive donor eligibility assessment, effective vaccination strategies, and continuous screening to mitigate the risk of Hepatitis B transmission.

The seroprevalence rate of HCV, at 1.85%, indicates the presence of donors still infected with the Hepatitis C virus. Hepatitis C infections can lead to chronic liver disease and other complications. The findings warrant on-going attention to blood safety protocols, emphasizing

the importance of detecting and excluding infected donors to prevent Hepatitis C transmission in blood transfusions. The prevalence rate in this study is comparable with 2.0% rate reported in Nnewi, also comparatively with 3.2% seroprevalence reported in Kenya (Kamande *et al*., 2016). It is however slightly lower than 4% reported by Bala *et al*. (2012) in Kano.

The serorevalence of syphilis in this study was 2.53%. This is comparable with a prevalence rate of 3.1% reported by Okoroiwu *et al*., (2018). Similar result has been reported from Sub-Saharan region such as Burkina Faso where Nagalo *et al*., (2009) reported a seroprevalence of 3.9%. The implication of syphilis among blood donors is the risk of transmission of this infection to recipients of blood and blood products. Syphilis has also acquired a new potential for morbidity and mortality through association with increased risk for HIV infection (Olokoba *et al*., 2008)

One remarkable finding is the higher prevalence of seropositive donors within the 26-33 age groups, with rates of 0.99% for HIV, 2.39% for HBsAg, 1.49% for HCV, and 2.64% for syphilis. This has also been corroborated by various studies including that of by Okoroiwu *et al*., (2018). This age bracket appears to exhibit an elevated risk of TTIs, which may be influenced by a combination of behavioural, social, and biological factors. Individuals in this age range might engage in higher-risk behaviours, such as unsafe sexual practices or other activities associated with infection transmission as these infections are primarily sexually transmitted infections (STI). The study reveals a lower cumulative seroprevalence rates among donors aged 18-25 who also formed a bulk of the donor population, with rates of 1.02% for HIV, 2.04% for HBsAg, 1.47% for HCV, and 1.93% for syphilis. While these rates might appear relatively lower, they highlight the need for early intervention and prevention strategies among the growing younger population.

This study revealed that, the majority of blood donors were males (72%). This demographic pattern among blood donors have been replicated in earlier studies from other parts of Nigeria (Okoroiwu *et al*., 2018) and in global studies (Julius *et al*., 2016). This may be attributed to deferral of potential female donors due to anaemia, pregnancy, breastfeeding or childbirth which are all criteria for donor exclusion. However, this observation was at variance with male donor population reports from United States of America (51.7%), Spain (54.0%), Portugal (57.0%), France (50.0%), United Kingdom (47.0%) and Finland (45.0%) where the male population were almost at par with the female population (Bani and Giussani, 2010). This non gender difference in developed countries may be attributed to the fact that majority of the blood donations in these developed countries were voluntary donations which is mainly driven by altruism which is shared by both sexes Although the study recorded more males, there was no statistically significant difference in the rate of testing positive for TTI infection among both genders.

This study found more replacement donors compared to voluntary donors. The significant correlation between donor category and the prevalence of TTIs, indicated by the p-value of less than 0.01, underscores the critical role of understanding donor motivation and behaviour. Another striking finding is the significantly higher seroprevalence of TTIs among replacement donors; the prevalence rates of HIV, HBsAg, HCV, and syphilis among replacement donors which was 0.99%, 2.42%, 2.14%, and 2.83%, respectively underscore the potential risks associated with this donor category. This higher prevalence might be attributed to the unique characteristics of replacement donors, such as higher-risk behaviours, insufficient self-awareness of potential infection, or incomplete disclosure of risk factors. In contrast, voluntary donors exhibited lower seroprevalence rates of TTIs. For HIV, HBsAg, HCV, and syphilis, the prevalence rates among voluntary donors were 0.744%, 2.11%, 0.99%, and 1.62%, respectively.

The reduced prevalence among voluntary donors might be attributed to the altruistic nature of voluntary donation, with donors typically more informed about health risks and motivated by a genuine desire to contribute to public health including the centre locations and public awareness of the importance of donation

CONTRIBUTION TO KNOWLEDGE

This study significantly contributes to the existing body of knowledge by shedding light on the intricate dynamics of TTI prevalence within a diverse donor population. The gender-based, age-specific, and donor category-specific prevalence rates expand our understanding of infection transmission patterns.

CONCLUSION

In conclusion, this study provides a comprehensive insight into the seroprevalence of Transfusion Transmissible Infections (TTIs) among blood donors at the University of Benin Teaching Hospital. The findings underscore the importance of continuous vigilance in maintaining blood safety standards and highlight the variable prevalence rates of HIV, HBsAg, HCV, and Syphilis among different demographic groups. This study emphasizes the critical role of targeted interventions to mitigate infection transmission, ensuring the safety of the blood supply and the well-being of recipients. To meet the dynamism of the problem to collect enough blood to meet the transfusion needs, factors such as blood donor recruiting and retention require ongoing and changing attention. Efforts should be continually intensified in ensuring maximum safety of blood for transfusion. This can be achieved by screening, counselling and creating awareness on the need for regular testing of TTIs to reduce transmission among prospective donors

RECOMMENDATIONS

Moving forward, it is recommended to implement gender-specific education campaigns to continually address the emerging Transfusion Transmissible Infections (TTI) rates. Tailored interventions targeting the younger age group can help reduce TTI prevalence in this vulnerable bracket. Strengthening pre-donation screening protocols for replacement donors and fostering a culture of voluntary donation will be instrumental in minimizing TTIs. Continuous research, surveillance, and collaboration with relevant stakeholders are essential for sustaining the progress made in blood safety.

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APPENDIX

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HEALTH RESEARCH ETHICS COMMITTEE APPROVAL

PROTOCOL NUMBER: ADM/E 22/A/VOL.VII/148301153

PROPOSAL TITLE: "THE SEROPREVALENCE AND TYPES OF TRANSFUSION TRANSMISSIBLE INFECTIONS AMONG VOLUNTARY DONORS IN THE BLOOD BANK OF UNIVERSITY OF BENIN TEACHING HOSPITAL"

PRINCIPAL INVESTIGATOR(S): AKPAN PAUL AKANINYENE

DEPARTMENT/INSTITUTION: DEPARTMENT OF MEDICAL LABORATORY SCIENCE, SCHOOL OF BASIC MEDICAL SCIENCES, UNIVERSITY OF BENIN, BENIN CITY, NIGERIA

CONSIDERED AUGUST 8TH, 2023

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 8/08/2023 TO /08/2024. IF THERE IS DELAY IN STARTING THE RESEARCH, PLEASE INFORM THE HREC SO THAT THE DATES OF APPROVAL CAN BE ADJUSTED ACCORDINGLY

REMARK:

CHAIRMAN: PROF. (MRS) A.N. OFILI **SIGNATURE & DATE** A.N.O. 7/8/2023

SUPERVISOR (S): DR (MRS) J.C. OTIKOR

DECLARATION BY INVESTIGATOR(S):
PROTOCOL NUMBER (please quote in all enquiries)
Note that no participant accrual or activity related to this research may be conducted outside of these dates. All informed consent forms used in this study must carry the HREC assigned number and duration of HREC approval of the study. In multiyear research, endeavor to submit your annual re-port to the HREC early in order to obtain renewal of your approval and avoid disruption of your research. No changes are permitted in the research without prior approval by the HREC except in circumstances outlined in the Code. The HREC reserves the right to conduct compliance visit your research site without previous notification.

Signature & Date..... 8/8/2023