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ASSESSING THE INCIDENCE AND RISK FACTORS OF POSTPARTUM HAEMORRHAGE IN PREGENANT WOMEN AT LEVY MWANAWASA UNIVERSITY TEACHING HOSPITAL

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A dissertation submitted to the University of Lusaka in partial fulfilment of the requirements for the award, Bachelor of Science, Medical Sciences.

June, 2025.

DECLARATION

I, Kemo One Sebikiri, declare that this dissertation is my own work and that all the sources quoted have been indicated and acknowledged as complete references. Furthermore, I declare that this research proposal has not been previously submitted for a diploma, a degree or for any other qualification at this or any other university. It has been written in partial fulfilment of the requirements for the award of the Bachelor of Medical Sciences at University of Lusaka - School of Medicine and health sciences.

Student's Signature: Kemo One Sebiriki

Date: 05 June 2025

Student Name: Kemo One Sebikiri

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DEDICATION

This research is dedicated to my family; my parents: Stephen M Sebikiri and Mompati K C Sebikiri and siblings: Maemo, Emang and Boemo. I am really thankful for their moral support as it enabled me to pursue this study.

ACKNOWLEDGEMENT

I would like to express my appreciation to my research supervisor, Dr Chipampe Lombe for the guidance and support she gave me. Without her, it would have been a very difficult process to undertake.

A special thanks to Levy Mwanawasa University Teaching hospital for allowing me to conduct my research there and providing the information required to complete this research.

Lastly, my utmost gratitude goes to God. Without Him, this entire project would not have come to what it is now. He made everything possible.

ABSTRACT

Background: Postpartum haemorrhage (PPH) is the leading cause of maternal mortality and an obstetric emergency that complicates 1-10% of all deliveries and require appropriate training for effective prevention, recognition and management. The aim of this study is to assess the incidence and risk factors of postpartum haemorrhage among pregnant women at Levy Mwanawasa University Teaching hospital.

Objective: The main objective of the study was to determine the incidence of postpartum haemorrhage among patients delivering at Levy Mwanawasa University Teaching Hospital.

Methodology: This was a retrospective cohort study with a quantitative approach of 278 medical files. The data was analysed using SPSS version 26 and Microsoft excel and was presented in the form of frequency tables, bar charts, pie charts and histograms.

Results: The findings from an analysis of 203 medical records, revealed that 13.8% (28 cases) developed PPH. The majority of affected women were under 30 (82.2%), particularly those aged 25 to 29 (53.6%). Most PPH patients were Gravida 3 (39.3%) and Para 2 (35.7%). PPH primarily occurred at term (35.7%) and at 37 weeks of gestation (21.4%), with most deliveries being spontaneous vaginal births (89.3%). Prolonged labor emerged as the main clinical risk factor, affecting 35.7% of cases. The outcome was generally positive, with 92.9% of women discharged and only 7.1% resulting in death. Regression analysis indicated that age ($p = 0.002$) and gestational age ($p < 0.001$) were significant predictors of PPH, highlighting that younger and preterm patients are at greater risk.

Key Terms: *Postpartum Haemorrhage, Incidence, Risk Factor.*

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LIST OF ABBREVIATIONS

PPH	postpartum hemorrhage
APH	antepartum hemorrhage
SVD	spontaneous vaginal delivery
AVD	assisted vaginal delivery
SPE	severe preeclampsia
IUFD	intrauterine fetal death
WHO	World Health Organization
LMUTH	Levy Mwanawasa University Teaching Hospital
UNILUSREC	University of Lusaka Research Ethics Committee
NHRA	National Health Research Authority

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

Postpartum haemorrhage (PPH) is an obstetric emergency that complicates 1-10% of all deliveries and requires appropriate training for effective prevention, recognition and management, (Mitta *et al*, 2023). According to the World Health Organization, (2023), PPH is defined as excessive bleeding following childbirth, typically more than 500 millilitres for vaginal deliveries or 1,000 millilitres for caesarean sections. World Health Organization, (2023) highlights that postpartum haemorrhage accounts for over 20% of maternal deaths and that each year, about 14 million women experience PPH resulting in about 70, 000 maternal deaths globally. The real incidence of maternal mortality due to PPH is certainly much higher as many cases remain unreported, especially in developing countries, due to multiple reasons. The absolute risk of death is "lower in high-income countries with an estimated rate of 1:100,000 deliveries" compared to "an estimated rate of 1:1000 in low-income countries" as (Aimagambetova *et al*., 2024) states.

PPH can occur immediately after delivery or in the days following, posing significant risks to the mother's life and health. PPH is a significant and potentially life-threatening complication that can occur after childbirth. According to Li *et al*, (2021) PPH is a complex condition to manage as its pathophysiology involves various mechanisms, including, genital tract trauma, failure of the uterus to contract after delivery, retained placenta and impaired blood clotting, and these factors may occur individually or as a combination, thus contributing to the complexity of the condition.

According to Mitta *et al*, (2023) PPH remains a critical challenge despite the medical interventions developed. The condition can lead to severe complications such as hypovolemic shock, organ failure, and even death if not promptly managed. Additionally, the emotional and economic burden on families and healthcare systems underscores the importance of addressing and preventing PPH through better medical practices, timely interventions, and enhanced awareness (Federspiel *et al*., 2023).

Postpartum haemorrhage (PPH) is one of the leading causes of maternal mortality in most low-income countries and is associated with nearly 25% of all maternal deaths globally (WHO, 2023). Significant efforts have been directed towards improving the management of this condition however, postpartum haemorrhage remains one of the greatest maternal health

threats that demand the most urgent attention in global health security. Understanding the incidence and identifying the risk factors of PPH are crucial for improving maternal outcomes. This knowledge helps in development of preventive measures, better clinical guidelines and interventions during labour and delivery.

There is a need to investigate the risk factors that may contribute to postpartum haemorrhage, especially those that may occur in the antenatal and intrapartum periods, to provide clinicians an opportunity for timely interventions to prevent PPH (Mitta *et al*., 2023). The assessed incidence may highlight the need to improve protocols and target interventions. By addressing both the preventable and non-preventable causes of PPH, the healthcare community can make significant strides in reducing maternal morbidity and mortality.

Therefore, this study is aimed at assessing the incidence and risk factors of postpartum haemorrhage among mothers that gave birth in a university hospital that provided tertiary care.

1.2 STATEMENT OF THE PROBLEM

Postpartum haemorrhage remains a problem in developing countries, where more than 99% of maternal mortality due to PPH occurs, (Liu *et al*, 2021). Despite the advances in obstetric care worldwide, the incidence of PPH continues to be high in many low and middle-income nations, where limited access to quality healthcare, skilled birth attendants and essential medical interventions exacerbate the risks. According to (Miyoshi, 2019) 34% of maternal mortality in Zambia is attributable to postpartum haemorrhage.

Developing successful preventative and treatment methods requires an understanding of the incidence of PPH and the precise risk factors that contribute to its high rates. Although uterine atony, retained placenta, birth trauma and coagulopathies are recognized risk factors, their incidence and effects might fluctuate greatly among populations and geographical areas. The development and creation of context-specific solutions is hindered by a lack of reliable data and research in various contexts. Hence, there is a need to assess the incidence and risk factors of postpartum haemorrhage among pregnant women to provide information that will aid in development of context-specific solutions (Ngwenya, 2016).

The significance of this research lies in its potential to reduce maternal deaths and long-term disabilities associated with postpartum haemorrhage in resource-limited settings. Investigating incidence and risk factors of PPH is not only a critical public health issue but also a fundamental step towards achieving global maternal health goals. Based on this supposition, the initiative

seeks to assess the incidence and identify risk factors of PPH among pregnant women that deliver at Levy Mwanawasa University Teaching Hospital.

1.3 JUSTIFICATION OF THE STUDY

Postpartum haemorrhage is a critical global concern, with its burden disproportionately affecting women in developing countries. Middle and low-income countries face significant challenges that contribute to the alarming incidence of PPH, despite the advances in medical technology and obstetric care. This study focused on understanding the incidence and risk factors of PPH is critically important for several reasons; firstly, maternal mortality in developing countries remains a concern and understanding precise risk factors that contribute to the high rates is important in tailoring interventions to local extents. According to Bestman *et al*, (2024), 14 million women develop PPH annually, 127,000 die and half of these deaths occur in Africa and Asia. He further highlights that there is a growing public concern over the rising incidence of PPH, with estimates ranging from1.47 to 18% among women of mixed parity. Therefore, the study will provide crucial data to inform prevention, diagnosis and treatment strategies.

Additionally, findings from this study can guide policymakers by providing evidence to support the design and implementation of targeted interventions. Evidence-based policies can help promote maternal health and reduce incidence of PPH.

In conclusion, this study is of paramount importance because it will provide critical data that can save lives, improve healthcare delivery, and inform policies aimed at reducing maternal mortality in developing countries. The findings have the potential to make a substantial contribution to the field of maternal health by identifying effective, culturally appropriate strategies to combat PPH in resource-limited settings.

1.4 OBJECTIVES

1.4.1 MAIN OBJECTIVE

To determine the incidence of postpartum haemorrhage among patients delivering at Levy Mwanawasa University Teaching Hospital.

1.4.2 SPECIFIC OBJECTIVES

i. To identify demographic and clinical risk factors associated with postpartum haemorrhage.
ii. To assess the impact of PPH on maternal outcomes (e.g., morbidity, mortality, blood transfusion).

iii. To evaluate the relationship between PPH and mode of delivery, gestational age, parity, multiple gestations and hypertension.

1.5 RESEARCH QUESTIONS

1.5.1 MAIN RESEARCH QUESTION

What is the incidence of postpartum haemorrhage (PPH) among patients delivering at Levy Mwanawasa University Teaching Hospital in Lusaka?

1.5.2 SPECIFIC RESEARCH QUESTIONS

i. What are the risk factors associated with PPH among patients delivering at Levy Mwanawasa University Teaching Hospital?
ii. What impact does PPH have on maternal outcomes?
iii. What is the relationship between PPH and mode of delivery, gestational age, parity, multiple gestations, HIV status and hypertension?

1.6 SCOPE OF THE STUDY

The study focused on mothers that had given birth at Levy Mwanawasa University Teaching Hospital. It assessed the maternal health before and during pregnancy, detailed information about delivery and any complications occurring intrapartum or postpartum. The research primarily relied on quantitative data obtained through medical records at the hospital. The study was limited to women that gave birth in the year 2024 to ensure relevance and timeliness of the findings.

1.7 DEFINTION OF KEY TERMS AND CONCEPTS

Postpartum haemorrhage: The excessive bleeding after childbirth, usually more than 500ml in vaginal birth or more than 1000ml in caesarean section delivery.

Incidence: The occurrence or frequency of a disease.

Risk factor: something that increases the chance of developing a disease.

CHAPTER 2: LITERATURE REVIEW

2.1. INTRODUCTION

This section provided a critical summary of the knowledge of postpartum haemorrhage, what is already known about the topic so that a comprehensive picture can be obtained. It gave clues to the methodology that people used before, and thus provided information on what has been tried regarding approaches

2.2. CONCEPTUAL FRAMEWORK

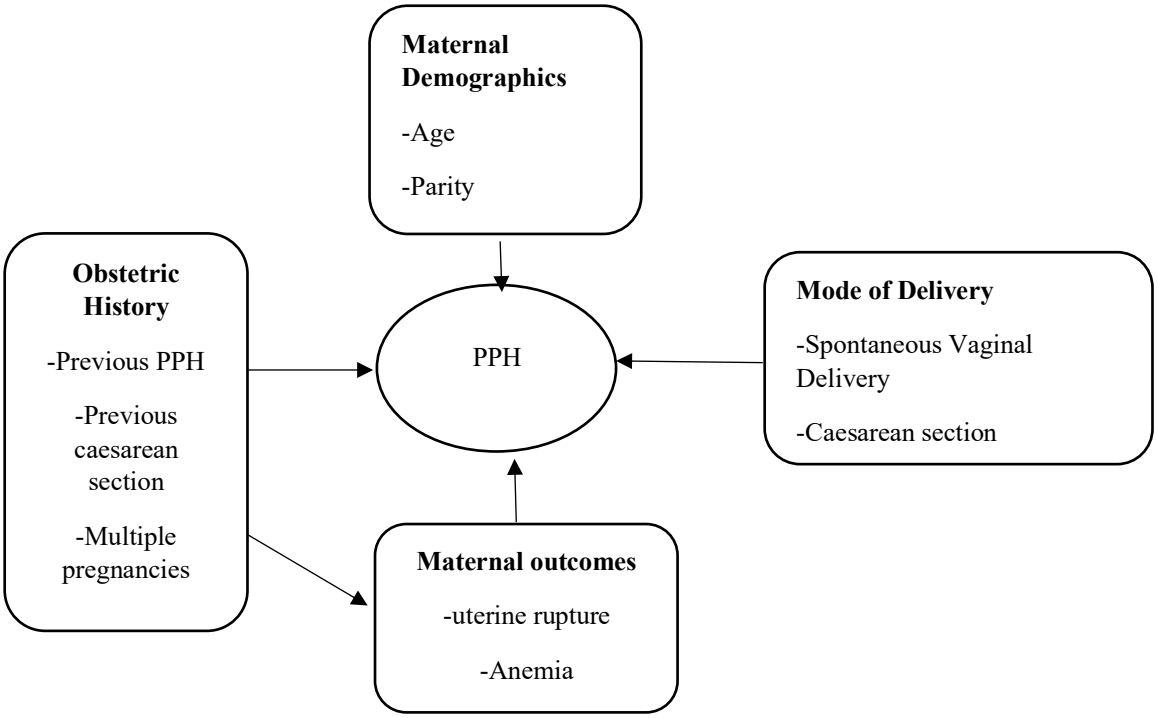

Figure 2.1: Conceptual Framework Adapted from Sufian *et al*., (2021)

The risk factors are independent variables which include maternal demographics, obstetric history and mode of delivery that interact to influence the incidence of PPH, which is the outcome of interest. The outcomes variable is influenced by the presence and severity of PPH.

2.3 THEORETICAL FRAMEWORK

2.3.1. CHILDBIRTH THEORY

Childbirth is defined as the process of bringing forth a child from the uterus and has three stages which are dilatation, expulsion and placental stage, WHO, (2020). This theory will help the researcher understand what may cause postpartum haemorrhage during the delivery of the child or after. For the purpose of this study, the factors that may cause PPH include, uterine atony, retained placenta and trauma. Uterine atony is the failure of the uterus to contract after the placenta is delivered. Failure of the uterus to contract allows for the placental blood vessels to

remain open thus this leads to continued blood loss. After the expulsion of the child from the uterus, the placenta is usually delivered and if it is not fully delivered, the placenta's tissue continuously bleeds as a result, the mother develops postpartum haemorrhage. Lastly, the trauma experienced during childbirth greatly contributes to postpartum haemorrhage. For vaginal delivery, the use of forceps may result in tears or lacerations in the birth canal and this may lead to significant blood loss. According to Bestman *et al*, (2024) soft birth canal avulsion have an increased odd for PPH in nulliparous women than in multiparous women.

2.3.2. MATERNAL HEALTH THEORY

This framework emphasizes on the biological factors that influence health and illness. This includes identifying conditions that may increase the chances of developing postpartum haemorrhage. Women should be assessed for risk factors before and during labour. Some of the risk factors may include hypertension, anaemia, previous caesarean sections and parity. Pinton *et al,* (2023) highlights that the rate of severe PPH was 24.8% among women with a placenta praevi, a previous caesarean section and without prenatally suspected PAS. These factors increase the likelihood of excessive bleeding after delivery. As shown in Figure 2.1, the maternal demographics and the obstetric history are factors that contribute to PPH and are important in terms of risk assessment of PPH.

2.3.3. POSTPARTUM HAEMORRHAGE COMPLICATIONS

This theoretical framework synthesizes physiological perspectives to explain the complications of PPH. Anaemia is a short-term complication that may be corrected with a blood transfusion or intake of oral iron supplements. As shown in Figure 2.1, one of the maternal outcomes is anaemia, this represents the complication associated with PPH. Bestman *et al*, (2024) highlights that anaemia in pregnancy can lead to reduced blood volume and impaired coagulation function, which increases the risk of bleeding after birth. Pregnant women may have coagulopathies that increase their chances of developing PPH, these include conditions that impair the body's ability to form clots henceforth they will experience prolonged bleeding. Furthermore, hypovolemic shock is often associated with major morbidity.

2.4. EMPIRICAL REVIEW

2.4.1. KNOWLEDGE ABOUT INCIDENCE AND RISK FACTORS OF POSTPARTUM HAEMORRHAGE

A study conducted in Zambia by Miyoshi (2019) analysed the incidence, risk factors, treatment and outcomes of postpartum haemorrhage at a district hospital in Zambia, revealed:

Incidence: the total incidence of PPH during the study period was 6.3%. For vaginal deliveries, the incidence was 4.6% and it was 13.8% for deliveries by caesarean section.

Factors associated with an increased risk of PPH: these included assisted vaginal delivery, macrosomia and multiple pregnancy for those that delivered their babies through spontaneous vaginal delivery. For those that delivered through a caesarean section, the factors that were associated with an increased risk were placenta previa and high parity.

2.4.2. GLOBAL PERSPECTIVE

Similar studies have been carried out before. Postpartum haemorrhage is a global health challenges, especially in developing countries. It poses as a catastrophic threat to maternal health. PPH is a significant contributor to severe maternal morbidity and long-term disability as well as to a number of other severe maternal conditions generally associated with more substantial blood loss, including shock and organ dysfunction, (World Health Organization, 2023).

In Southern China, Liu *et al* (2021), stated that severe PPH was observed in 1.56% mothers among the total population and placental related problems were the major identified causes of SPPH wile uterine atony without associated retention of placental tissues accounted for 38.91%. The study further identified the risk factors to be previous caesarean section, history of postpartum haemorrhage, pre-delivery anaemia and maternal age of less than 18years.

A study in Brazil identified primary risk factors for severe maternal outcomes secondary to PPH as maternal age, gestation age, caesarean section and previous uterine scar. According to Betti *et al* (2023), uterine distension predisposes to uterine atony, which is considered the leading cause of postpartum haemorrhage. “A retrospective cohort study conducted in Peru from 2015-2017 showed that multiple gestation is a risk factor for PPH” (Nyfløt *et al*, 2017)

In Iran, Hosseinzadeh *et al* (2023), highlighted that the postpartum haemorrhage incidence was not predicted by the mother’s height or weight but it has been proven to significantly correlate with body mass index. This in turn influenced this study not to include height or weight as factors that may contribute to PPH.

2.4.3 REGIONAL PERSPECTIVE

In Uganda, Ononge, *et al* (2016), highlighted that general women with PPH tended to be older, more likely to have twin births and HIV infection. They also more likely to have delivered a macrosomic baby, or have received no uterotonics. The study found the prevalence of PPH and severe PPH among the participants with vaginal deliveries to be 7.4% and 0.7% respectively.

According to Ononge *et al* (2016), the risk factors for PPH were being HIV positive, multiple pregnancy, delivery by caesarean section and delivering a macrosomic baby.

In Mozambique, Lancaster *et al* (2020), explained that HIV-related mortality was exacerbated by PPH and that the probability of maternal mortality from PPH when the mother was infected with HIV was well over 50%. The study also highlighted that mothers with PPH who died had much lower haemoglobin concentrations on admission compared to mothers with PPH who survived. This established a relationship between anaemia and postpartum haemorrhage.

In Ethiopia, Getahun *et al*, (2023) highlighted that history of caesarean delivery, prolong labour and genital trauma apart from episiotomy were the independent determinants of postpartum haemorrhage.

A study conducted in Rwanda by Bazirete *et al* (2022) revealed that the overall prevalence of primary PPH was 25.2% and identified the risk factors to be uterine atony, retained tissue, and lacerations of genital organs after birth. Furthermore, the study highlighted that uterine atony remained the foremost cause of primary PPH.

2.4.4 NATIONAL PERSPECTIVE

A study conducted in Zambia by Miyoshi (2019) revealed that the total incidence of PPH during the study period was 6.3%. For vaginal deliveries, the incidence was 4.6% and it was 13.8% for deliveries by caesarean section. The study further identified factors associated with an increased risk of PPH and these included assisted vaginal delivery, macrosomia and multiple pregnancy for those that delivered their babies through spontaneous vaginal delivery. For those that delivered through a caesarean section, the factors that were associated with an increased risk were placenta previa and high parity. Miyoshi (2019) highlighted that most women with PPH survived the condition after uterine balloon tamponade.

According to Mubambe *et al*, (2024), PPH contributes 34% of maternal death. Women in Zambia often experience multiple pregnancies, with uterine fatigue increasing the risk of PPH. Furthermore, a study in Zambia by Kabuya *et al*, (2020) highlighted that in-hospital maternal mortality declined from 23 per thousand live births in 2007 to 8 per thousand in 2010-11 and although this may be true, the study identified that there was no significant reduction seen in case fatality due to postpartum haemorrhage. In addition to the study by Mubambe et al, (2024), another study by Zimbia (2020), it states that 34% of maternal mortality in Zambia is caused by PPH.

CHAPTER 3: METHODOLOGY

3.1 RESEARCH APPROACH

The study adopted a quantitative investigation. This involved collection of the numerical data through medical files, to help determine the prevalence of PPH and its risk factors.

3.2 RESEARCH DESIGN

The research design was a retrospective cohort design which focused on examining existing medical records and historical data to identify trends, associations and outcomes in relation to postpartum haemorrhage.

3.3 RESEARCH CONTEXT

The research was conducted at Levy Mwanawasa University Teaching Hospital (LMUTH), a hospital that provides tertiary care to its patients hence has a wide range of obstetric services such as deliveries and maternal and neonatal care. It was an appropriate setting for the research as the hospital is open to the public, and have a number of deliveries to generate an adequate sample size for a meaningful analysis.

3.4 STUDY POPULATION

The study population included all women aged (18-35) who delivered at the hospital between 1st January and 31st December 2024.

3.5 SAMPLE SIZE

The sample size was calculated using Cochran's method, 1977. Given as:

$$n_0 = \frac{Z^2 \times p \times (1-p)}{e^2}$$

Where:

- N_0 = Sample size for an infinite population
- Z = Z-value (confidence level, typically 95% confidence level)
- p = Estimated proportion of the population with the characteristic (assumed as 0.5 for maximum variability)
- e = Margin of error (typically 5% or 0.05)

$$n_0 = \frac{(1.96)^2 \times 0.5 \times (1-0.5)}{(0.05)^2}$$

=384.16

Thus, the initial sample size for an infinite population was approximately 384.

Since, the total number of women that delivered at LMUTH is definite, Cochran's formula was adjusted as follows for a definite population (n):

$$n = \frac{n_0}{1 + \frac{n_0 - 1}{N}}$$

Where:

- n = Adjusted sample size (384)
- N = Population size (assume approximately 1000 women who delivered for this study)

$$n = \frac{384}{1 + \frac{384 - 1}{1000}}$$

N ≈ 278

The adjusted sample size for a definite population of approximately 1000 women who delivered at LMUTH is 278 participants. However, only 203 medical files were assessed, representing overall 73% of the total sample size.

3.6 SAMPLING TECHNIQUES

Participants were selected using a convenience sampling method, a non-probability sampling technique in which participants are selected based on their availability, in this case, the availability of medical records.

3.6.1 INCLUSION CRITERIA

i. Women who delivered within the 1st January and 31st December 2024.
ii. Women who delivered through spontaneous vaginal delivery and caesarean section.
iii. Women who had complete obstetric and medical records available for review.

3.6.2 EXCLUSION CRITERIA

i. Women with missing data from their medical records
ii. Women with multiple (twin or triplets) pregnancies
iii. Women who received a blood transfusion because of postpartum anaemia, without evidence of excessive haemorrhage.

3.7 DATA COLLECTION

Data was extracted from the hospital's manual patient records. The reviewed data included the maternal demographic information, obstetric history, pregnancy and any labour complications and postpartum data.

3.8 DATA ANALYSIS

Data categorization, coding, and computer data entry was done using the SPSS (Statistical Package for Social Sciences) version 26 program. Microsoft Excel sheet with a chi-square was used for variable associations, for all steps in the process and was presented in the form of frequency tables, bar charts, pie charts, and histograms. Additionally, data was presented in the form of frequencies, and percentages to calculate categorical variables. Further, a regression analysis was performed to determine the strength of association between risk factors and the likelihood of developing PPH, and a significance level of less than 0.05 was considered statistically significant.

3.9 ETHICAL CONSIDERATION

The ethical approval was obtained from the University of Lusaka Research Ethics Committee (UNILUSREC). Additionally, authority from the National Health Research Authority (NHRA) to conduct the study. Furthermore, permission to conduct the study was sought from LMUTH before commencement of data collection. The study adhered to ethical confidentiality requirements and no data acquired was shared with third parties during the study. Data was anonymized to protect participant's identities.

CHAPTER 4: RESULTS PRESENTATION

4.1 INTRODUCTION

This chapter presents the findings of a study that examined the prevalence and risk factors associated with postpartum haemorrhage (PPH) among women who delivered at Levy Mwanawasa University Teaching Hospital (LMUTH). The results are organized into sections that cover participant characteristics, demographic patterns, clinical risk factors, maternal outcomes, and regression analysis.

4.2 OVERVIEW OF PARTICIPANTS

Out of 278 eligible medical records, 203 (73%) were successfully retrieved and analysed. Among these, 28 women (13.8%) developed postpartum haemorrhage (PPH) during delivery, indicating a significant prevalence of the condition in this setting.

Table 4.1. PPH Occurrence

Variable	Category	Frequency (N=203)	Percentage
PPH Occurred	No	175	**86.2%**
	Yes	28	**13.8%**

The table summarizes the frequency of PPH among the study population. Most women (86.2%) did not experience PPH, while a significant minority (13.8%) did.

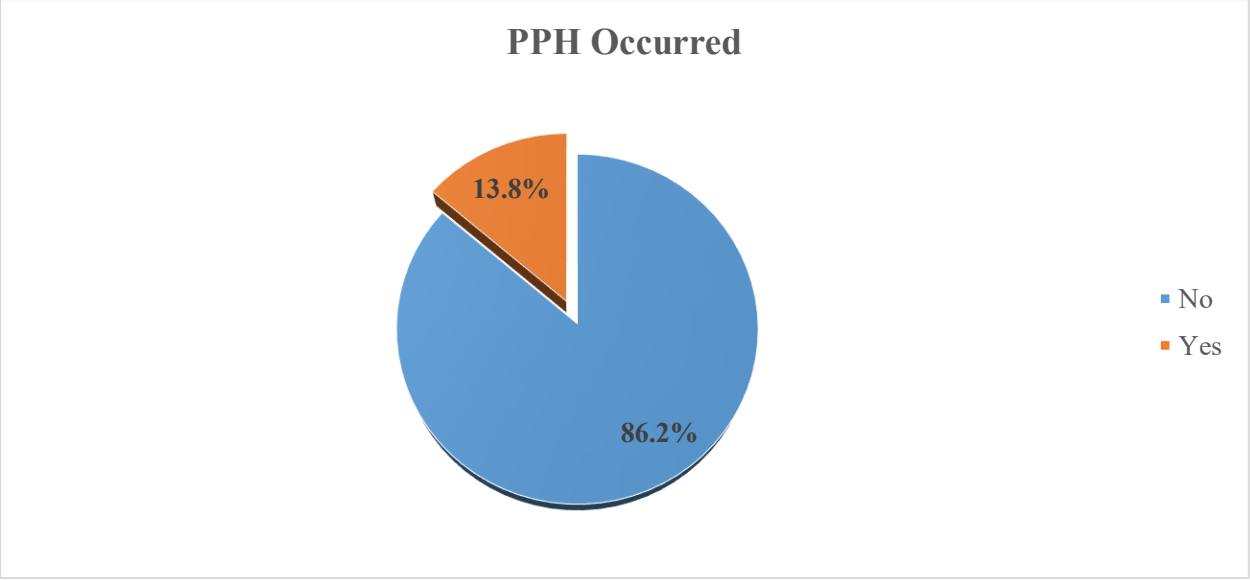

Figure 4.1. PPH Occurrence – *A pie chart or bar graph visually illustrates the occurrence of PPH, reinforcing that only 13.8% of the women were affected.*

4.3 DEMOGRAPHIC CHARACTERISTICS

This section highlights the age distribution, gravidity, parity, and gestational age of the 28 women who developed PPH.

Table 4.2. Demographic characteristics of PPH patients

Variable	Category	Frequency (N=28)	Percentage
Age (in years)	18-24	8	**28.6%**
	25-29	15	**53.6%**
	30-35	5	**17.9%**
Gravidity	Gravida 1	2	**7.1%**
	Gravida 2	8	**28.6%**
	Gravida 3	11	**39.3%**
	Gravida 4	4	**14.3%**
	Gravida 5	3	**10.7%**
Parity	Para 0	2	**7.1%**
	Para 1	9	**32.1%**
	Para 2	10	**35.7%**
	Para 3	4	**14.3%**
	Para 4	3	**10.7%**
Gestation Age (in weeks)	30	2	**7.1%**
	33	1	**3.6%**
	34	3	**10.7%**
	35	2	**7.1%**
	36	4	**14.3%**
	37	6	**21.4%**
	Term	10	**35.7%**

Women aged 25 to 29 represented the largest group of PPH cases, accounting for 53.6%. The majority were Gravida 3 (39.3%) and Para 2 (35.7%). Notably, 35.7% delivered at term, indicating that full-term pregnancies can still face complications.

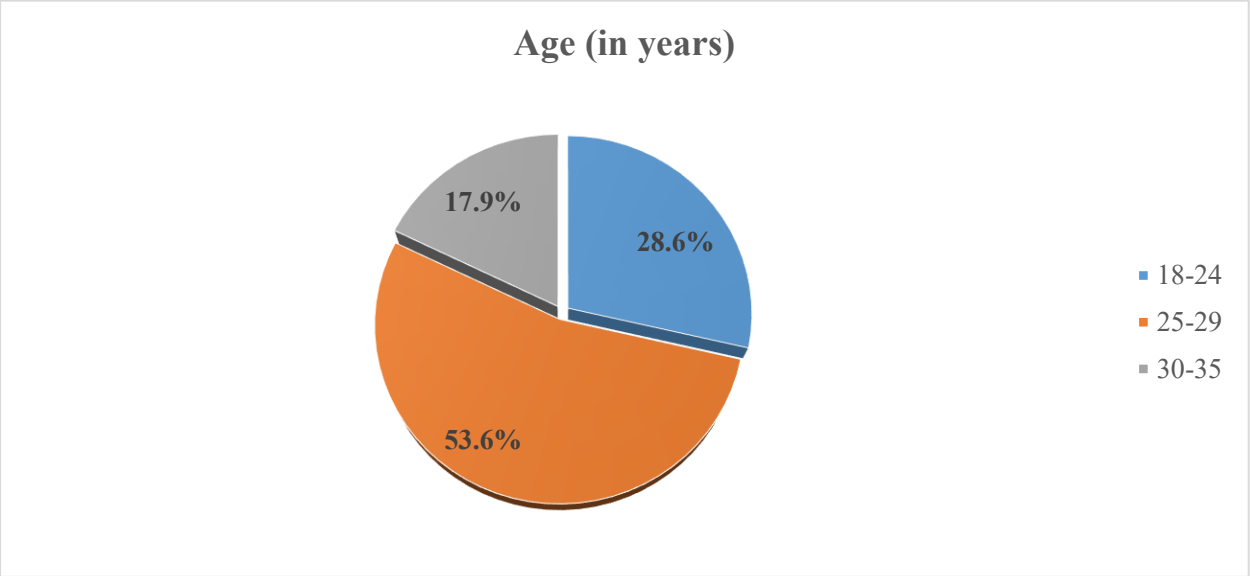

Figure 4.2. Age group – *showing that 82.2% of PPH cases occurred in women below 30 years.*

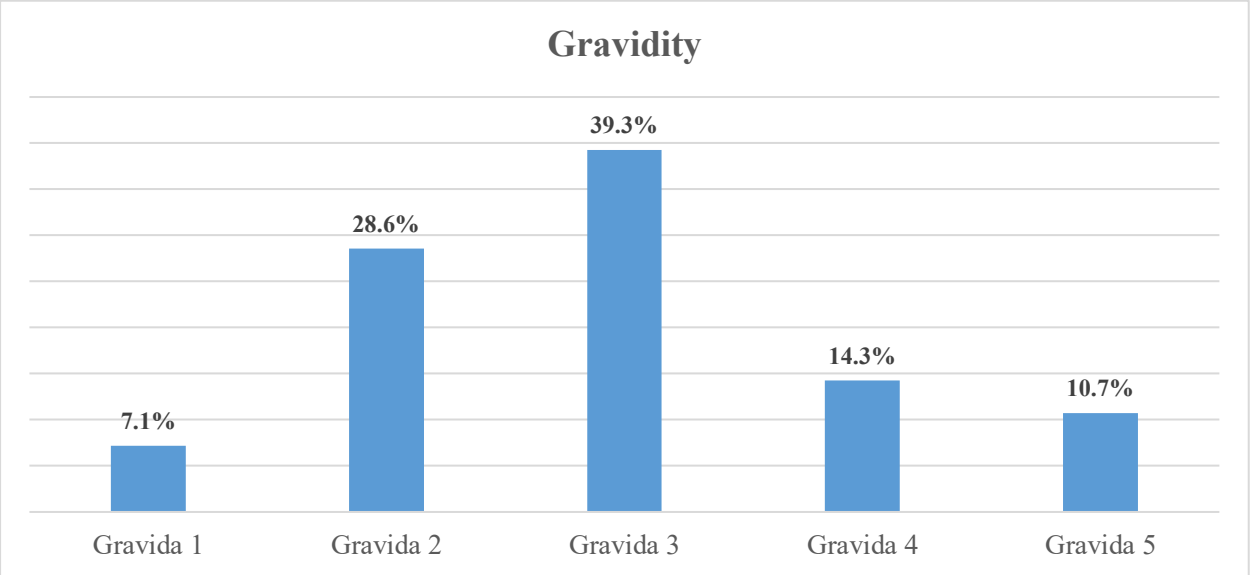

Figure 4.3. Gravidity – *A visual showing that Gravida 3 women were the most affected (39.3%), indicating a possible pattern with moderate gravidity.*

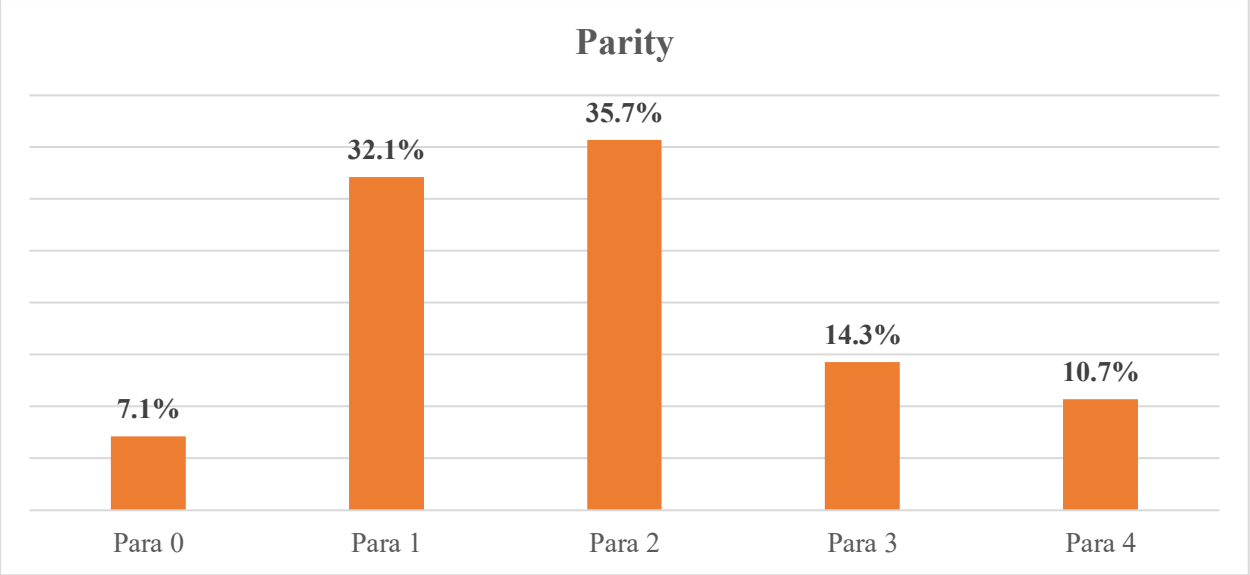

Figure 4.4. Parity – *Most PPH patients were Para 2 (35.7%), followed by Para 1 (32.1%). Lowest occurrence was among Para 0 (7.1%).*

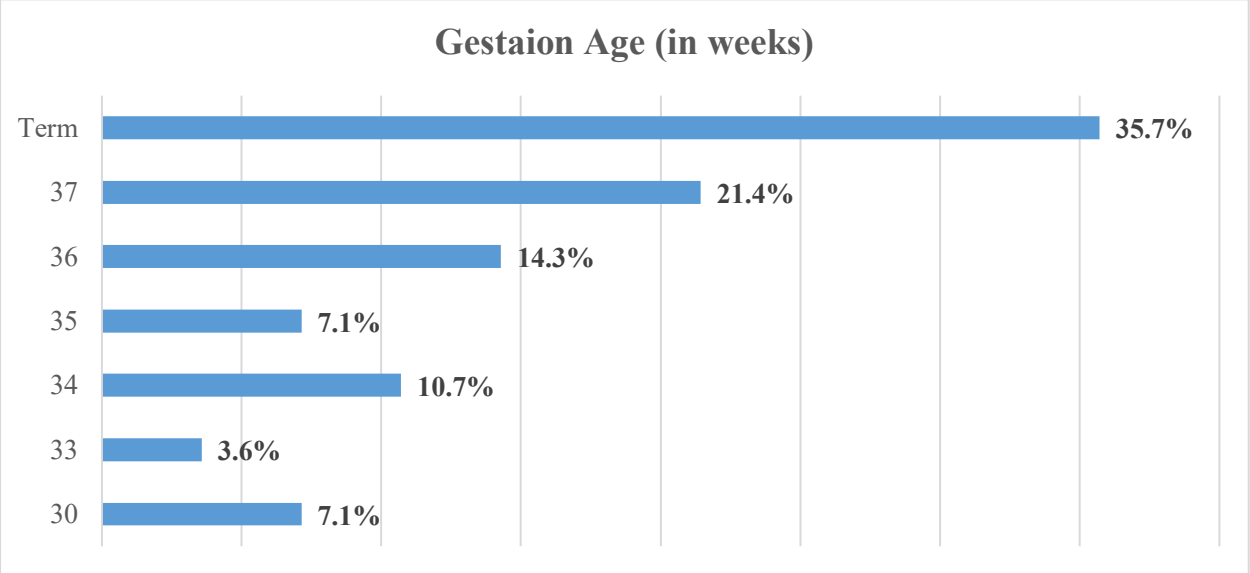

Figure 4.5. Gestation Age – *Term deliveries were most common among PPH cases (35.7%), with the lowest at 33 weeks (3.6%).*

4.4 CLINICAL RISK FACTORS

Clinical conditions accompanying PPH were analysed to identify common risk markers.

Table 4.3. Clinical Factors Associated with PPH

Variable	Category	Frequency (N=28)	Percentage
Mode of Delivery	Assisted Vaginal Delivery (AVD)	3	**10.7%**
	Spontaneous Vaginal Delivery (SVD)	25	**89.3%**
Obstetric/Medical or Surgical	APH (Placenta Abruptio)	3	**10.7%**
	Eclampsia in Twin Pregnancy	1	**3.6%**
	High Parity	2	**7.1%**
	IUFD	2	**7.1%**
	IUFD in SPE	2	**7.1%**
	SPE	3	**10.7%**
	Prime gravida	2	**7.1%**
	Prolonged Labor	10	**35.7%**
	Severe Anemia	1	**3.6%**
	PPROM in 1 Previous C/S	2	**7.1%**

*APH (antepartum hemorrhage), IUFD (intrauterine fetal death), SPE (severe preeclampsia), PPROM (preterm premature rupture of membranes), C/S (caesarian section).

Spontaneous vaginal delivery (SVD) accounted for the majority of PPH cases (89.3%). Among clinical risk factors, prolonged labour was the most prominent (35.7%), highlighting its relevance in obstetric complications.

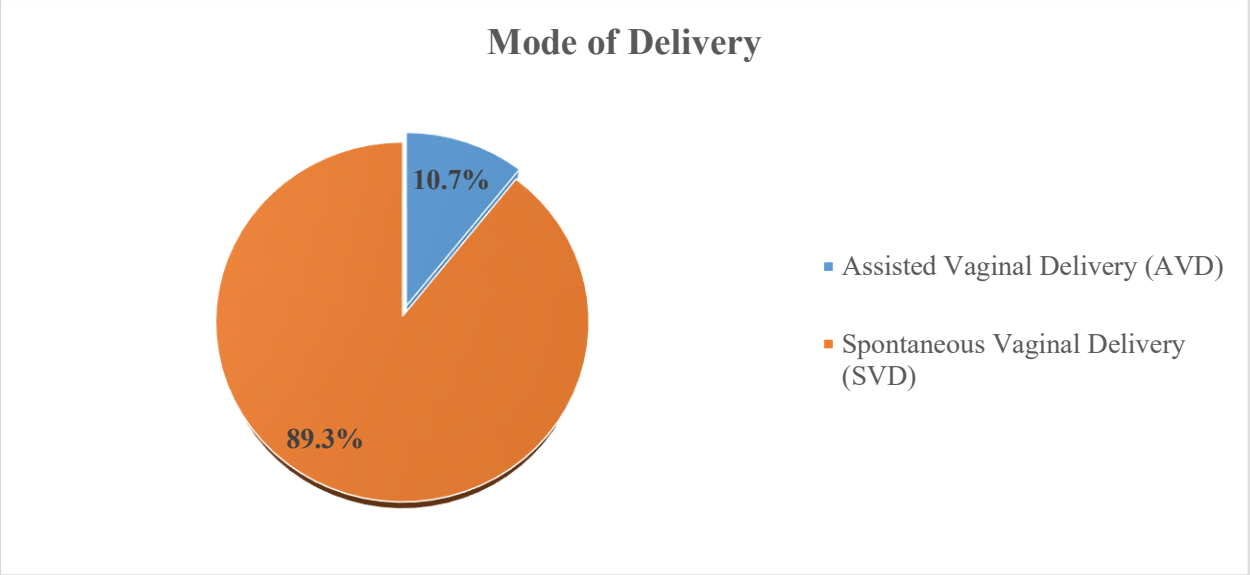

Figure 4.6. Mode of Delivery – *The graph shows that 89.3% of PPH cases followed SVD, suggesting that even normal deliveries can lead to complications when compounded by other risk factors.*

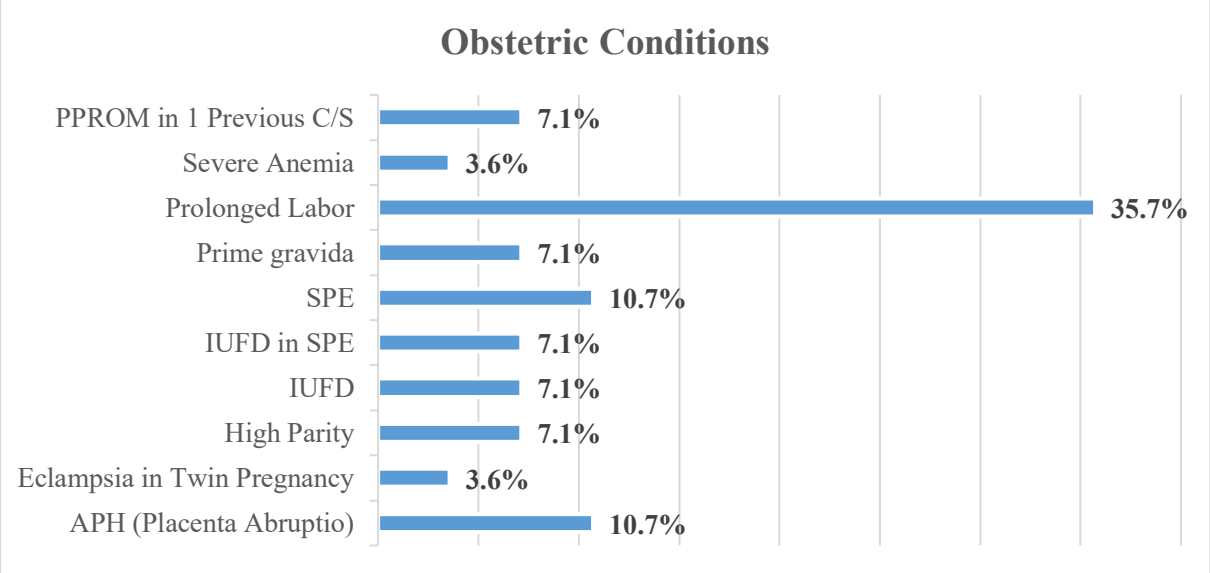

Figure 4.7. Obstetric Conditions – *A bar chart illustrating the distribution of obstetric conditions associated with PPH, with prolonged labor being the most prominent clinical factor (35.7%).*

4.5 MATERNAL OUTCOMES

Table 4.4. Maternal Outcomes

Variable	Category	Frequency (N=28)	Percentage
Maternal Outcome	Died	2	**7.1%**
	Discharged	26	**92.9%**

While 92.9% of women survived PPH and were discharged, a non-negligible 7.1% mortality rate was recorded, underscoring the seriousness of the condition.

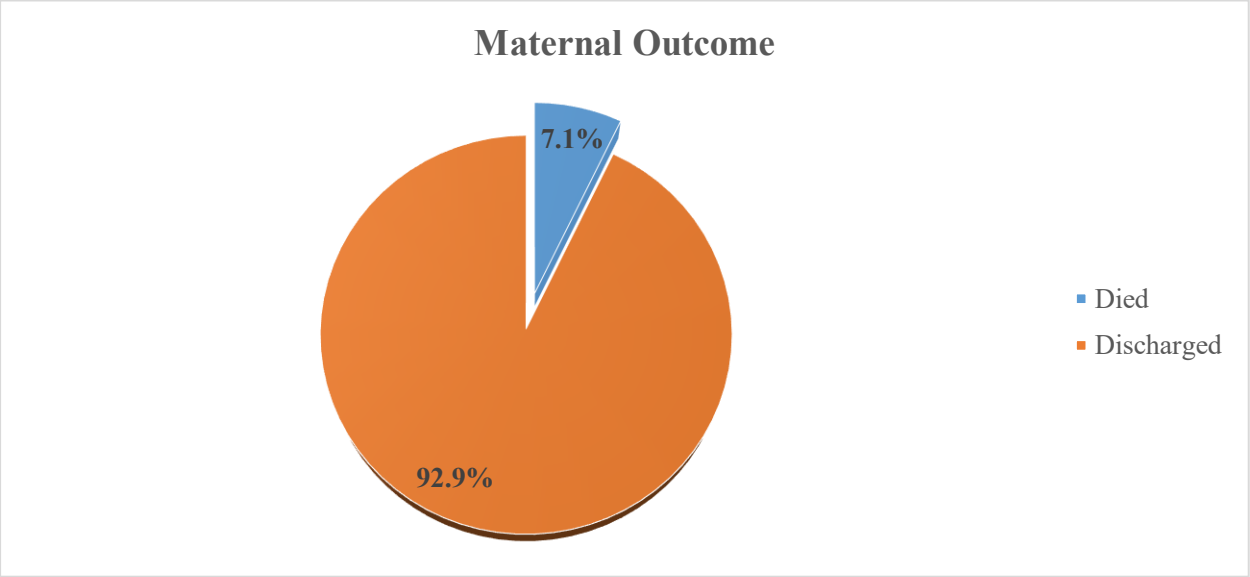

Figure 4.8. Maternal outcomes – *A pie chart shows that the majority of PPH patients were discharged, with a small but significant proportion (7.1%) succumbing to the condition.*

4.6 REGRESSION ANALYSIS

Table 4.5. Regression Analysis of Factors Associated with PPH

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	3.405132803	0.571773768	5.95538479	1.17341E-08
Age	-0.024194041	0.007896774	-3.063787864	0.002491443*
Gravida	-0.175628854	0.095538025	-1.838313639	0.067521923

Parity	0.179468949	0.096024222	1.868996657	0.063107446
Gestational Age (weeks)	-0.062130184	0.012707979	-4.889068876	2.0973E-06*
Mode of delivery	-0.04793244	0.046687626	-1.026662621	0.305838303

The regression model revealed that age (p=0.002) and gestational age (p<0.001) are statistically significant predictors of post-partum haemorrhage (PPH). Specifically, younger age and lower gestational age were linked to increased odds of experiencing PPH. Additionally, gravida and parity showed borderline significance, while the mode of delivery did not have a significant impact.

4.7 CHAPTER SUMMARY

This chapter presents findings from an analysis of 203 medical records, of which 13.8% (28 cases) indicated postpartum haemorrhage (PPH). The majority of the affected women were under the age of 30, specifically 82.2%, with the largest group being those aged 25 to 29 years, accounting for 53.6%. Among the patients experiencing PPH, the most common characteristics were being Gravida 3 (39.3%) and Para 2 (35.7%). Most cases of PPH occurred at term (35.7%), with 21.4% occurring at 37 weeks of gestation.

The vast majority of deliveries were spontaneous vaginal births, making up 89.3% of the cases. Prolonged labour was identified as the primary clinical risk factor, impacting 35.7% of the cases. Fortunately, the overall outcomes were positive, with 92.9% of the women being discharged and only 7.1% resulting in death. Regression analysis indicated that both age ($p = 0.002$) and gestational age ($p < 0.001$) were significant predictors of PPH, suggesting that younger and preterm patients are at a higher risk.

CHAPTER 5: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter discusses the study's findings and offers conclusions and recommendations.

5.2 DISCUSSION

This study aimed to determine the incidence of postpartum haemorrhage (PPH) among patients delivering at Levy Mwanawasa University Teaching Hospital (LMUTH). It sought to identify associated demographic and clinical risk factors, assess maternal outcomes, and evaluate the relationship between PPH and various obstetric and clinical variables. The findings provide crucial insights into the burden and determinants of PPH at a tertiary-level health facility in Zambia, reflecting both regional and global patterns observed in similar contexts.

The total incidence of PPH was 13.8% at LMUTH as illustrated in Figure 4.1, which is over double the 6.3% mentioned in the rural hospital research by Miyoshi (2019) in Zambia. This discordance may well relate to the fact that LMUTH is a referral centre in which rather complex patients were handled. This higher prevalence is comparable to the results reported from Rwanda (Bazirete *et al*., 2022) where the primary PPH was 25.2%, and Ethiopia (Getahun *et al*., 2023,) indicating that the prevalence of PPH is found to be higher among the referral hospitals as this complex and complicated obstetric emergency related cases need for referral service. Globally, the prevalence of PPH is very heterogeneous, being lower in countries such as Brazil and China (Liu *et al*., 2021, Betti *et al*., 2023), presumably because of more sophisticated obstetric surveillance systems, as well as the generalized use of prophylactic uterotonics

In terms of demographic risk factors, Figure 4.2 shows that women aged 25 to 29 years constituted the largest proportion of PPH cases (53.6%), followed by those aged 30 to 34 years. These findings deviate from the global trend, where advanced maternal age (35 years and older) is often associated with a higher risk of PPH (Hosseinzadeh *et al*., 2023; WHO, 2023). The predominance of younger women affected at LMUTH may reflect early fertility patterns and higher reproductive rates in Zambia. This trend is consistent with findings in Uganda by Ononge *et al*. (2016), which also noted a significant burden of PPH among younger women.

Gravidity and parity were important predictors of PPH. Figure 4.3 and Figure 4.4 communicate that a large proportion of PPH cases involved women with Gravida 3 (39.3%) and Para 2 (35.7%). Higher gravidity and parity can predispose women to uterine fatigue and atony, resulting in poor uterine contractility after delivery. These findings are supported by previous

reports from Mozambique (Lancaster *et al*., 2020) and Peru (Nyfløt *et al*., 2017), which identified high parity and multiple gestations as critical PPH risk factors. Additionally, Figure 4.5 illustrates that 35.7% of PPH cases occurred at term gestation, as term pregnancies, especially those involving macrosomic foetuses, are often linked to uterine over-distension, which increases the risk of uterine atony (Betti *et al*., 2023).

Clinically, the most important contributing factor of PPH was prolonged labour (35.7%) as shown in Figure 4.7. Uterine exhaustion from prolonged labour renders it incapable of adequate contractions, which thereby predisposes it to haemorrhage within a few minutes after delivery. The findings were supported by Getahun *et al*. (2023) in which they identified prolonged labour and genital trauma as predictors of PPH. With most deliveries being spontaneous vaginal delivery (89.3%) among PPH cases as seen in Figure 4.6, this could be due to inadequate intrapartum monitoring or failure to identify labour dystocia early.

Regression analysis in Table 4.5 demonstrated statistically significant associations between PPH and both maternal age ($p = 0.002$) and gestational age ($p < 0.001$), reinforcing the importance of closely monitoring these variables. While no significant associations were observed between PPH and factors such as parity, HIV status, or hypertensive disorders in this cohort, it is noteworthy that other regional studies, such as those conducted in Uganda and Mozambique, have reported associations between PPH and HIV status, possibly due to immunosuppression and compromised healing capacity (Ononge *et al*., 2016; Lancaster *et al*., 2020).

Maternal outcomes were generally favourable, with 92.9% of patients recovering and being discharged as shown in Figure 4.8. This reflects the strong obstetric emergency care services available at LMUTH. However, the mortality rate of 7.1% among PPH cases illustrated in Figure 4.8 remains concerning and aligns with national statistics indicating that PPH contributes to 34% of maternal deaths in Zambia (Mubambe *et al*., 2024; Zimbia, 2020). Effective interventions, such as timely administration of uterotonics, the use of uterine balloon tamponade, and the availability of blood products, likely contributed to the high survival rate. Nonetheless, gaps in emergency preparedness and blood supply chains may still exist.

Although the deaths due to childbearing are high, the quite optimistic outcomes of the mothers can be concluded that LMUTH has been in compliance with their standard operation processes that have minimized the fatal outcomes related to PPH. The same way, much more need to be improved as the present situation does not correspond with the Sustainable Development Goal

(SDG) 3.1 target of the world maternal mortality ratio to be below 70 per 100,000 live births by 2030.

5.2 CONCLUSION

The study is clear that postpartum haemorrhage (PPH) is a major concern relating to public health at LMUTH with a rate of 13.8%. The definite factors to deliver changed from PPH that were identified include the following: Age of the mothers of youngest, the highest gravidity and parity, term gestation, and prolonged labour. Besides the most of maternal outcomes was with a good ending, the higher mortality levels recorded there highlighted the matters of urgency regarding the need to have the investment in the obstetric emergency care sector continued. The evidence from local and international sources implies that PPH is a complex and multifactorial problem, and as a result, it necessitates both prevention and management measures that are integrated.

5.2.1 STUDY LIMITATIONS

The study had several limitations, including recall bias. Since it relied on participants' past records, there was a risk that they might not accurately remember past events, which could lead to biased data. Additionally, confounding variables posed a limitation, as it is difficult to control for other factors that may influence the outcome. This can result in an inaccurate estimate of the relationship between exposure and outcome and present challenges when generalizing the study's findings.

5.3 RECOMMENDATIONS

1. **Risk Screening During Antenatal Care:** Routine screening for risk factors associated with postpartum haemorrhage (PPH), including gravidity, parity, and gestational age, should be incorporated into antenatal care protocols. This will help identify and prepare for high-risk deliveries.

2. **Invest in Obstetric Emergency Training:** Regular in-service training and simulations on the active management of the third stage of labour (AMTSL), PPH response, and the use of uterine tamponade devices can enhance provider readiness.

3. **Expand Community Sensitization Programs:** Educating communities about the importance of early antenatal care booking, skilled birth attendance, and recognizing danger signs during labour can improve care-seeking behaviour and reduce delays.

4. **Implement Robust Data Systems:** A maternal outcomes surveillance system should be established to continuously track, analyse, and respond to PPH trends. This will facilitate evidence-based interventions and informed policymaking.

5. **Policy Integration and Health System Strengthening:** National and hospital-level policies should integrate comprehensive PPH management strategies into maternal health programs. Supporting these strategies through resource allocation and capacity building is essential for their successful scale-up.

5.3.1 SUGGESTIONS FOR FUTURE STUDIES

Subsequent studies need to comprise multicentre studies to establish trends and causality for postpartum haemorrhage (PPH) in all healthcare facilities in Zambia and Sub-Saharan Africa. Correct determination of current prevention and intervention algorithms, such as uterotonics and active management of the third stage of labour (AMTSL), also need to be evaluated, particularly in low-resource hospitals. Integration of community health education and emergency transport services could reduce PPH-related morbidity and mortality. Research involving the views of health practitioners on barriers to early PPH care would be significant to guide policy changes.

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APPENDICES

Appendix I: Study Timeframe

Activity	Responsible person	Nov. 2024	Dec. 2024	Jan. 2025	Feb 2025	Mar. 2025	Apr. 2025	May 2025
Proposal writing	Researcher							
Submission of proposal	Researcher							
Data collection	Researcher							
Report writing	Researcher							
Final report submission	Researcher							

Appendix II: Study Budget

ITEM	AMOUNT
UNILUS Research Committee Clearance	K500
Levy Mwanawasa Hospital Clearance	K250
Stationery	K400
Internet connectivity	K300
Transport money	K100
Total	K1550

Appendix III: Study Tools
DATA ABSTRACTION TOOL

Study Title: ASSESSING THE INCIDENCE AND RISK FACTORS OF POSTPARTUM HAEMORRHAGE IN PREGENANT WOMEN AT LEVY MWANAWASA UNIVERSITY TEACHING HOSPITAL

Study ID: _____

Date of Abstraction: _____

Abstraction Completed By: _____

Patient Demographics

- Patient ID: _____
- Age at Delivery: _____ (in years)
- Parity:

o ☐ 0 (Primiparous)

o ☐ 1 (Multiparous)

o ☐ 2 (Multiparous)

o ☐ 3+ (Multiparous)

Gestational Age at Delivery:

- ☐ Preterm (less than 37 weeks)
- ☐ Term (37-42 weeks)
- ☐ Post-term (more than 42 weeks)

Obstetric History

- Previous History of PPH:

o ☐ Yes

o ☐ No

• Previous Cesarean Section:

o ☐ Yes

o ☐ No

• Previous Uterine Surgery:

o ☐ Yes

o ☐ No

o If yes, specify: _____

• History of Hypertension:

o ☐ Yes

o ☐ No

• Gestational Diabetes:

o ☐ Yes

o ☐ No

• Multiple Gestation (Twins/Triplets):

o ☐ Yes

o ☐ No

• Pre-eclampsia / Eclampsia:

o ☐ Yes

o ☐ No

LABOUR AND DELIVERY DETAILS

• Mode of Delivery:

☐ Vaginal

☐ Cesarean Section (Emergency)

☐ Cesarean Section (Elective)

☐ Instrumental (Forceps/Vacuum)

• Complications During Delivery:

☐ Prolonged Labor

☐ Shoulder Dystocia

☐ Uterine Rupture

☐ Cord Prolapse

☐ Breech Presentation

☐ Other (Specify): _____

• Blood Loss During Delivery (Estimated):

☐ less than 500mL (Normal)

☐ 500-1000mL

☐ 1000-2000mL

☐ 2000mL

• Use of Prophylactic Oxytocin:

☐ Yes

☐ No

• Use of Prophylactic Oxytocin:

☐ Yes

☐ No

• Placental Retention or Abnormal Placenta:

☐ Yes (Specify): _____

☐ No

• Uterine Tone at Delivery:

☐ Normal

☐ Poor Tone (Atony)

POSTPARTUM HAEMORRHAGE DETAILS

• Was PPH Diagnosed?

o ☐ Yes

o ☐ No

o If Yes, what was the definition of PPH used?

♣ ☐ >500 mL (Vaginal Delivery)

♣ ☐ >1000 mL (Cesarean Section)

♣ ☐ Clinical diagnosis based on symptoms

♣ ☐ Other (Specify): _____

• Date and Time of PPH Onset: _____

• Total Blood Loss (mL): _____

PPH Type:

• ☐ Primary PPH (within 24 hours of delivery)

• ☐ Secondary PPH (after 24 hours, within 6 weeks postpartum)

Management of PPH:

• ☐ Uterine Massage

• ☐ Intravenous (IV) Oxytocin

- ☐ Misoprostol (oral or rectal)
- ☐ Tranexamic Acid
- ☐ Surgical Intervention (e.g., Hysterectomy, B-Lynch suture)
- ☐ Blood Transfusion
- ☐ Balloon Tamponade
- ☐ Other (Specify): _____

RISK FACTORS FOR POSTPARTUM HAEMORRHAGE

- High Blood Pressure (Hypertension):

o ☐ Yes

o ☐ No

- Pre-eclampsia / Eclampsia:

o ☐ Yes

o ☐ No

- Multiple Gestation (Twins/Triplets):

o ☐ Yes

o ☐ No

- Obesity (BMI ≥30):

☐ Yes

☐ No

- Anemia (Prepartum):

☐ Yes

☐ No

• Placenta Previa or Accreta:

☐ Yes

☐ No

• Uterine Fibroids:

☐ Yes

☐ No

• Cesarean Section History:

☐ Yes

☐ No

• Large Baby (Macrosomia, >4000g):

☐ Yes

☐ No

• Intrauterine Infection (Chorioamnionitis):

☐ Yes

☐ No

• Prolonged Labor:

☐ Yes

☐ No

• Uterine Atony:

☐ Yes

☐ No

ABSTRACTION VERIFICATION

- Abstraction Verified By: _____
- Date of Verification: _____

Appendix IV: UNILUSREC Approval

UNIVERSITY *of* LUSAKA

Passion for Quality Education: Our Driving Force

UNIVERSITY OF LUSAKA RESEARCH ETHICS COMMITTEE (UNILUS-REC)

Plot No. 37413, Off Alick Nkhata Mass Media. P. O Box 36711, Lusaka.
Phone: +260211258505, 258409 Fax +260211233409; Cell +260976075850,961917862,
E-mail:unilus@zamnet.zm,ictar@zamnet.zm

UNILUS-RESEARCH ETHICS COMMITTEE

Ref no: FWA00033228-646(08)/(08)/{2024}

Date: 01 April 2025

STUDENT NAME: **Ms. Kemo Sebikiri**

Assessing The Incidence and Risk Factors of Postpartum Haemorrhage in Pregnant Women at Levy Mwanawasa University Teaching Hospital

The above research was submitted to the research ethics committee for review. The study has no major ethical problems and is approved subject to the following:

1. The study cannot be changed without express permission of the UNILUS research ethics committee.
2. Approval from the necessary authority should be sought.

Professor Kasonde Bowa

MSc(Glasgow),M.Med(UNZA),FRCS(Glasgow),FACS,FCS,DPH(LSTMH),MPH(UCL)

Chairman- UNILUS REC

Professor of Urology and Consultant Urologist

Deputy Vice-Chancellor – Research and Innovation

Executive Dean - School of Medicine and Health Sciences

Appendix V: NHRA Approval

NATIONAL HEALTH RESEARCH AUTHORITY
Lot No. 18961/M, off Kasama Road, Chalala, P.O. Box 30075, LUSAKA
Tell: +260211 250309 | Email: znhrasec@nhra.org.zm | www.nhra.org.zm

NHRA8567/02/04/2025 **8th April 2025**

The Principal Investigator,
Kemo One Sebikiri,
University of Lusaka,
Lusaka

Dear Kemo One Sebikiri,

Re: Request for Authority to Conduct Research

The National Health Research Authority Is in Receipt of Your Request for Authority to Conduct Research Titled **"Assessing The Incidence and Risk Factors of Postpartum Haemorrhage in Pregnant Women at Levy Mwanawasa University Teaching Hospital"**

I wish to inform you that following submission of your request to the Authority, our review of the same and in view of the ethical clearance, this study has been **approved** on condition that:

1. The relevant Provincial and District Medical Officers where the study is being conducted are fully appraised.
2. Progress updates are provided to NHRA bi-annually from the date of commencement of the study.
3. The final study report is cleared by the NHRA before any publication or dissemination within or outside the country.
4. After clearance for publication or dissemination by the NHRA, the final study report is shared with all relevant Provincial and District Directors of Health where the study was being conducted, University leadership, and all key respondents.

Yours sincerely,

National Health Research Authority

Prof Victor Chalwe,
Director and Chief Executive Officer

Appendix VI: LMUTH Approval

All Communications should be addressed to:
The Senior Medical Superintendent
Tel: +260 211 285461
Fax: +260 211 285462

In reply please quote.

No.:.....

REPUBLIC OF ZAMBIA

MINISTRY OF HEALTH

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

24th April, 2025

The Principal Investigator,
Kemo One Sebikiri
UNILUS
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 ***"ASSESSING THE INCIDENCE AND RISK FACTORS OF POSTPARTUM HAEMORRHAGE IN PREGNANT WOMEN AT LEVY MWANAWASA UNIVERSITY TEACHING HOSPITAL"***

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