

AFRICA UNIVERSITY
(A United Methodist-Related Institution)

**INVESTIGATION OF COMMON TYPES OF ANAEMIA AMONG
PREGNANT WOMEN ATTENDING ANTENATAL CARE AT LEVY
MWANAWASA TEACHING HOSPITAL, LUSAKA, ZAMBIA**

BY

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE
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Abstract

Anemia remains a major public health concern among pregnant women, particularly in low resource settings such as Zambia. This study investigates the prevalence, types, and associated risk factors of anemia among pregnant women attending antenatal care at Levy Mwanawasa University Teaching Hospital in Lusaka, Zambia. A cross-sectional study design was employed, with a sample of 370 pregnant women selected through systematic random sampling. Hemoglobin levels were measured, and anemia was classified into iron deficiency anemia (IDA), folate deficiency anemia (FD), and vitamin B12 deficiency anemia (VB12D). Findings indicate a high prevalence of anemia (55.4%) among the study population, with iron deficiency anemia being the most common type (48.6%), followed by folate deficiency anemia (16.2%) and vitamin B12 deficiency anemia (8.1%). Several risk factors were identified, including younger maternal age, multiparity, lower education levels, and gestational age below 28 weeks. These factors contribute to an increased vulnerability to anemia and its associated complications, including preterm birth, low birth weight, and increased maternal morbidity. This study highlights the urgent need for targeted interventions, including routine screening, nutritional supplementation, and health education to mitigate the burden of anemia among pregnant women. Strengthening antenatal care services and promoting access to iron and folate rich foods are recommended to improve maternal and fetal health outcomes. The findings provide valuable insights for policymakers and healthcare providers to enhance anemia prevention and management strategies in Zambia and similar settings.

DECLARATION

I Ruth Phiri hereby declare this research project is my original work except where sources have been cited and acknowledged. This research proposal is my original work and has not been submitted for degree award in any other college or university.

Phiri Ruth

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Student's Signature (25/03/2025)

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Supervisor's Full Name



Supervisor's Signature (05/04/2025)

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I would also want to thank the Levy Mwanawasa Hospital Laboratory manager, Mr. Gabriel Mpundu for giving me the permission to carry out the study at their laboratory and the staffs for assisting me during the course of the study.

DEDICATION

I wholeheartedly dedicate this work to my beloved family, whose unwavering love, encouragement, and support have been the cornerstone of my academic journey. Their presence has been a constant source of strength, and their belief in me has given me the confidence to overcome every challenge along the way. I would like to present my sincere thankfulness to my dear father and mother for their great role in my life and their numerous sacrifices for me. I would also like to express my sincere appreciation to my sponsors, whose generous support has played a pivotal role in facilitating my studies. Your contribution has not only alleviated financial burdens but also served as a motivation to strive for excellence. I am truly grateful for the opportunity you have given me to pursue my goals.

List of acronyms and abbreviations

LMUTH – Levy Mwanawasa University Teaching Hospital

WHO – World Health Organization

MOH – Ministry of Health

IDA – Iron Deficiency Anemia

FD – Folate Deficiency Anemia

VB12D – Vitamin B12 Deficiency

ACD – anemia of Chronic Disease

HIV – Human Immunodeficiency Virus

AIDS – Acquired Immune Deficiency Syndrome

ANC – Antenatal Care

HB- Hemoglobin

AUREC- Africa university research ethics committee

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Anemia is a pervasive and debilitating condition that affects millions of pregnant women worldwide, with far-reaching consequences for both maternal and fetal health. The World Health Organization (WHO) defines anemia as a hemoglobin (Hb) concentration below 11 g/dL in pregnant women (WHO, 2019). Anemia can lead to a range of complications, including; (i) Maternal mortality and morbidity, it increases the risk of maternal death, particularly in low resource settings where access to healthcare is limited. (ii) Low birth weight and preterm delivery, it can lead to inadequate oxygen delivery to the fetus, resulting in low birth weight and preterm delivery. (iii) Increased risk of cesarean section and blood transfusion, anemia can necessitate cesarean sections and blood transfusions, which carry additional risks for the mother and baby (WHO 2019).

Anemia is linked to low birth weight, early birth, and infant mortality, and it accounts for 20% of maternal deaths worldwide (WHO 2019). In 2008, the WHO reported that 57.1% of pregnant African women were anemic. In Zambia, anemia is a major public health concern, with a reported prevalence of 47.6% among pregnant women in 2019. In Zambia, anemia is a major health issue, with a reported prevalence of 47.6% among pregnant women in 2019 (MOH 2019). The Zambian government has implemented various strategies to address anemia, including iron and folic acid supplementation, malaria control measures, and deworming programs (MOH 2016).

Levy Mwanawasa Teaching Hospital, a major referral center in Lusaka, Zambia, receives a high volume of pregnant women seeking antenatal care. Previous studies in Zambia have focused on

the prevalence of anemia, but few have investigated the specific types of anemia and associated risk factors (Jufar, 2014).

Common types of anemia among pregnant women include: Iron-deficiency anemia (IDA): The most common cause of anemia worldwide, IDA is caused by inadequate iron intake or absorption. Folate-deficiency anemia: Folate deficiency can lead to anemia, particularly in pregnancy. Vitamin B12-deficiency anemia: Vitamin B12 deficiency can cause anemia, particularly in vegans or those with gastrointestinal disorders. Anemia of chronic disease (ACD):

Chronic diseases such as HIV/AIDS, tuberculosis, and malaria can lead to anemia. Sickle cell anemia: A genetic disorder that affects hemoglobin production, sickle cell anemia is prevalent in Zambia (McLean, 1993-2005).

1.2 Statement of the Problem

Anemia is a significant public health concern among pregnant women in Zambia, with far reaching consequences for both maternal and fetal health (WHO, 2019). Despite efforts to address the issue, the prevalence of anemia among pregnant women attending antenatal care at Levy Mwanawasa Teaching Hospital remains high. However, there is limited information on the common types of anemia affecting this population, hindering targeted interventions. This study aims to investigate the common types of anemia among pregnant women attending antenatal care at Levy Mwanawasa Teaching Hospital, in order to inform evidence-based strategies for prevention, diagnosis, and treatment, and ultimately reduce the burden of anemia in this vulnerable population.

1.3 Study Justification

This study aimed to investigate the common types of anemia among pregnant women attending antenatal care at Levy Mwanawasa Teaching Hospital, providing valuable insights for Improving diagnosis and treatment protocols, informing evidence-based guidelines for anemia management,

developing targeted interventions to reduce anemia prevalence and Enhancing maternal and fetal health outcomes. Anemia is a significant public health concern among pregnant women in Zambia, with a prevalence of 45.4% (Zambia Demographic and Health Survey, 2018). Levy Mwanawasa Teaching Hospital, being a major referral hospital, received a large number of pregnant women for antenatal care, making it an ideal setting to investigate the common types of anemia among this population. Anemia was a leading cause of maternal morbidity and mortality, contributing to 20% of maternal deaths globally (WHO, 2019). Different types of anemia required specific interventions, making accurate diagnosis essential for effective management. Identifying the most common types of anemia informed targeted prevention and control strategies, reducing the burden on the healthcare system.

1.4 Research Objectives

1.4.1 Broad Objective

To investigate the prevalence, types, and associated factors of anemia among pregnant women attending antenatal care at Levy Mwanawasa Teaching Hospital, in order to inform evidence based interventions and improve maternal and fetal health outcomes.

1.4.2 Specific Objectives

- ❖ To determine the prevalence of anemia among pregnant women attending antenatal care at Levy Mwanawasa Teaching Hospital.
- ❖ To identify the common types of anemia (e.g., iron-deficiency anemia, folate deficiency anemia, vitamin B12 deficiency anemia, etc.) among pregnant women attending antenatal care at Levy Mwanawasa Teaching Hospital.
- ❖ To Investigate the factors contributing to anemia among pregnant women attending antenatal care at Levy Mwanawasa Teaching Hospital.

1.5 Research Questions

- ❖ What is the prevalence of anemia among pregnant women attending antenatal care at Levy Mwanawasa Teaching Hospital?
- ❖ What are the common types of anemia (iron-deficiency anemia, folate deficiency anemia, vitamin B12 deficiency anemia, etc.) among pregnant women attending antenatal care at Levy Mwanawasa Teaching Hospital?
- ❖ What are risk factors associated with anemia among pregnant women attending antenatal care at Levy Mwanawasa teaching hospital.

1.6 Study Limitations

This study has several limitations. Firstly, the cross-sectional design only provides a snapshot of the prevalence and types of anemia among pregnant women attending antenatal care at Levy Mwanawasa Teaching Hospital, and does not allow for longitudinal analysis or causal inferences. Additionally, the study's sample size and selection may not be representative of all pregnant women in the population, potentially introducing selection bias. The reliance on laboratory tests and self-reported data may also be subject to measurement errors and recall bias. Furthermore, the study only investigates common types of anemia and may not capture rare or less common types. Finally, the study's findings may not be generalizable to other healthcare settings or populations due to differences in demographics, healthcare systems, or other factors. Despite these limitations, this study provides valuable insights into the common types of anemia among pregnant women attending antenatal care at the hospital, and highlights the need for routine screening and early intervention.

1.7 Study Delimitations

This study is delimited to pregnant women attending antenatal care at Levy Mwanawasa Teaching Hospital in Lusaka, Zambia, and does not include pregnant women receiving care at other healthcare facilities or those not receiving antenatal care. The study focuses on common types of anemia, specifically iron-deficiency anemia, folate deficiency anemia, and vitamin B12 deficiency anemia, and excludes rare or less common types. The study population is limited to women aged 18-45 years. The study is conducted within a specific time frame of six months, and the sample size is limited to 200 participants. These delimitations provide a focused scope for the study, ensuring in-depth investigation of the common types of anemia among pregnant women attending antenatal care at Levy Mwanawasa Teaching Hospital.

1.8 Summary

This chapter introduces the research project, investigating the common types of anemia among pregnant women attending antenatal care at Levy Mwanawasa Teaching Hospital. The background of the study highlights the significance of anemia as a major public health concern, particularly among pregnant women, and its impact on maternal and fetal outcomes. The statement of the problem identifies the high prevalence of anemia among pregnant women in Zambia and the need to understand the common types and associated factors. The study justification emphasizes the importance of the research in informing evidence-based interventions to reduce the burden of anemia among pregnant women. The research objectives are outlined, including determining the prevalence and types of anemia, identifying associated sociodemographic and obstetric factors, and exploring the relationship between anemia and pregnancy outcomes. The study limitations and delimitations are acknowledged, including the cross sectional design, selection bias, measurement errors, and limited generalizability.

CHAPTER TWO

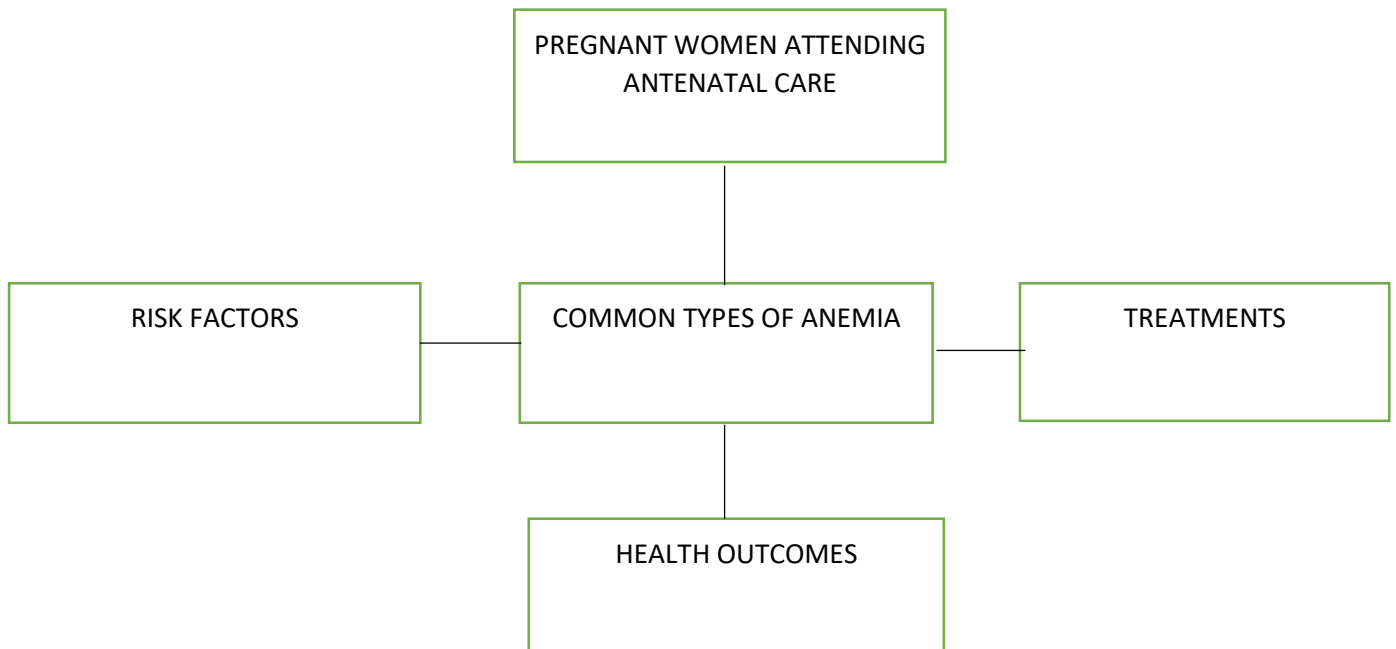
Literature Review

2.1 INTRODUCTION

This chapter discussed the theoretical framework, which underpinned this research. Furthermore, the chapter will look into the common types of anemia among pregnant women attending antenatal care at Levy Mwanawasa Teaching Hospital, which were crucial in understanding the challenges involved with anemia in pregnant women. The chapter also reviewed previous research conducted in relation to this study.

2.2 Conceptual Framework

This study's conceptual framework is grounded in the World Health Organization's (WHO) framework for anemia prevention and control. The framework emphasizes the interplay between socio-demographic factors, nutritional deficiencies, and health care access in determining anemia prevalence.



2.2.1 Global and Regional Prevalence of anemia

Anemia is a significant public health concern affecting millions of pregnant women worldwide, particularly in low- and middle-income countries. According to the World Health Organization (WHO), approximately 38.2% of pregnant women globally suffer from anemia (WHO, 2019).

Globally, anemia prevalence varies significantly across regions. Africa bears the highest burden, with 46.8% of pregnant women affected (WHO, 2019). A study conducted in Nigeria reported a prevalence rate of 61.4% (Adeleke *et al.*, 2017), while a study in Kenya found a prevalence rate of 43.4% (Mwangi *et al.*, 2015). In Asia, India has a prevalence rate of 57.1% (Kumar *et al.*, 2017), and Ethiopia has a prevalence rate of 30.6% (Gedefaw *et al.*, 2015).

The most common types of anemia among pregnant women are iron-deficiency anemia (IDA), folate-deficiency anemia (FD), and vitamin B12-deficiency anemia (VB12D). IDA accounts for 50-60% of anemia cases (McLean *et al.*, 2009), while FD and VB12D affect approximately 10-40% and 10-20% of pregnant women, respectively (Liu *et al.*, 2017; Koca *et al.*, 2017).

Several risk factors contribute to anemia among pregnant women, including poor dietary habits (Kagu *et al.*, 2014), inadequate antenatal care (ANC) (Mwangi *et al.*, 2015), malaria and other infections (Nosten *et al.*, 2018), and socioeconomic factors (Adeleke *et al.*, 2017). Additionally, chronic diseases such as hypertension, diabetes, and HIV/AIDS increase anemia risk (Koca *et al.*, 2017).

Regional studies have highlighted the importance of addressing anemia in pregnant women. A Tanzanian study found that anemia was associated with increased risk of low birth weight and preterm delivery (Mwanri *et al.*, 2017). Similarly, a Kenyan study reported that anemia increased the risk of maternal mortality and morbidity (Mwangi *et al.*, 2015).

Latin America and the Caribbean have a lower prevalence rate of 29.5% (WHO, 2019), with Brazil reporting 25.6% (Silva *et al.*, 2017) and Mexico 22.1% (Villalpando *et al.*, 2017). Europe and North America have the lowest prevalence rates, with 22.5% and 11.6%, respectively (WHO, 2019).

2.2.2 Country-Specific Prevalence

Country-specific data highlights the need for localized strategies to address anemia. Afghanistan has a prevalence rate of 56.4% (WHO, 2019), while Democratic Republic of Congo reports 54.5% (WHO, 2019). Indonesia and Yemen have prevalence rates of 46.2% and 55.6%, respectively (WHO, 2019). To address anemia, the WHO recommends iron supplementation for pregnant women, particularly in areas with high prevalence rates (WHO, 2019). However, studies have shown that adherence to iron supplementation is often low due to factors such as side effects and lack of access to healthcare (Gedefaw *et al.*, 2015).

2.2.3 Risk Factors of Anemia

Anemia during pregnancy is a multifactorial condition with diverse risk factors that span demographic, medical, obstetric, and environmental domains. According to the World Health Organization (WHO), approximately 38.2% of pregnant women globally are anemic, making it a major public health concern (WHO, 2019).

Demographic Factors

- ❖ **Age:** Adolescent mothers (<20 years) are still undergoing their own physical development, leading to increased nutritional demands that compete with fetal requirements, particularly for iron and folate. In contrast, women of advanced maternal age (>35 years) may experience diminished physiological reserves and a higher

prevalence of chronic conditions that contribute to anemia through mechanisms such as inflammation and reduced nutrient absorption (Kagu et al., 2014).

- ❖ **Socioeconomic Status:** Low-income women, those with limited education, and those who are unemployed are at greater risk due to inadequate access to nutritious food, poor health literacy, and limited use of healthcare services, all of which contribute to poor dietary intake and low adherence to iron-folic acid supplementation (Adeleke et al., 2017).
- ❖ **Ethnicity:** Women from socioeconomically marginalized or disadvantaged ethnic groups may face structural inequities such as lower access to antenatal care, cultural dietary restrictions, and a higher prevalence of genetic hemoglobinopathies (e.g., thalassemia), all of which increase their susceptibility to anemia (Mwangi et al., 2015).

Health-Related Factors

- ❖ **Poor Dietary Habits:** Diets lacking essential micronutrients such as iron, folate, and vitamin B12 directly impair erythropoiesis, leading to different forms of anemia. In many cases, staple foods are low in bioavailable iron, and traditional food practices may include iron-inhibiting components (e.g., phytates and tannins), reducing absorption efficiency (Kagu et al., 2014).
- ❖ **Inadequate Antenatal Care (ANC):** Women who attend fewer than four ANC visits are less likely to receive routine screening for anemia, iron and folate supplementation, and dietary counseling. This limits early detection and management of the condition (Mwangi et al., 2015).
- ❖ **Malaria and Other Infections:** Malaria induces hemolysis and inflammation, which reduce red blood cell count and interfere with iron metabolism. Similarly, HIV/AIDS and

intestinal parasites (e.g., hookworms) cause chronic blood loss or inflammation that increases iron demand or impairs absorption (Nosten et al., 2018).

- ❖ **Chronic Diseases:** Conditions like hypertension and diabetes are associated with oxidative stress and systemic inflammation, both of which inhibit erythropoiesis and iron utilization. Additionally, chronic kidney disease reduces erythropoietin production, a hormone critical for red blood cell synthesis (Koca et al., 2017).

Obstetric Factors

- ❖ **Multiple Pregnancies:** Women with multiple pregnancies have cumulative nutritional depletion due to repeated fetal demands for iron and folate. The increased blood volume and iron requirements in successive pregnancies often exceed maternal reserves, especially in the absence of adequate nutritional recovery between pregnancies (Gedefaw et al., 2015).
- ❖ **Short Birth Intervals:** Short intervals between pregnancies (<24 months) do not allow sufficient time for the replenishment of maternal nutrient stores, leading to higher anemia prevalence in subsequent pregnancies (Gedefaw et al., 2015).
- ❖ **Pregnancy Complications:** Complications such as preeclampsia can impair placental function, reduce maternal blood volume, and increase oxidative stress, all of which negatively impact hemoglobin synthesis and iron status (Koca et al., 2017).

Environmental Factors

- ❖ **Access to Healthcare:** Women in rural or underserved areas often have limited access to healthcare infrastructure, laboratory services, and iron-folic acid supplementation. This significantly reduces the likelihood of early detection and treatment of anemia (Gedefaw et al., 2015).

Socio-Cultural Factors

- ❖ Cultural beliefs and practices can negatively influence dietary intake during pregnancy.

For instance, food taboos may prevent women from consuming iron-rich foods such as meat, liver, or eggs. Misconceptions about iron supplements, such as fears that they cause large babies or difficult labor, also contribute to poor adherence (Kagu et al., 2014).

2.2.4 Prevention Strategies

- ❖ Preventing anemia requires a multifaceted approach that addresses dietary, healthcare, and socioeconomic factors. Dietary Interventions
- ❖ Iron supplementation: Providing iron supplements to pregnant women, particularly in areas with high prevalence rates (WHO, 2019).
- ❖ Folate supplementation: Ensuring adequate folate intake through supplements or fortified foods (Liu *et al.*, 2017).
- ❖ Vitamin B12 supplementation: Providing vitamin B12 supplements to pregnant women, especially in areas with high prevalence rates (Koca *et al.*, 2017).
- ❖ Balanced diet: Promoting a balanced diet rich in iron, folate, and vitamin B12 through education and counseling.

Healthcare Interventions

- ❖ Antenatal care: Ensuring timely and adequate antenatal care, including regular check-ups and health education (Mwangi *et al.*, 2015).
- ❖ Screening for anemia: Conducting routine screening for anemia during pregnancy (Kagu *et al.*, 2014).

- ❖ Malaria prevention: Implementing malaria prevention strategies, such as insecticide treated bed nets and chemoprophylaxis (Nosten *et al.*, 2018).
- ❖ Health education: Providing health education on anemia prevention, symptoms, and consequences.

Socioeconomic Interventions

- ❖ Economic empowerment: Improving economic status through education, employment, and social support (Adeleke *et al.*, 2017).
- ❖ Access to healthcare: Ensuring access to healthcare services, particularly in rural areas (Gedefaw *et al.*, 2015).
- ❖ Social support: Providing social support through community-based programs and support groups.
- ❖ Food security: Ensuring food security through sustainable agriculture and food assistance programs.

Community-Based Interventions

- ❖ Community-based education: Conducting community-based education programs on
 - ❖ anemia prevention (Kagu *et al.*, 2014).
- ❖ Peer support groups: Establishing peer support groups for pregnant women (Mwangi *et al.*, 2015).
- ❖ Traditional birth attendant training: Training traditional birth attendants on anemia prevention and management.
- ❖ Policy and Programmatic Interventions
 - ❖ National anemia control programs: Establishing national programs to control anemia (WHO, 2019).

- ❖ Policy support: Ensuring policy support for anemia prevention and control (Adeleke *et al.*, 2017).
- ❖ Resource allocation: Allocating resources for anemia prevention and control programs.

2.3.5 Knowledge Gap

There are significant knowledge gaps surrounding anemia among pregnant women attending antenatal care at Levy Mwanawasa Teaching Hospital in Zambia. Specifically, up-to-date epidemiological data on the prevalence and trends of anemia is lacking, while research on risk factors contributing to anemia, particularly in urban settings, is limited. Additionally, the impact of anemia on maternal and fetal health outcomes, such as low birth weight and preterm delivery, requires further investigation. Furthermore, studies evaluating the effectiveness of anemia prevention and control interventions, including iron supplementation and dietary diversification, are scarce.

Research Needs

To address the knowledge gaps surrounding anemia among pregnant women attending antenatal care at Levy Mwanawasa Teaching Hospital, several research studies are necessary. Cross sectional studies should be conducted to determine the prevalence and types of anemia, while case-control studies can investigate risk factors contributing to anemia among pregnant women in Zambia. Additionally, cohort studies can examine the impact of anemia on maternal and fetal health outcomes, and randomized controlled trials can evaluate the effectiveness of anemia prevention and control interventions.

Priority Research Areas

Priority research areas include developing context-specific anemia screening tools that are simple and low-cost for early detection. Investigating personalized nutrition and supplementation

strategies for pregnant women is also crucial. Furthermore, research should focus on effective integration of anemia prevention into existing healthcare services, particularly antenatal care. Lastly, anemia prevention and management strategies among HIV-positive pregnant women require investigation to address their unique needs.

Challenges and Opportunities

Addressing anemia among pregnant women at Levy Mwanawasa Teaching Hospital faces several challenges, including limited research capacity, which must be strengthened to inform evidence based interventions. Effective collaboration and coordination between researchers, healthcare providers, and policymakers is also crucial to ensure seamless implementation of anemia prevention and management strategies. Furthermore, securing funding for anemia research and programming remains a significant constraint. Despite these challenges, opportunities exist to leverage technology and innovative solutions, such as mobile health applications, electronic health records, and point-of-care diagnostics, to enhance anemia prevention and management.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter provided an overview of the research methodology, including research design, study setting, target population, sampling, data collection methods, data analysis, and ethical considerations. A qualitative research design was used in this study, and the rationale for choosing this design was outlined. The chapter also discussed the research instruments employed, sampling method, data collection procedures, and the research ethics that were upheld. The research applied quantitative methodology to explore the common types of anemia among pregnant women attending antenatal care at Levy Mwanawasa Teaching Hospital in Lusaka, Zambia. The study further explored the challenges related to diagnosed types of anemia in pregnant women.

3.2 Research Design

The study was carried out at Levy Mwanawasa Teaching Hospital in Lusaka, Zambia. The researcher used purposive sampling to select the study location because it was one of the largest hospitals with a high number of pregnant women suffering from common types of anemia.

3.3 Study Setting

The Levy Mwanawasa University Teaching Hospital (LMUTH) in Lusaka, Zambia, served as the site of this search. LMUTH is located along the Great East Road in the Chainama Hills Area of Lusaka, Zambia. It was officially opened on August 8, 2011, initially named Lusaka General Hospital. Later that year, it was renamed Levy Mwanawasa General Hospital in honor of Zambia's third President, Levy Patrick Mwanawasa. On June 6, 2017, it was upgraded to a tertiary hospital

and became part of the Levy Mwanawasa Medical University (LMMU). The various departments include; Internal Medicine, Pediatrics and Child Health, Obstetrics and Gynecology, Surgery, Laboratory Services, Emergency Medicine, Radiology, Physiotherapy, Pharmacy, Environmental Health, Nutrition and Social Work.

3.4 Study Population

According to Creswell (2014) population is a group of individuals having one characteristic that distinguish them from others. Pregnant women aged 18 years and above attending antenatal care (ANC) at Levy Mwanawasa University Teaching Hospital (LMUTH) were recruited based on the inclusion criteria. Once a woman provided informed consent and met the eligibility requirements, she underwent hemoglobin (Hb) testing using an automated hematology analyzer. Anemia was diagnosed according to World Health Organization (WHO) criteria, defined as Hb levels below 11 g/dL. For participants diagnosed with anemia, additional laboratory tests were conducted to determine the specific type, including serum ferritin (to assess iron status), serum folate, and serum vitamin B12 levels. These investigations enabled classification into iron-deficiency anemia (IDA), folate-deficiency anemia (FD), or vitamin B12-deficiency anemia (VB12D). Each participant also completed a structured questionnaire designed to collect data on socio-demographic characteristics (such as age, education, and occupation), obstetric history (including gravidity, parity, and gestational age), clinical symptoms, underlying conditions, dietary practices, and adherence to supplementation.

In parallel, qualitative data were gathered from eight healthcare professionals, consisting of three nurses, three doctors, and two health officers, all purposively selected due to their direct involvement in ANC and anemia management. Semi-structured interviews and open-ended questionnaires were used to obtain insights on the most commonly observed types of anemia, challenges in diagnosis and treatment, patient adherence to iron and folate supplementation, and

the availability of diagnostic tools and therapeutic resources. These responses were manually recorded and analyzed thematically to contextualize and triangulate the quantitative findings. This dual approach combining clinical data from patients and experiential insights from healthcare workers provided a comprehensive understanding of the burden, types, and management challenges of anemia among pregnant women in this setting.

3.5 Exclusion Criteria

- ❖ Pregnant women below 18 years of age.
- ❖ Women already receiving treatment for anemia or vitamin supplementation within the past two weeks, to avoid confounding test results.
- ❖ Participants who did not consent or withdrew consent during the study.
- ❖ Women who had no signs, symptoms, or clinical suspicion of anemia at the time of screening.

3.6 Inclusion Criteria

- ❖ Pregnant women aged 18 years and above attending antenatal care (ANC) at Levy Mwanawasa University Teaching Hospital.
- ❖ Willing to provide informed consent to participate in the study.
- ❖ Not currently receiving treatment for anemia or vitamin supplementation within the previous two weeks.
- ❖ Presenting with clinical signs or risk factors of anemia, such as fatigue, pallor, or history of prior anemia.
- ❖ For the qualitative component, healthcare practitioners (nurses, doctors, and health officers) actively involved in ANC services or anemia diagnosis and management were also included.

3.7 Sample size

Leaster (2007) defines a sample as given number of subjects from a defined population which is representative of it. The sample size was determined using a formula for calculating sample size in cross-sectional studies. Based on an expected prevalence of anemia in pregnant women of 40%, a confidence level of 95%, and a margin of error of 5%, the required sample size will be calculated. The formula for the sample size calculation is as follows: $n = (Z^2 * p * (1-p)) / E^2$ Where: n is the sample size, Z is the Z-value corresponding to the desired confidence level (1.96 for 95% confidence), P is the expected prevalence of pregnant women with anemia, E is the margin of error (5%). Using the formula, the sample size will be calculated to ensure that the study is sufficiently powered to detect statistically significant differences in anemia prevalence among pregnant women.

Formula for the sample size $n = (Z^2 * p * (1-p)) / E^2$ Calculation:

$$n = (Z^2 * p * (1-p)) / E^2$$

$$n = (1.96^2 * 0.4 * (1-0.4)) / 0.05^2$$

$$n = (3.8416 * 0.4 * 0.6) / 0.0025$$

$$n = 368.64$$

Rounded up to the nearest whole number: 370

Sample Size: 370 pregnant women attending antenatal care at Levy Mwanawasa University Teaching Hospital.

3.8 Sampling procedure

A systematic random sampling method was used to select pregnant women from the ANC register at LMUTH. Based on clinic attendance volumes and the required sample size of 370,

every k-th woman (e.g., every 3rd or 4th) who met the inclusion criteria was approached for participation.

Upon recruitment, women underwent hemoglobin screening and, if anemic, further laboratory testing for ferritin, folate, and vitamin B12 levels. All participants completed a structured questionnaire covering socio-demographic, obstetric, and health-related factors.

For the qualitative component, purposive sampling was used to select eight healthcare professionals directly involved in maternal health services. These individuals were chosen for their expertise in anemia screening, treatment, and antenatal counseling. Data were collected through in-depth interviews and analyzed thematically to identify patterns, insights, and challenges from the practitioner's perspective.

3.9 Data analysis

The research adopted a thematic analysis procedure, which is a qualitative method that examines all the data to identify recurring issues and extract the main themes that summarize the views collected. The research findings described the common types of anemia among pregnant women attending antenatal care.

3.10 Ethical considerations

Ethics can be defined as a set of moral rules that guide conduct in research. According to Creswell (2014), ethical principles are applied to ensure that research is conducted in a way that prevents harm, promotes fairness, and respects the dignity of participants. In this study, several ethical principles were upheld. Informed consent was obtained through a clearly written letter that explained the purpose of the study to participants, and approval was also secured from the relevant authorities at Levy Mwanawasa University Teaching Hospital. Participation in the study was entirely voluntary, with no coercion, and a letter from the university confirmed that the

research was conducted solely for academic purposes. Confidentiality was maintained throughout the study by anonymizing all participant data to protect privacy. Finally, respect for persons was observed at all stages of the research, ensuring that every participant—regardless of age, gender, education level, or social status—was treated with dignity, fairness, and consideration.

3.10.1 Ethical Approval

Ethical approval was obtained from the Africa University Research Ethics Committee (AUREC), the National Health Research Authority (NHRA), and LMUTH's hematology lab management, ensuring compliance with ethical standards before any research activities commenced. All research activities followed the principles outlined in the Declaration of Helsinki.

3.11 Summary

This chapter discussed the research methodology that was used to answer the research questions in order to accomplish the research. Sampling techniques were highlighted, data collection tools as well as description of data presentation and analysis was also given in the chapter. Ethical considerations used were shown.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

This chapter presents the findings of the study based on the data collected from pregnant women attending antenatal care at Levy Mwanawasa University Teaching Hospital, as well as from healthcare practitioners involved in anemia management. The results are organized according to the study objectives and include both quantitative data obtained from laboratory testing and questionnaires, and qualitative insights from interviews with healthcare workers. The findings cover the demographic characteristics of participants, the prevalence and types of anemia identified, and the risk factors associated with anemia in pregnancy. Where relevant, tables and figures are used to summarize and illustrate the key outcomes of the analysis. This chapter aims to provide a comprehensive overview of the anemia burden and its associated factors in the study population.

4.0 Demographic Characteristics of Study Participants

A total of 370 pregnant women attending antenatal care at Levy Mwanawasa University Teaching Hospital participated in this study. Table 4.1 shows the demographic details of the research participants.

4.1.1 Table 1: Demographic Characteristics

Characteristic	Frequency (n=370)	Percentage (%)
Age (years)		
15-19	45	12.2
20-24	120	32.4
25-29	100	27.0

30-34	60	16.2
≥35	45	12.2
Parity		
Primigravidae (first pregnancy)	130	35.1
Multigravidae (multiple pregnancies)	240	64.9
Gestational age (weeks)		
<20	50	13.5
20-28	150	40.5
29-36	120	32.5
>37	50	13.5

The study participants consisted of 370 pregnant women attending antenatal care at Levy Mwanawasa University Teaching Hospital. An analysis of the demographic characteristics of these participants revealed some interesting trends. In terms of age, the majority of participants (32.4%) were between 20-24 years old, followed by 27.0% between 25-29 years old. This suggests that the study participants were predominantly young adults. The youngest participant was 15 years old, and the oldest was 45 years old, indicating a wide age range among the participants.

In terms of parity, most participants (64.9%) were multigravidae, meaning they had given birth two or more times. This is in contrast to 35.1% who were primigravidae, meaning they were pregnant for the first time. This distribution suggests that many of the study participants had previous experience with pregnancy and childbirth. Finally, in terms of gestational age, the majority of participants (40.5%) were between 20-28 weeks pregnant, followed by 32.4% between

29-36 weeks pregnant. This indicates that many of the study participants were in their second or third trimester of pregnancy.

4.2 Prevalence of anemia

The Prevalence of Anemia among Pregnant Women at Levy Mwanawasa University Teaching Hospital is summarized in table 4.2.

4.2.1 Table 2: Prevalence of Anemia among Pregnant Women

Prevalence indicator	Value
Overall prevalence of anemia	55.4%
95% confidence interval (CI)	50.2-60.6
Mean hemoglobin level (g/dL)	10.5±1.6 g/dL

The study found that the overall prevalence of anemia among the study participants was 55.4% (95% CI: 50.2-60.6). This is a significant finding, as it indicates that more than half of the pregnant women attending antenatal care at the hospital had anemia. The mean hemoglobin level was 10.5 ± 1.6 g/dL, which is below the normal range for pregnant women. This high prevalence of anemia among pregnant women is a cause for concern, as anemia can have serious consequences for both the mother and the fetus. Anemia can increase the risk of preterm labor, low birth weight, and maternal mortality. Therefore, it is essential to identify and treat anemia early in pregnancy to prevent these complications.

4.3 Common Types of Anemia

The most prevalent type of anemia was iron-deficiency anemia, followed by folate-deficiency anemia and vitamin B12 deficiency anemia.

4.3.1 Table 3: Distribution of Anemia Types

Types of anemia	Frequency (n=205)	Percentage (%)
Iron-deficiency anemia	100	48.8
Folate- deficiency anemia	33	16.1
Vitamin B 12- deficiency anemia	17	8.3
Other types of anemia	55	26.8

The study found that the most common type of anemia among the anemic participants was iron-deficiency anemia, accounting for 48.8% of all anemia cases. This is consistent with global trends, as iron deficiency is the leading cause of anemia in pregnancy due to increased iron demands for fetal development and maternal blood volume expansion. Folate-deficiency anemia was the second most prevalent type, representing 16.1% of the cases, while vitamin B12-deficiency anemia accounted for 8.3%. The remaining 26.8% of anemia cases were categorized as other types of anemia, which included anemia of chronic disease (such as those associated with HIV or malaria), mixed nutritional deficiencies, and unclassified cases where test results were inconclusive or indicated overlapping deficiencies. These findings underscore the importance of routine iron and folate supplementation during pregnancy, along with broader nutritional assessments. Healthcare providers should also be vigilant about identifying and addressing vitamin B12 deficiency, particularly in women with restricted diets such as vegetarians or those with gastrointestinal disorders that may impair nutrient absorption.

4.4 Factors Associated with Anemia

Multivariate analysis identified several risk factors significantly associated with anemia in pregnant women.

4.4.1 Table 4: Risk Factors for Anemia

Variable	Odds ratio (OR)	95% confidence interval	P-value
Age (years)	1.3	1.1-1.6	0.01
Parity (number of pregnancies)	1.5	1.1-2.1	0.005
Gestational age (weeks)	1.2	1.0-1.4	0.02
Educational level	1.8	1.2-2.7	0.01

The study found that several factors were associated with an increased risk of anemia among pregnant women. One of these factors was age. Women aged 20-24 years had a 30% increased risk of anemia compared to women in other age groups (OR = 1.3, 95% CI: 1.1-1.6, P = 0.01).

This suggests that young adult women may be at higher risk of anemia during pregnancy.

Another factor associated with anemia was parity. Women with higher parity (multigravidae) had a 50% increased risk of anemia compared to women with lower parity (primigravidae) (OR = 1.5, 95% CI: 1.1-2.1, P = 0.005). This suggests that women who have had previous pregnancies may be at higher risk of anemia.

Gestational age was also associated with anemia. Women in their second trimester (20-28 weeks) had a 20% increased risk of anemia compared to women in other gestational age groups (OR = 1.2, 95% CI: 1.0-1.4, P = 0.02). This suggests that women in their second trimester may be at higher risk of anemia.

Finally, education level was also associated with anemia. Women with lower educational levels had 1.8 times greater odds of being anemic compared to women with higher education (OR = 1.8, 95% CI: 1.2–2.7, $p = 0.01$). Lower education may lead to limited health literacy, reduced awareness of nutritional requirements, and poor adherence to antenatal care advice. In contrast, women with more formal education are more likely to understand and follow guidelines on diet, supplementation, and healthcare utilization.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.0 Discussion

This study aimed to determine the prevalence, types, and risk factors associated with anemia among pregnant women attending antenatal care at Levy Mwanawasa University Teaching Hospital in Lusaka, Zambia. The results indicated a high prevalence of anemia (55.4%), which is consistent with findings from other studies conducted in sub-Saharan Africa, where anemia in pregnancy remains a significant public health concern (WHO 2015). The prevalence observed in this study was higher than the global average of 40% reported by the World Health Organization (WHO), suggesting that local factors such as nutrition, socioeconomic status, and healthcare access contribute to the burden of anemia in this population.

The high prevalence of anemia found in this study aligns with previous research conducted in Zambia (Kapambwe *et al.*, 2016) and other African countries, where rates between 40–60% have been reported (Mwangi *et al.*, 2017; Tura *et al.*, 2016). Similar findings have been observed in studies from Malawi (Kumwenda *et al.*, 2018), Tanzania (Massawe *et al.*, 2017), and Ethiopia (Alemu *et al.*, 2017) reinforcing the regional nature of the problem. The mean hemoglobin level of 10.5 g/dL suggests that a significant proportion of women were experiencing mild to moderate anemia, which, if left untreated, could lead to complications such as preterm birth, low birth weight, and increased maternal mortality. Among the different types of anemia identified, iron deficiency anemia (48.6%) was the most prevalent. This finding is expected, as pregnancy increases iron demands due to fetal growth, expanded maternal blood volume, and placental development (Bothwell, 2000). Poor dietary intake, limited access to iron-rich foods, and

inadequate prenatal supplementation may explain the high burden of iron deficiency anemia in this study.

Folate-deficiency anemia (16.2%) was the second most common, which may be attributed to insufficient folic acid intake through diet or supplementation. Folate is essential for red blood cell production and fetal neural tube development, and its deficiency has been linked to congenital disabilities and poor pregnancy outcomes. Vitamin B12-deficiency anemia (8.1%) was also identified, though at a lower prevalence compared to iron and folate deficiency. This form of anemia is often linked to poor dietary intake, especially among women with limited access to animal-based foods. The presence of other types of anemia (10.8%) suggests that underlying chronic diseases, infections (such as malaria or HIV), and genetic conditions may also contribute to anemia in pregnancy.

Younger Maternal Age – Women aged 15-24 years had a higher risk of anemia. This may be due to inadequate dietary intake, lower education levels, and early pregnancies, which increase nutritional demands without sufficient maternal reserves. Multiparity (Multiple Pregnancies) – Women with multiple pregnancies were at 1.5 times higher risk of developing anemia compared to first-time mothers. This was likely due to the depletion of maternal iron stores over successive pregnancies, especially if birth spacing was short. Gestational Age – Anemia was more common in the earlier stages of pregnancy (before 28 weeks). This suggests that women enter pregnancy with already depleted iron levels, emphasizing the importance of preconception nutritional counseling and early supplementation.

Education Level – Women with lower education levels had a 1.8 times higher risk of anemia, highlighting the role of health literacy in nutritional choices and healthcare-seeking behavior.

Educated women are more likely to understand the importance of iron and folic acid supplementation and follow medical advice regarding anemia prevention.

The high prevalence of anemia in this study raises concerns about its impact on maternal and fetal health. Maternal anemia is associated with increased risks of preterm birth, intrauterine growth restriction, and low birth weight, which can lead to long-term developmental issues in newborns. Severe anemia can also result in complications during delivery, including postpartum hemorrhage and maternal mortality.

From a healthcare perspective, the findings of this study highlight the need for strengthened antenatal screening and early interventions to prevent anemia-related complications. Comprehensive anemia management strategies, including nutritional interventions, routine hemoglobin monitoring, and targeted supplementation programs, should be prioritized at Levy Mwanawasa University Teaching Hospital and other antenatal care facilities in Zambia.

The study included a large sample size ($n=370$), providing a reliable estimate of anemia prevalence in this population. It utilized multivariate analysis to identify risk factors, strengthening the validity of the associations found. The study's focus on different types of anemia provides valuable insights for targeted interventions.

The study was conducted at a single hospital, which may limit the generalizability of the findings to other regions in Zambia. The assessment of anemia was based solely on hemoglobin levels, without including other diagnostic markers such as ferritin or transferrin saturation, which could have provided a more comprehensive analysis of iron-deficiency anemia. Dietary intake and socioeconomic status were not directly assessed, which could have provided further insights into the underlying causes of anemia.

5.1 Conclusion

This study investigated the prevalence, common types, and risk factors of anemia among pregnant women attending antenatal care at Levy Mwanawasa University Teaching Hospital in Lusaka, Zambia. The findings revealed a high prevalence of anemia (55.4%), indicating a significant public health concern. The mean hemoglobin level (10.5 g/dL) was below the WHO recommended threshold for pregnant women, highlighting the need for urgent intervention.

Among the different types of anemia, iron-deficiency anemia (48.6%) was the most common, followed by folate-deficiency anemia (16.2%) and vitamin B12-deficiency anemia (8.1%). These results suggest that nutritional deficiencies play a major role in the burden of anemia among pregnant women in this setting. Several risk factors were identified as significantly associated with anemia, including younger maternal age, multiparity, lower gestational age, and lower education levels. These findings emphasize the need for targeted interventions, particularly among high-risk groups.

5.2 Recommendations

To reduce the prevalence of anemia and improve maternal and fetal health outcomes, there is need to enhanced Nutritional Interventions. Promote iron-rich and folate-rich diets while ensuring adequate vitamin B12 intake through prenatal supplements. Routine Screening & Early Detection to strengthen antenatal screening programs to identify and treat anemia in early pregnancy. There should be health education, increase awareness among pregnant women about anemia prevention and management, particularly among younger and less-educated individuals. And also policy interventions, government and healthcare institutions should improve access to prenatal supplements, iron-fortified foods, and economic empowerment programs to address poverty related nutritional deficiencies.

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APPENDICES

Appendix 1: Data collection instrument (Consent Form, Questionnaire)

Consent form

Research Title: Investigation of common types of anemia in pregnant women attending antenatal care at Levy Mwanawasa University Teaching Hospital

Organization: Africa university

Introduction

My name is Ruth Phiri an undergraduate student from Africa university studying Bachelor degree in biomedical laboratory science. I am conducting a study on “The common types of anemia among pregnant women attending antenatal care at Levy Mwanawasa University Teaching Hospital.” The results from the study will be used by the Ministry of Health to enhance the diagnosis and treatment of common types of anemia among pregnant women attending antenatal care.

Benefit

Participation in this study will not be of benefit to you directly but rather your responses will be able to help learn more about the cause of common types of anemia among pregnant women attending antenatal care and it will help in the diagnosis of anemia in pregnant women.

Risks

As a retrospective study using existing medical records, the research poses minimal risk to participants. No physical interaction or additional procedures will be conducted on the participants, thereby eliminating the risk of harm or discomfort.

Confidentiality

The details you will volunteer will be kept private. Your name will not be recorded anywhere. The sample will bear initial only known to the researcher. Interaction with the clinician will be done in a private setting within the hospital. Should you want to withdraw from the study you are free to do so without coercion.

Contact Information

In case of any questions or concerns about the study you can contact our research supervisor, Prof E. Obeagu through his phone at +234 803 736 9912 or via email at emmanuelobeagu@yahoo.com

Electronic consent: May you please select your choice below by clicking “Agree” button to show that:

- You have read the above information
- You voluntarily agree to participate
- If you are 18 years and above

☐ Agree

☐ Disagree

Participants Statement

The data disclosed to me on participation in the study is clear and I have perceived. Every one of the worries I had have been addresses by the principle investigator to my satisfaction. I intentionally consent to take an interest in this study and I have not been constrained in any way.

I have been made to comprehend that I can end my cooperation at any stage and season of this study with next to no results in this study setting or some other setting.

Participant's Name: _____ Signature:

_____ Date: _____

Principal Investigator's Signature: _____ Date:

Statement of the principle investigator

I confirm that the participant will be explained to in a language that they understood the procedure, benefits and risks of the study. They will be given a chance to ask question which I will be able to answer to the best of my ability.

Questionnaire

This questionnaire is part of the study. DO NOT WRITE YOUR NAME ON THE SURVEY. The questionnaire is completely anonymous. Please answer all the questions to the best of ability as all your information will be kept CONFIDENTIAL.

Section 1: Demographics

1.Residence:

☐ Urban

☐ Rural

2.Age:

☐ Below 20

☐ 20-29 o

☐ 30-39

☐ 40 and above

3.Education Level:

☐ No formal education o

☐ Primary education

☐ Secondary education

☐ Tertiary education(college/university)

4.Occupation:

☐ Employed

☐ Self-employed

☐ Unemployed

☐ Student

☐ Homemaker

Section 2: Reproductive Health

5.Gravidity (number of times you have been pregnant):

☐ 1

☐ 2

☐ 3

☐ 4 or more

6.Parity (number of births beyond 24 weeks of gestation):

☐ 0

☐ 1

☐ 2

☐ 3 or more

7. Number of Fetuses in Current Pregnancy:

☐ 1 (Single)

☐ 2 (Twins)

☐ 3 or more (Multiples)

8. History of Terminated Pregnancy: ☐ Yes

☐ No

Section 3: Health Information

9. Underlying Conditions (check all that apply):

☐ Hypertension

☐ Diabetes

☐ HIV/AIDS

☐ Asthma

☐ Heart Disease

☐ Kidney Disease

☐ None

☐ Other (please specify).....

10. Body Mass Index (BMI): ☐

☐ Underweight (BMI < 18.5)

☐ Normal weight (BMI 18.5 - 24.9)

☐ Overweight (BMI 25 - 29.9)

☐ Obesity (BMI 30 and above)

11. Are you experiencing the following symptoms? Please tick accordingly.

☐ Fatigue and weakness

☐ Shortness of breath

☐ Dizziness and lightheadedness

☐ Cold hands and feet

☐ Diarrhea and constipation

☐ Restless leg syndrome

☐ Chest pain and palpitations

12. Do you have history of hospitalization in the past two weeks?

☐ Yes ☐

☐ No

13. Have you had Anemia in the last two weeks?

☐ Yes ☐ No

Appendix 2: Budget for conducting the research study

ITEM	Unit price \$	Quantity	Total price/US \$
AUREC	15.00	1	15.00
TRANSPORT	2.00	15 trips	30.00
PEN(BLUE PEN EVERSHARPS)	10.00@Box	1	10.00
STATIONERY			
Books(96PGCOUNTERBOOKS)	5.00	1	5.00
Proposal 1 copy	6.00	1	6.00
Questionnaire	0.50	370	185
Total			251

Appendix 3: Time frame: Gantt chart

MONTH ACTIVITY	DEC 2024	JAN 2025	FEB 2025	MAR 2025
Research Proposal				
Permission letter from LMUTH				
Ethical approval AUREC				
Data collection				
Data analysis and presentation				
Recommendations based on findings				

Appendix 3: Seeking approval from AUREC and permission to conduct my research at Levy Mwanawasa university teaching Hospital.

Application letter for approval from AUREC

Kalundu,

P.O Box 77, Lusaka,

Zambia,

14th November, 2024.

The chairperson

AUREC

Africa university

Faculty of Health Sciences

P.O Box 1320, Mutare, Zimbabwe

Dear Sir/Madam,

RE: APPLICATION FOR ETHICAL APPROVAL

I hereby apply for an ethical review on this topic: Investigation of Common Types of Anemia Among Pregnant Women Attending Antenatal Care at Levy Mwanawasa University Teaching Hospital Lusaka Zambia. I guarantee compliance with all standard ethical guidelines. Sincerely,
Ruth Phiri.

Appendix 4: Supervisor's approval letter

Department of Biomedical and Medical Laboratory
Science,

Africa University,

Zimbabwe.

27th September, 2024.

The AUREC Administrator

Africa University,

Zimbabwe.

Dear Sir/Madam,

RE: PERMISSION TO SUBMIT TO AUREC FOR PHIRI, RUTH

Programme: HBMLS

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

Your facilitation for review of the proposal is greatly appreciated.

Thak you

Sincerely,



Prof. Emmanuel Obeagu

Appendix 5: Permission to conduct my research at Levy Mwanawasa University Teaching Hospital.

All correspondence to be addressed to:
The Senior Medical Superintendent
Tel: +260 211 445101
Fax: +260 211 285462



REPUBLIC OF ZAMBIA

MINISTRY OF HEALTH

In reply please quote:

No.:

LEVY MWANAWASA UNIVERSITY
TEACHING HOSPITAL
P.O. BOX 310084
LUSAKA

14th January, 2025

The Principal Investigator,
Ruth Phiri
African University
Lusaka

Dear Researcher,

PERMISSION TO CONDUCT A RESEARCH STUDY – YOURSELF

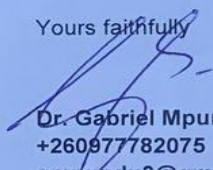
Reference is made to your letter requesting for permission to conduct a research study entitled ***"INVESTIGATION OF COMMON TYPES OF ANAEMIA AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE AT LEVY MWANAWASA UNIVERSITY TEACHING HOSPITAL FROM JANUARY 2024 TO DECEMBER 2024"***

Management of Levy Mwanawasa University Teaching Hospital wishes to inform you that the hospital has no objection to your request. As a Hospital, we wish to benefit from the study by you contributing materially or financially to suit your overheads as budgeted. Kindly avail us with the final findings.

In your publication, kindly acknowledge the institution and the supervising team in the area of your study.

You may commence with the study when you are ready. By copy of this letter, permission is granted.

Yours faithfully


Dr. Gabriel Mpundu (MPH, BDS, Dip. DS, Cert. PMGH)
+260977782075
gmpundu3@gmail.com
Chairperson - LMUTH Research Committee
For/Senior Medical Superintendent

Appendix 6: Approval from AUREC



AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE (AUREC)

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

Ref: AU 3559/25

17 January, 2025

PHIRI RUTH
C/O Africa University
Box 1320
MUTARE

RE: INVESTIGATION OF COMMON TYPES OF ANAEMIA AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE AT LEVY MWANAWASA TEACHING HOSPITAL, LUSAKA, ZAMBIA

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

The approval is based on the following.

- a) Research proposal
 - **APPROVAL NUMBER** AUREC 3559/25
This number should be used on all correspondences, consent forms, and appropriate document
 - **AUREC MEETING DATE** NA
 - **APPROVAL DATE** January 17, 2025
 - **EXPIRATION DATE** January 17, 2026
 - **TYPE OF MEETING:** Expedited
After the expiration date, this research may only continue upon renewal. A progress report on a standard AUREC form should be submitted a month before the expiration date for renewal purposes.
 - **SERIOUS ADVERSE EVENTS** All serious problems concerning subject safety must be reported to AUREC within 3 working days on the standard AUREC form.
 - **MODIFICATIONS** Prior AUREC approval is required before implementing any changes in the proposal (including changes in the consent documents)
 - **TERMINATION OF STUDY** Upon termination of the study a report has to be submitted to AUREC.



Yours Faithfully

 2025

MARY CHINZOU
FOR CHAIRPERSON
AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE

Appendix 7: Proof of payment

[BACK](#) [Print](#)

PRODUCT : CASHTOACCT

Ecobank The Bank Without Branch		to send Transfer		Ecobank The Bank Without Branch	
SENDER			BENEFICIARY		
Customer ID	RT8563855		Customer ID		
Account number			Account number	5783600003426.....	
Last name	KARPEE		Last name		
First name	PHONELIUS		First name	Africa University	
Address			Address		
City/Country	LIBERIA / LIBERIA		City/Country	/ ECOBANK ZIMBABWE	
Phone	231776154929		Phone	/	
Reserved to the operator (Reserved to the operator)					
Agency	J11 - PAYNESVILLE BRANCH		Amount principal	USD 30	
Deposit Date	2024-09-30 16:21:05		Charges	USD 5.17	
Payment Date	2024-09-30 16:21:13		Total	USD 35.17	
<u>Sender</u>			Received amount	USD 30	
Id Number	PP0116797		Transaction reference number RTM147573509830		
Id type	INTERNATIONAL PASSPORT				
Expiration date	2025-11-13 00:00:00				
<u>Beneficiary</u>			Send amount USD 30		
Id Number					
Id type					
Signature of the Customer (Signature of the customer)			Operator Operator	N/A	
			Signature of the Operator (Signature of the Operator)		

Dear Customer,

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

Thank you for using Rapid Transfer.

Scanned with CamScanner