

**PREVALENCE AND CHARACTERISTICS OF MATERNAL NEAR-MISS AND
MANAGEMENT OUTCOMES AMONG WOMEN WHO SOUGHT POST ABORTION
CARE AT THE PRINCESS CHRISTIAN MATERNITY HOSPITAL, FREETOWN
SIERRA LEONE 2018-2019,**

A COMPARATIVE CROSS-SECTIONAL STUDY

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(M.Med) in Obstetrics and Gynecology, University of Nairobi, Kenya.**

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DECLARATION

This dissertation is my original work and has not been presented for a degree in any other university.

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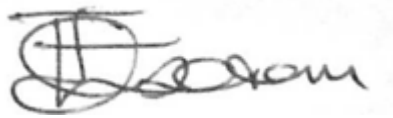
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May the Almighty give us strength and wisdom to continue being a blessing in the lives of other people.

DEDICATION

I dedicate this work to my wife, Pharm. Jodiel-Joy James and daughter Faustina Keziah Sia James.

LIST OF ABBREVIATIONS

APHRC.....	African Population and Health Research Centre
ACOG.....	American College of Obstetricians and Gynecologists
CAC.....	Comprehensive Abortion Care
CDC.....	Centers for Disease Control and Prevention
FP.....	Family Planning
ICU.....	Intensive Care Unit
MD.....	Maternal Death
MDG.....	Millennium Development Goal
MNM.....	Maternal Near-Miss
MMR.....	Maternal Mortality Ratio
MVA.....	Manual Vacuum Aspiration
PAC.....	Post Abortion Care
PCMH.....	Princess Christian Maternity Hospital
PHC.....	Population and Housing Census
PLTC.....	Potentially Life-Threatening Condition
SAMM.....	Severe Acute Maternal Morbidity
SLDHS.....	Sierra Leone Demographic and Health Survey
SLMICS.....	Sierra Leone Multiple Indicator Cluster Survey
SMO.....	Severe Maternal Outcome
SPSS.....	Statistical Package for Social Scientist
SRH.....	Sexual and Reproductive Health
TOP.....	Termination of Pregnancy
WHO.....	World Health Organization

DEFINITION OF TERMS/OPERATIONAL DEFINITIONS

Maternal near-miss: a maternal near miss is defined by WHO as a woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy.

Abortion: is defined as pregnancy termination prior to 20 weeks' gestation or a fetus born weighing less than 500 g [CDC/WHO]. It can also be defined as termination of pregnancy before viability. In Sierra Leone, the age of fetal viability is 28 weeks.

Unsafe abortion: it is defined by the World Health Organization (WHO) as a procedure for terminating an unintended pregnancy, carried out either by persons lacking the necessary skills or in an environment that does not conform to minimal medical standards, or both.

Safe abortion: the World Health Organization (WHO) defines safe abortion as abortion in countries where abortion law is not restrictive (abortion is legally permitted for social or economic reasons, or without specification as to reason).

Characteristics of maternal near-miss: uniform set of criteria (clinical, laboratory-based, management-based) used to describe severe maternal complications or life-threatening conditions in women during pregnancy, childbirth or within 42 days of termination of pregnancy.

Prevalence: refers to the number of cases of a disease that are present in a particular population at a given time.

Severe Maternal Outcome: includes cases of maternal near miss and maternal deaths.

LIST OF FIGURES

Figure 1:Map of Sierra Leone.....	14
Figure 2: Conceptual Framework	21
Figure 3:Location of PCMH in the Western Area and its catchment area.	28
Figure 4:Planimetry of PCMH.....	29
Figure 5: Study Flowchart	39

LIST OF TABLES

Table 1: Study Variables..... 33

Table 2: Demographic characteristics of patients who sought Post abortion care at PCMH **Error! Bookmark not defined.**

Table 3:Comparison of patient characteristics of women seeking PAC at PCMH hospital..... 40

Table 4:Comparison between HB levels between adolescents and other women of reproductive age 41

Table 5:Comparison of treatment and complications of women seeking PAC at PCMH hospital 42

Table 6:Comparison of prevalence of maternal near miss of women seeking PAC at PCMH hospital 43

Table 7:Comparison of Characteristics of Maternal Near Miss among women seeking PAC at PCMH hospital..... 43

Table 8:Comparison of management outcomes among women seeking PAC at PCMH hospital44

TABLE OF CONTENTS

DECLARATION.....	2
ACKNOWLEDGEMENT.....	4
DEDICATION.....	5
LIST OF ABBREVIATIONS	6
LIST OF FIGURES	8
LIST OF TABLES	9
TABLE OF CONTENTS	10
ABSTRACT.....	12
CHAPTER ONE: INTRODUCTION.....	14
CHAPTER TWO: LITERATURE REVIEW.....	17
2.1. Prevalence of Maternal near-miss.....	17
2.2. Characteristics of maternal near-miss.....	18
2.3. Management outcomes of post abortion care.....	19
2.6 Study Justification	23
2.7 Research Question	25
2.8 Study Objectives	25
2.8.1 Broad Objective.....	25
2.8.2 Specific Objectives	25
CHAPTER THREE: METHODOLOGY	26
3.1. Study Design	26
3.2. Study Site.....	26
3.3. Study Population	30
3.3.1. Inclusion criteria.....	30
3.3.2. Exclusion criteria	30
3.4. Sample Size and Sampling Procedure.....	31
3.4.1. Sample Size.....	31
3.4.2. Sampling Procedure	32
3.5. Sampling technique	32
3.6. Data Variables.....	33
3.7. Research assistants.....	34

3.8.	Data Collection and Management.....	34
3.9.	Data Analysis	36
3.10.	Ethical Considerations	37
3.11.	Study Limitations and strength	38
CHAPTER FOUR: ANALYSIS RESULTS.....		39
4.1.	Introduction.....	39
4.2.	Demographic characteristics of patients seeking Post abortion care at PCMH.....	40
4.3.	Comparison between HB levels between adolescents and other women of reproductive age 41	
4.4.	Comparison of treatment and complications of women seeking PAC at PCMH hospital.....	41
4.5.	Comparison of prevalence of maternal near miss of women seeking PAC at PCMH hospital..	43
4.6.	Comparison of Characteristics of Maternal Near Miss among women seeking PAC at PCMH hospital	43
4.7.	Comparison of management outcomes among women seeking PAC at PCMH hospital	44
CHAPTER FIVE: DISCUSSION.....		45
CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS		49
6.1.	Conclusion	49
6.2.	Recommendations.....	49
REFERENCES.....		50
APPENDICES.....		53
	Appendix I: WHO MNM criteria and SSA MNM criteria.	53
Appendix II: Management outcomes		55
	Appendix III: Questionnaire	56
	Appendix IV: Study Timelines	59
	Appendix V: Budget	60
	Appendix VI: Similarity Report.....	61
	Appendix VII: ERC Approval	62
	Appendix VIII: Approval from Sierra Leone Ethics	64

ABSTRACT

Background: The World Health Organization (2011) affirmed that most of the unsafe abortions accounting for 22 million cases and subsequent 47,000 deaths occur in developing countries. Most of these countries have laws in place outlawing abortion making it difficult to have the process done openly. Most of these patients include adolescents. The Sierra Leone Demographic and Health Survey report in 2013 revealed that adolescents contribute to around 25 percent of total maternal deaths which makes this population vulnerable. Women seeking care for post abortion complications have been increasing in the country with a significant number of patients presenting with maternal near miss events. Globally, there are more than 46 million cases of induced abortion which occur annually with more than 20 million being unsafe abortions (1). Thus, it is essential to investigate complications arising from unsafe abortion and management outcomes to understand the existing burden.

Objective: To compare the prevalence and characteristics of maternal near-miss and management outcomes between adolescents (10-19 years) and other women of reproductive age (20-49 years) who sought post abortion care at PCMH between 1st January 2018 - 31st December 2019.

Methodology: This is a facility-based retrospective comparative cross-sectional study. It was conducted at the Princess Christian Maternity Hospital (PCMH) in Freetown Sierra Leone. A total of 459 patients were recruited into the study which included 153 adolescents (10- 19 years) and 306 other women of reproductive age (20–49 years). Patient records were reviewed using a structured questionnaire and the modified WHO maternal near-miss tool. Data analysis was done using SPSS software. The prevalence of maternal near miss was calculated based on a specified formula including women who sought post abortion care between 2018 - 2019. A Pearson chi-square test or Fischer's exact test was used to compare categorical variables and outcome variables. Independent samples t-test was used to compare continuous variables and the study outcome variables. All comparisons were performed at 0.05 significance level.

Results: The findings from the study revealed that, 88.9% of adolescents were dependent compared to 23.5% among other WRA. The probability of adolescents seeking treatment elsewhere before presenting to hospital was 52% lower compared to other WRA (41.2% vs 72.9%). The total prevalence of maternal near miss was 24.4%. The prevalence of maternal near miss however, was slightly higher in other WRA 25.2% compared to 22.9% among adolescents. The probability of adolescent women receiving blood transfusion was 77% lower compared to other WRA, (OR =0.23, 95%CI:0.18 – 0.94, p =0.049). The common characteristics of MNM included Transfusion (69.6%), Sepsis (19.6%) and Laparotomy (8.1%). Other observed characteristics were hysterectomy, shock and severe malaria. There was no association between the exposed and non-exposed groups based on MNM characteristics. Many of the patients in the adolescent group did not have any evidence of complications, 60.8% compared to 55.6% (170) in other WRA. Maternal near miss was slightly higher among other WRA 25.2% (77) compared to 22.9% (35) in adolescents.

Conclusion and Recommendations: The findings have shown that there are no major significant differences between adolescents and other women of reproductive age. However, the risk of

adverse complications was highly prevalent across the groups. Thus, it is essential to review the current laws to allow for safer abortion.

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND



Figure 1:Map of Sierra Leone

Sierra Leone is a developing country in West Africa with a total of 7,092,113 people. The country has approximately 59 percent of its population living in rural areas with 40% residing in urban centres. The demographic profile of a young population is reflected in the 2015 Population and Housing Census (PHC) which found that 41 percent of the population were under the age of 15. Northern, Southern, Eastern, and Western area are the four administrative regions of the country. There are 14 districts and 149 chiefdoms in the four regions. Sierra Leone, like many other countries in Sub-Saharan Africa (SSA) has high proportion of unemployment with poor health management system. Majority of the population do not have any form of healthcare insurance.

The identified drivers of teenage pregnancy in the country include low socio-economic status, lack of family planning utilization, lack of knowledge on proper maternal care, poverty and cultural aspects such as early forced marriages according to the 2015 Reproductive, Newborn, and Child Health (RNCH) strategy and a teenage pregnancy survey. Adolescents are estimated to account for 25 percent of all maternal deaths in the country, according to the SLDHS 2013, making them a priority focus group for any significant reduction in maternal mortality rates.

Maternal Near Miss (MNM) occurs when a woman almost dies but survives a severe complication which occurs during pregnancy, at delivery or within forty two days of pregnancy termination according to WHO. The key criteria that are used to investigate MNM include the clinical, laboratory and management-based approach.

The development of the WHO-MNM tool was inclusive of all settings including low income. However, the tool has been unable to effectively aid in identifying MNM in low resource setting because of limited resources which are crucial in classification of a case as MNM. There have been changes which have sought to help create local adoption for an improved knowledge on the criteria using the available tools (2). However, in assessing the modified tool, there is no available data to confirm whether this modified version of the tool has been validated for use in Sub-Saharan African. A review by A.K Tura *et al* identified that the WHO-MNM tool has not been evenly applied in the SSA which presents the need to a more inclusive approach in its adoption (3). See appendix I.

Additionally, the WHO defines unsafe abortion as a method of ending an unplanned pregnancy that is carried out by people who lack the requisite expertise or in a setting that does not meet minimum medical requirements, or both. Abortions are safe when performed using a WHO-recommended procedure that is suitable for the pregnancy length and when the person performing the abortion has the requisite skills. Controlling the incidence of unsafe abortions is vital in attaining the Sustainable Development Goal 3 on reducing global maternal mortality ratio to 70 per 100,000 livebirths. The vision of sustainable development in reproductive health has effectively emphasized on integration of better approaches such as Universal Health Coverage (UHC) which are focussing on attaining zero percent of preventable maternal deaths through control of common maternal morbidities such as unsafe abortions (4).

Abortion in Sierra Leone was made illegal by the Offences Against the Persons Act of 1861. According to Sections 58 and 59 of this act, which was adopted from the English law and domesticated state that no woman is legally allowed to dispense her pregnancy in situations where her life is not in any form of danger using any tool. Abortion in Sierra Leone is illegal although there are specific cases to which it is permitted by law such as when the life of the mother is at increased risk. However, the proposed legislation, The Safe Abortion Act 2015 has not been

assented to by the president owing to the fact that religious stakeholders have many concerns pertaining to different aspects of the law (5).

Adolescents are an overlooked or ignored group with regards to the provision of sexual and reproductive health services despite the existing high rates of unprotected sexual practices and poor health seeking behaviour/decision exhibited by this age bracket. This predisposes them to a wide range of morbidities including abortion-related complications and severe maternal outcomes. Previous studies in other parts of the world have shown that adolescents presenting for post abortion care are more likely to have adverse outcomes including maternal near miss events. However, very few studies have presented a clear comparison on the prevalence and characteristics of maternal near miss among adolescents and other women of reproductive age as well as associated management outcomes. Thus, this study aims to assess how well or poorly the adolescent age group does as against other women of reproductive age in terms of the proportions of abortion-related near-miss burden, management outcomes; and to establish whether post abortion care interventions should be specific for the different age groups. The comparison as included in this study sought to establish whether there are significant differences in terms of proportion of near miss and adverse outcomes between adolescents and other women of reproductive age.

CHAPTER TWO: LITERATURE REVIEW

2.1. Prevalence of Maternal near-miss

Maternal health is a crucial aspect of health care delivery. Severe morbidities need an approach that is comprehensive. Information and data on maternal near miss aid in reducing maternal death and contribute to achieving the goals that relate to the reduction of maternal mortality rate of a country as well as the whole world. In a retrospective observational study of maternal near miss conducted at a district teaching hospital in India by Manjunatha S, et al., they found 25 MNM cases out of 3347 live births representing a MNM ratio of 7.46/1000 live birth (6).

Most of the people who perform unsafe abortion procedures are not well trained or do not perform the procedures in the appropriate setting for fear of being arrested. This has made unsafe abortion a major factor leading to increased maternal morbidities globally. In the SSA region, the prevalence of unsafe abortion is high as a result of harsh economic situation and poverty. Worldwide, SSA region contributes immensely to mortalities resulting from abortion complications (90 per 100,000 livebirths). Abortion has been associated with increased stigma in the society which prevents individuals who procure abortion from seeking early medical care. In a multi-center study conducted in Zambia, maternal near-miss accounted for 16% of admitted complications. The study further found that, for the three provinces, the maternal near-miss rate for abortion-related cases was 72/100,000 livebirths and a MNM ratio of 450/100,000 livebirths. The study further found that there was 7 percent MNM among all women who sought PAC (7).

More than 3,000 women in Nigeria are estimated to die each year due to complications resulting from unsafe abortion. In a study to assess the incidence of MNM in selected hospitals in Nigeria, 137 of women who were enrolled in the study suffered MNM. Of the 137 maternal near-miss cases, 13 of them were accounted for by unsafe abortion which represented 9.5% of all the maternal near-miss cases (8).

Adverse outcomes from pregnancy and birth are important causes of maternal morbidity and mortality the world over and particularly in the developing countries. Currently, the definition is useful for determining serious morbid conditions during pregnancy or after a pregnancy termination. Olusola et al in a study conducted in Nigeria revealed that 89 women in the study presented with spontaneous miscarriages, 151 had life threatening obstetric complications, 40

women had severe maternal outcomes while 33 had MNM and there were also 76 maternal deaths during the study period (9).

Quite recently, the use of maternal near-miss approach for assessing maternal health is on the increase. It has also been known to be an important instrument used to understand the patterns of maternal morbidity and mortality in the local context, examining strengths and weaknesses in the health care system. In a study done in South-West Ethiopia investigating MNM, it was found that 138 of the women enrolled had MNM and there were 24 maternal mortalities. (10).

Maternal near-miss approach could be a proxy for maternal death. This concept can be used to describe women who nearly passed on as a result of obstetric complications. Assessment of quality of obstetric care and severe complications related to pregnancy can be done using this near-miss approach. In a prospective descriptive study conducted in Harare Zimbabwe assessing factors associated with MNM, the study found that there were 110 MNM cases and thirteen maternal mortalities (11).

2.2. Characteristics of maternal near-miss

Hemorrhage is a critical adverse-event resulting from unsafe abortion and its extent can be deduced by anemia which can be easily assessed in developing countries. Including the severity of anemia to the maternal near-miss criteria adds more value in such contexts. Getting an acceptable limit for anemia within the maternal near-miss group and that used in other disease conditions is a huge task. In a study done in Zambia explaining the burden of abortion complications in health centres, a large proportion of maternal near-miss cases were seen with severe anemia 44 percent, 24 percent had massive blood transfusion, 27 percent had hypovolemic shock and 10 percent had septic shock (7).

In developing countries, a greater proportion of the maternal near-miss events are accounted for by hemorrhage and hypertensive disorders in pregnancy. These two conditions are the commonest morbidities in maternal near-miss and maternal mortalities. Generally, anemia is more common in maternal near-misses than seen in maternal death. However, complications arising from abortion are equally associated with both maternal outcomes. It is important to note that abortion-related maternal near miss events are different from obstetric maternal near-miss events resulting from

other causes. In a study done in Nigeria investigating the incidence of MNM as a result of unsafe abortion, it was noted that there were 204 near-miss morbidities among the 137 near-miss cases suggesting a mean of 1.5 morbidities per case. The common causes of maternal near-miss events included hemorrhage (33%) and anemia (33%). Infection accounted for 17% of the near-miss events and ten percent was related to unsafe abortion (8).

Haemorrhage has remained a major cause of MNM and thus the efforts undertaken to improve this has focused on building a broader perspective for change in response to maternal health. Notably, in the management of patients with medical conditions in pregnancy a multi-disciplinary approach is a major requirement for the early recognition of complications. Similarly, in a cross-sectional study in Yaoundé Central Hospital, Cameroon, common maternal near-miss events were noted to include: severe anemia (31.4%), shock (5.7%), uterine perforation (4.3%), sepsis (5.7%) and generalized peritonitis (7.1%) (12).

Sohel et al conducted a cross-sectional descriptive study in Bangladesh, abortion-related severe maternal morbidities included hemorrhage (58.8%), anemia (10.0%) and 26.3% had known infection of the uterus (13). In addition, a study done in 2005 by Carol Levin et al revealed that, maternal near-miss events included infection (7.6%), blood transfusion (0.13%), uterine perforation (0.06%) and shock (0.06%) (14).

2.3. Management outcomes of post abortion care

In a study conducted by Collins A Kalu *et al* in Ebonyi State University Teaching Hospital, Abakaliki, Nigeria; 556 women received post abortion care representing 41.1% of all gynecological admissions. It was revealed that the most common intervention offered for uterine evacuation was Manual Vacuum Aspiration (MVA). This was offered for 500 (95.8%) of the patients. Antibiotics were received by all the patients in line with the departmental policy. About 40 women (7.7%) were transfused while laparotomy was performed for 42(8.0%) due to pelvic abscess, uterine and gut perforation. Counselling on the different modern methods of contraception was done for 219(42%) of the women who were managed at the facility. Referral to family planning center for uptake of their preferred method and other reproductive health needs was done for 84(16%). The common maternal near-miss events were hemorrhage (38.3%), septic abortion (27.8%), pelvic abscess (7.1%), uterine perforation (2.9%) and gut perforation 8(1.5%). The total

number of maternal deaths were 10 representing 1.9% of all cases who received post abortion care (15).

An institutional based retrospective study in Botswana assessing post abortion outcomes found that about 86 (13.9%) and 50 (8.1%) of the patients had oxytocin and misoprostol administered respectively. About 9.5% of the patients were transfused blood products. While 121 (19.5%) received post abortion counselling, 30(4.8%) received some form of contraception. Maternal near-miss events observed included 10% hypovolemic and septic shock, 1.6% had multiple organ failure, 1.3% had disseminated intravascular coagulation (DIC), while 0.8% reported renal failure while out of the 619, there were 9 deaths (16).

In a cross-sectional study conducted to assess post abortion care in Cameroon, a total of 142 patients who received post abortion care services were included. Manual vacuum aspiration (MVA) was performed for 6 (4.2%) of the patients while Misoprostol alone was the applied method of uterine evacuation for (52.1%) of the patients. Oral or injectable antibiotics was administered to 96.5% of the patients during and after management and only 9.2% received blood transfusion. About 50.7% of the patients received no post abortion contraception. Severe maternal morbidities included anemia 26 (18.3%), hemorrhagic shock 8 (5.6%) and sepsis 9 (6.3%). There were no maternal deaths recorded (17).

In a study conducted in Sri Lanka among 171 patients to identify post-abortion care outcomes, it was found that 74 percent had retained products of conception surgically removed. Surgeries performed included, 57% Manual Vacuum aspiration (MVA), 31% dilation and evacuation, 8% manual removal of the retained products with 4% reporting abdominal hysterectomy. The management approach in most of these cases also involved use of intravenous antibiotics such as Cephalosporins and Metronidazole. Cases with induced abortion showed clear clinical signs which included signs of infection such as septicaemia, peritonitis, endometritis, tetanus and high-grade fever. In addition, 12% of the cases had organ failure. The common organ failure identified included cardiac failure, hypovolaemic shock, renal failure, anaemia and coagulation defects (18).

2.5 Conceptual Framework

2.5.1 Figurative Presentation

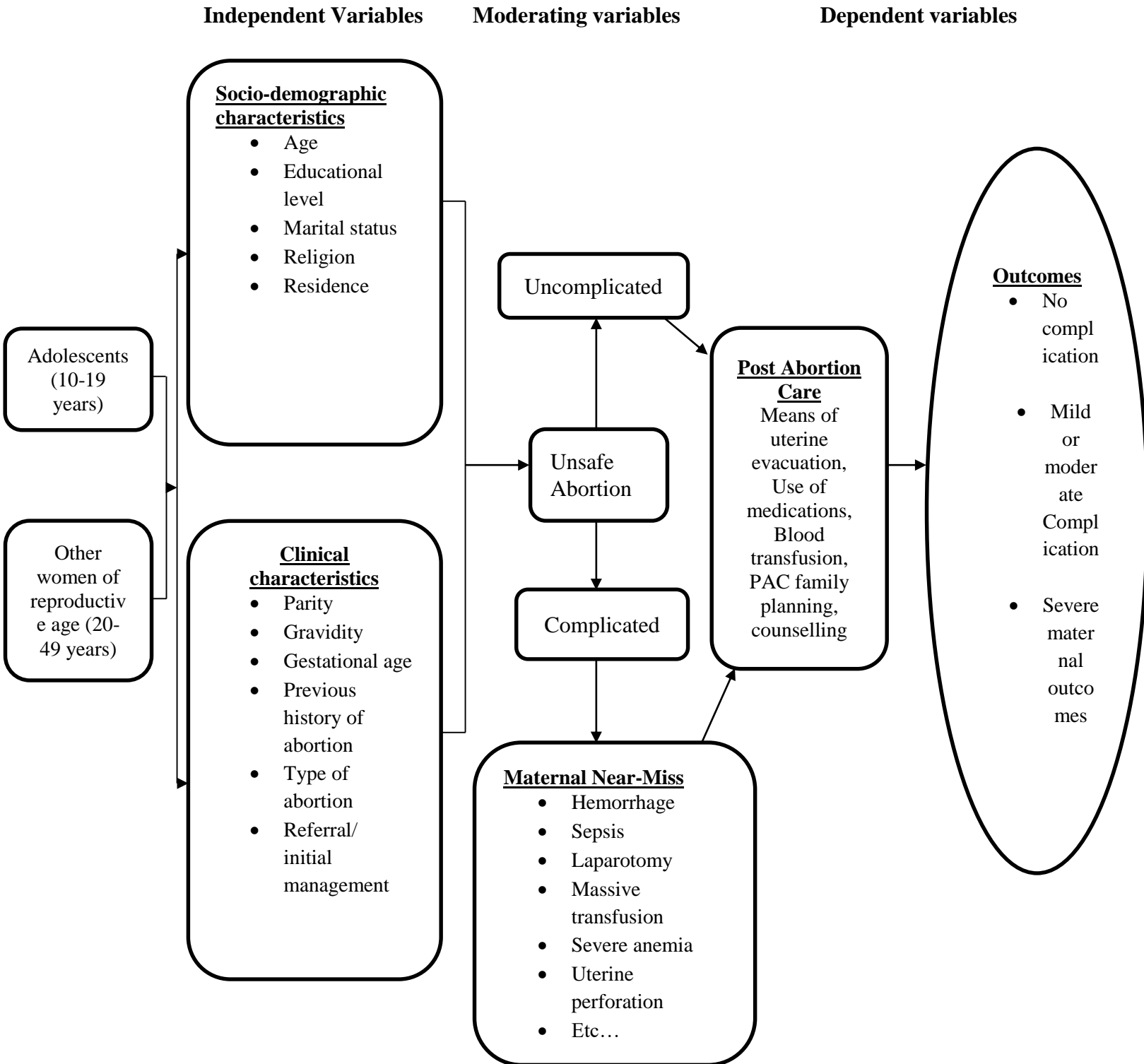


Figure 2: Conceptual Framework

2.5.2 Conceptual Framework Narrative

Generally during the reproductive age, women engage in sexual intercourse with consequent planned or unplanned pregnancy. The pregnancy may be allowed to progress to a normal pregnancy or may result in a spontaneous or induced (unsafe) abortion. In the event of an abortion (spontaneous or induced), there is usually a need to provide care in the form of medical or surgical management. The socio-demographic and clinical characteristics of both adolescents and other women of reproductive age interact with their reproductive health cycle, and influence their risks of becoming pregnant, getting an unsafe abortion, and complications becoming serious or being eliminated.

Unsafe abortion may result in complicated and uncomplicated outcomes. When it results to complicated outcomes, maternal near-miss events may follow. Post abortion care is then instituted to adequately manage the maternal near-miss events resulting from the unsafe abortion. The post abortion care program involves treating women who experience near-miss events consequent to unsafe abortion and provide family planning counselling and services to help prevent another unplanned pregnancy that may result in a repeat abortion. Essentially, post abortion care is instituted to reverse the near-miss events resulting from unsafe abortion and to avert permanent disability or death.

Post abortion care is an integrated service delivery package with elements including treatment, family planning and contraceptive services, counselling, community and service provider partnerships, reproductive and other health services. The management outcomes will reflect the condition of patients at discharge (viz improved with no postabortion complication; improved, but developed mild or moderate complications or severe maternal outcomes after the initiation of the post abortion care or dead). The management outcomes in this study are explained using operational definitions adapted from the Prospective Morbidity Methodology (PMM) proposed by WHO (19) and also from a study conducted by O.O. Owolabi et al in Zambia (7). See Appendix II.

2.6 Study Justification

Maternal mortality ratio in Sierra Leone is significantly high at 1,165 per 100,000 livebirths (SLDHS 2013). Maternal mortality conventionally has been the indicator of maternal health all over the world. Cases of MNM have become more prevalent and present a better basis where it is easier to investigate maternal health. Maternal near-miss shares the same pathway and pathological processes as maternal death but maternal near-miss provides room for audit of the quality of care during the process.

Forty six percent of deaths occurring among girls aged 15-19 years are maternal deaths with unsafe abortion among adolescents accounting for 25 percent of these deaths. The country's high maternal mortality rate could be attributed to poor sexual and reproductive health outcomes (20).

Regardless of the minimal progress that has been witnessed in the country over the years in maternal and adolescent health, the indicators are still not encouraging. The adolescent birth rate is 102 births per 1,000 women aged 15-19 years (SLDHS 2019) which compares poorly with global average of 44 per 1,000 live births. Currently, the early adolescent (10-14 years)-age-specific fertility rate stands at 4 births per 1,000 girls (SLDHS 2019). There has been reported low contraceptive uptake which presents the basis of increased unsafe abortion especially among adolescents. The adolescent contraceptive prevalence rate is 14.4% (SLDHS 2019). Unmet need for family planning among married women is highest among adolescents (15-19) 27.8% and young women (20-24) 27.5% (SLDHS 2019) and for sexually active unmarried adolescents unmet need is 34.2% (SLMICS 2017). According to the SLDHS 2013, as of the time of the study, 28 percent of adolescents aged 15-19 had started childbearing and 6 percent were pregnant with their first child. While the number of young women aged 15 to 19 who marry by the age of 15 has decreased from 10 percent in 2008 to 6 percent in 2013, the rate remains unacceptably high.

In an assessment conducted at thirty (30) healthcare facilities (29 Community Health Centers and 1 hospital) in all four regions of Sierra Leone to determine the status of the provision of adolescent and youth friendly services, 36.7% of the facilities had no space available for service provision, 86.7% had no Information, Education and Communication (IEC) materials regarding sexual and reproductive health, only 33.3% had peer educators to provide sexual and reproductive health education to adolescents and young people and only 17% had all essential contraceptives (20).

Treatment of abortion related complications has cost the country an estimated \$231,000 annually. This cost could be significantly reduced with an improved focus on abortion care services to approximately 53 percent. The increased economic burden in management of these complications can be controlled with development of clear systems and processes (1). Thus, the fundamental goal of this study was to establish the prevalence and characteristics of MNM resulting from abortion in both adolescents and other women of reproductive age at The Princess Christian Maternity Hospital (PCMH). It is hoped that the results from this study will be used to compliment efforts being made to get the Government of Sierra Leone to make abortion safe and legal.

2.7 Research Question

Is there a difference in the prevalence and characteristics of maternal near-miss and management outcomes among adolescents (10-19 years) compared to other women of reproductive age (20-49 years) who sought post abortion care at PCMH from 2018-2019?

2.8 Study Objectives

2.8.1 Broad Objective

To compare the prevalence and characteristics of maternal near miss and management outcomes between adolescents (10-19 years) and other women of reproductive age (20-49 years) who sought post abortion care at PCMH between January 2018 - December 2019.

2.8.2 Specific Objectives

Among adolescents (10-19years) and other women of reproductive age (20-49years) who sought post-abortion care at PCMH between January 2018 to December 2019, to compare:

1. The prevalence of maternal near-miss
2. The characteristics of maternal near-miss
3. The management outcomes

CHAPTER THREE: METHODOLOGY

3.1. Study Design

This was a comparative cross-sectional study and was undertaken retrospectively from January 2018 to December 2019 (a two-year period). For the purpose of comparison, the study included two groups (i.e. adolescents aged 10-19 years and other women of reproductive age 20-49 years) who sought post-abortion care at PCMH within the study period. The prevalence and characteristics of maternal near-miss and management outcomes were determined by assessing patient records/files and using the modified WHO MNM criteria. Data from patient records was used to compare the prevalence and characteristics of MNM and management outcomes of PAC between adolescents and other women of reproductive age.

3.2. Study Site

Princess Christian Maternity Hospital (PCMH) is a tertiary referral hospital for Obstetric and Gynecological cases. It has a capacity of about 144 beds. PCMH is the only public health facility in the country that offers specialized maternal and neonatal care. Western Area District counts with 121 health facilities serving a population of 1.6 million people (University of Sierra Leone Teaching Hospital Complex, PCMH Annual Report of 2018).

The services offered at the PCMH include the Out-patient department (OPD) and Emergency Treatment Room; Triage department; Antenatal care (ANC) services, including ultrasound scanner service and recently opened Diabetes Screening Service; In-patient services with 7 different wards, 6 wards for obstetrics and 1 for gynecology; labor ward with 6 separate small rooms.

The hospital has two (2) main operating theatres and one (1) minor operating/procedure room. In 2018, exploratory laparotomy (2%) and laparotomy for uterine perforation (8%) accounted for the gynecological interventions performed in the main theatres. In the minor theatre, uterine evacuation using dilatation and evacuation/curettage method (58%) and manual vacuum aspiration (8%) were the predominant minor interventions. There is a Blood Bank at the hospital for blood transfusion services. In 2018, 6,328 blood units were processed of which 14.6% were for gynecological cases. In 2017, a new protocol on the use of blood was proposed to and accepted by the Blood Bank staff which included issuing unmatched blood units after checking blood grouping compatibility and having ensured safety through negativity of rapid tests in case of very severe emergencies. This has drastically reduced the mortality from obstetric complications, especially haemorrhages. There is a 4-bed high dependency unit with basic critical care equipments and a 4-

bed step down recovery room within the hospital. Average age of admitted patient is 25 year (QR 21-30). The major causes of admission to HDU are hemorrhage (61.58%) and sepsis (11.12%). Internal referral to HDU is mainly due to hemodynamic instability, respiratory distress, coma and acute kidney injury. There is no renal unit within the hospital. Dialysis and other major renal care services are sought at other facilities within the city (PCMH Annual Report of 2018).

Post abortion care services provided at PCMH are supported by the Ministry of Health and Sanitation and Ipas (a non-governmental organization). PAC services are provided in line with WHO and MoHS guidelines. MoHS ensures that PAC services are rendered at a free cost by regularly providing the required medications including oxytocics, antibiotics, analgesics, anesthetic drugs and intravenous fluids. Ipas provides MVA kits and conducts training for all healthcare providers on post abortion care and on the use of the kits. However, uterine evacuation is mostly done by dilatation and curettage method partly due to frequent stock out of the MVA kits. Exploratory laparotomy for post abortion complications can be done by the very few specialist Gynecologists available at the hospital. Laboratory, blood transfusion services and a high-dependency unit are available for patients with severe complications resulting from unsafe abortion. Family planning and counselling services are also available to patients seeking post abortion care. However, because of frequent stock out of medications and laboratory reagents provided by MoHS, patients are mostly bound to do out-of-pocket payments for these services.

Results from this study will be used to highlight gaps in the provision of post abortion care at PCMH and ensure adherence to guidelines established by MoHS and WHO. Using the study findings, advocacy for allocation of more resources and funds will be undertaken to enhance provision of adequate and standard PAC services at the hospital.



Figure 3: Location of PCMH in the Western Area and its catchment area.

Source: University of Sierra Leone Teaching Hospital Complex, PCMH Annual Report of 2018.

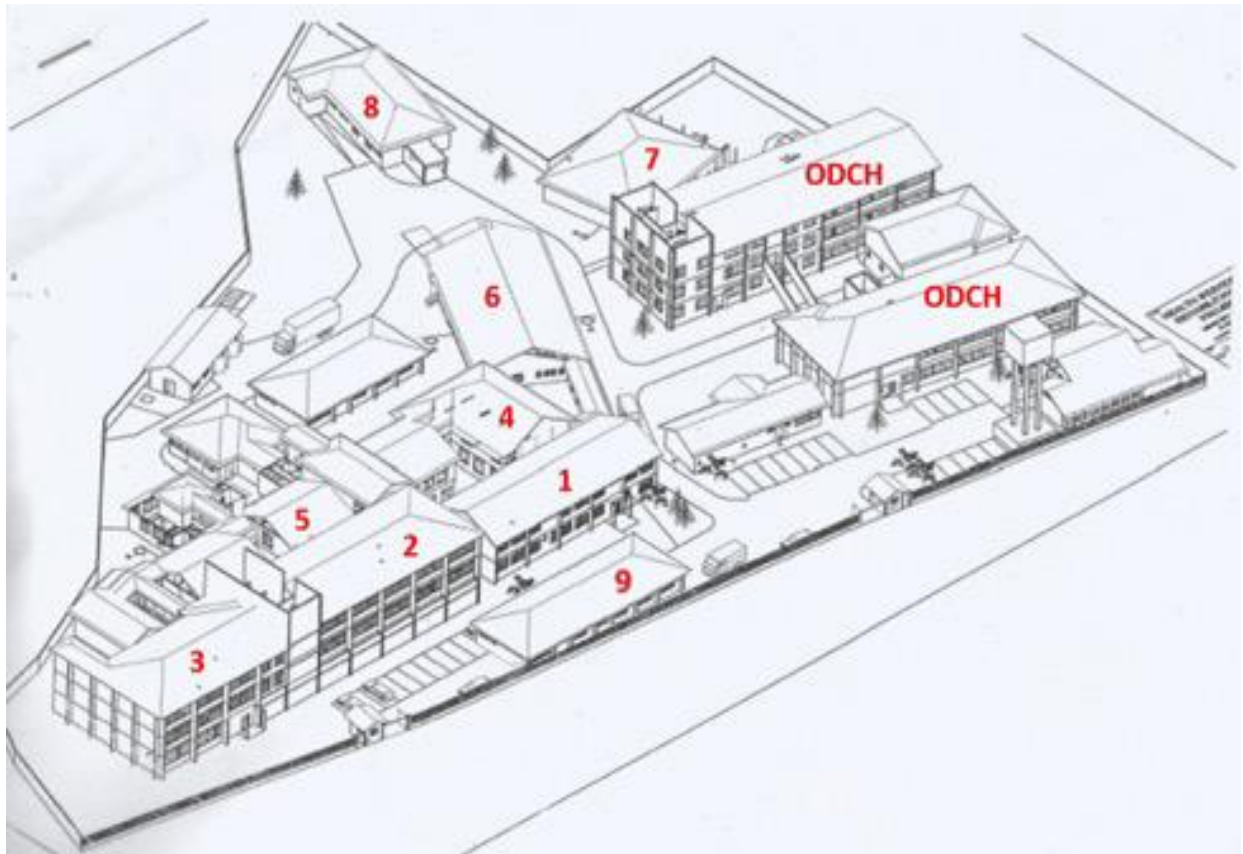


Figure 4: Planimetry of PCMH

Source: University of Sierra Leone Teaching Hospital Complex, PCMH Annual Report of 2018.

Planimetry of PCMH

- 1: OPD / Doctor's office
- 2: DMS 1 / Theatre / Midwifery School
- 3: DMS 2 / Ward 5 / Matron's Office / Blood Bank / Laboratory
- 4: Ward 2 / Ward 3
- 5: Ward 4 / Labour Ward
- 6: Ward 6 / RH (Reproductive Health Office)
- 7: ANC / Anaesthetic Hall
- 8: Morgue
- 9: Triage building
- 10. ODCH: Ola Doring Children's Hospital

3.3.Study Population

Adolescents (10-19 years) were being compared to other women of reproductive age (20-49 years) who sought post-abortion care at the PCMH during the study period (2018 -2019). The two categories were unmatched.

3.3.1. Inclusion criteria

- All adolescents (aged 10-19 years) who presented at PCMH for post abortion care.
- All women of reproductive age (20-49 years) presented at PCMH for post abortion care.

3.3.2. Exclusion criteria

- Patients with ectopic pregnancies
- Patients with gestational trophoblastic disease
- Incomplete files

3.4. Sample Size and Sampling Procedure

3.4.1. Sample Size

Sample size was determined as specified by Kelsey using assumptions from a study done in Nigeria (8) :

$$\text{As } n_1 = \frac{(Z\alpha + Z\beta)^2 pq(r+1)}{r(P_1 - P_2)^2}$$

$$n_2 = rn_1$$

$$P_1 = \frac{P_2 OR}{1 + P_2(OR - 1)}$$

$$p = \frac{P_1 + rP_2}{r + 1}$$

In the formulas;

n_1 is the number of adolescents 10-19 years (exposed),

n_2 is the number of other women of reproductive age 20-49 years (unexposed),

P_1 is proportion of other women of reproductive age (20- 49 years) with maternal near miss

P_2 is proportion of adolescents with abortion-related maternal near miss – 30.8% (11)

$Z\alpha = 1.96$ (for 95% confidence level);

$Z\beta = 0.84$ (required for power of 80% required in the study);

$r = 2:1$ is ratio of other WRA to adolescents seeking post abortion care

The odds ratio of maternal near miss in adolescents was 1.8 (21).

Therefore

$$P_1 = \frac{P_2 OR}{1 + P_2(OR - 1)}$$

$$P_1 = \frac{0.3 * 1.8}{1 + 0.3(1.8 - 1)}$$

$$P_1 = \frac{0.558}{1.248} = 0.45$$

$$p = \frac{P_1 + rP_2}{r + 1}$$

$$p = \frac{0.45 + 2 * 0.31}{2 + 1} = 0.36$$

$$q = 1 - 0.36 = 0.64$$

Using the formula;

$$n_1 = \frac{(1.96+0.84)^2 0.36*0.64(2+1)}{2(0.45-0.31)^2} = 139$$

Thus $n_1 = 139$

The sample for n_1 is 139, however, including a 10% for missing data, the sample size was:

10% of 139 = 13.9

$$n_1 = 139 + 14 = 153$$

$$n_2 = 2(153) = 306$$

Therefore, the study sample size was **459**

where adolescents (10–19 years) = **153**

other women of reproductive age (20–49 years) = **306**

3.4.2. Sampling Procedure

All adolescents and other women of reproductive age who presented to PCMH within 42 days of having induced abortion within the study period had their records screened for severe maternal morbidities and severe maternal outcomes. The identification of severe maternal morbidities was done using clinical, laboratory and management criteria as per the modified WHO maternal near-miss tool. Data on the management outcomes among the study participants was extracted by screening patient records.

3.5. Sampling technique

The study adopted a systematic sampling technique in recruiting all the patients who met the inclusion criteria. Patient files from 1st January 2018 to 31st December 2019 were retrieved and those who met the inclusion criteria systematically selected to achieve the predefined sample size. The files were grouped into two categories which included adolescents (10-19 years) who sought post abortion care at PCMH between 1st January 2018 to 31st December 2019 and other women of reproductive age (20-49 years) who sought post abortion care at PCMH within the same study period. Systematic sampling technique was appropriate since the files were stored in an orderly form and all patients who met the inclusion criteria had an equal chance of being selected based on a defined interval. The sample interval was calculated by dividing the sample frame by the desired sample size. The periodic interval was determined beforehand which aided in controlling any form of bias during actual sampling. This is further illustrated in the flow chart as shown in data collection and management section.

3.6.Data Variables

Table 1: Study Variables

Objective	Exposure Variables	Outcome variables	Sources of data
To compare the prevalence of maternal near-miss between adolescents (10-19 years) and other women of reproductive age (20-49 years) who sought PAC	Total population (adolescents and other women of reproductive age) who sought post abortion care	Total number of adolescents (10-19 years) with MNM Total number of other women of reproductive age (20-49 years) with MNM	Patient clinical file/records, Modified WHO near-miss tool
To compare the characteristics of MNM between adolescents (10-19 years) and other women of reproductive age (20-49 years)	Total number of adolescents and other women of reproductive age identified as maternal near-miss	Characteristics of maternal near-miss: Acute cyanosis, Shock, Sepsis/severe systemic infection, Severe anemia (Hb<7g/dl)/transfusion > 2 units red cells, Gaspng, Loss of consciousness >12 hours, cardiac arrest, Acute thrombocytopenia, Uterine perforation, Pulmonary edema, etc	Patient clinical file.
To compare the management outcomes of PAC between adolescents (10-19 years) and other women of reproductive age (20-49 years)	Total number of adolescents compared to other women of reproductive age who received PAC	No complication, Mild or moderate complications, severe maternal outcomes	Patient clinical file

3.7. Research assistants

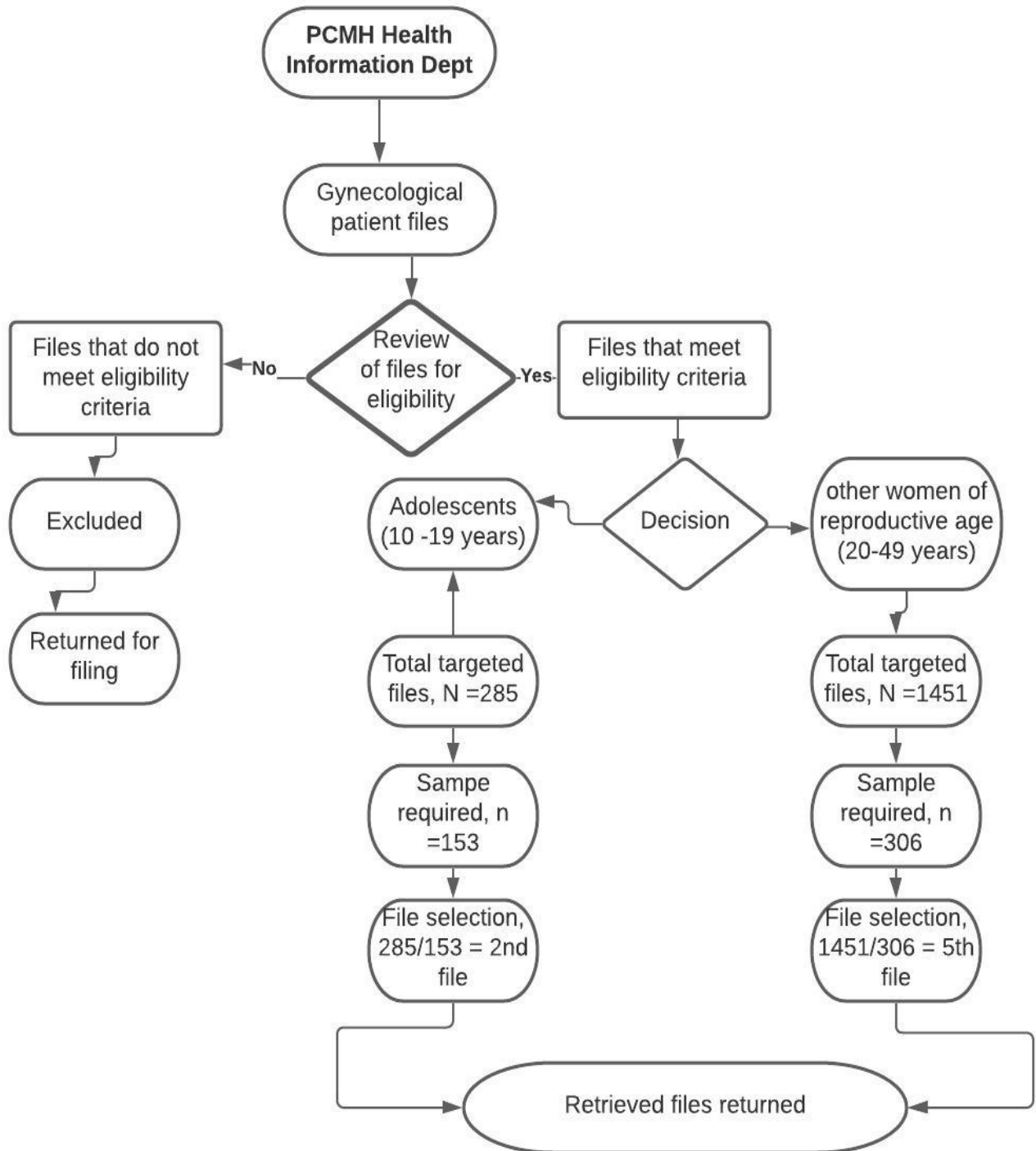
The researcher recruited four (4) research assistants to help in the data collection process. The research assistants were qualified Community Health Officers (Clinical Officers) with a Diploma in Medicine and Surgery. The research assistants were also required to have experience in data retrieval from patient files. This aided in maintaining high level of accuracy and reliability of the data collected. The research assistants were trained on data collection based on the study objectives and developed data abstraction tool. The training duration was two (2) days. The first day included familiarization with data abstraction tool and the objectives of the study while the second day included the data collection process and training on how to retrieve only accurate information from the patient files based on the inclusion criteria.

3.8. Data Collection and Management

Research assistants were trained on the use of structured and pre-tested questionnaire containing questions on socio-demographic and reproductive characteristics, details about abortion and abortion-related issues including complications and severe morbidities, obstetric and gynecological characteristics and post abortion care received at the time of presentation to the facility, during admission and at the time of discharge from the facility. Patient clinical records were used to collect data. The patient clinical records were sourced from the hospital records department, gynecological wards and the procedure room registration books.

Questionnaires were filled using patient records and identification of severe maternal morbidity using the modified WHO maternal near-miss criteria, after receiving post abortion care and at the time of discharge. Data from questionnaires were coded, entered into an SPSS software. Data cleaning was done and the Chi square was used to determine the difference among variables in each objective. The data was summarized using tables and figures. All personal identifiers were removed from the questionnaires.

Data collection flow chart



Source (Author, 2021).

3.9.Data Analysis

Data analysis was done using SPSS version 26 software. All comparisons were performed at 0.05 significance level. The analysis included both descriptive and inferential analysis.

Demographic characteristics

Descriptive analysis was grouped into categorical and continuous variables.

Categorical variables were analysed using frequencies (n) and percentages (%). Continuous variables were analysed using mean (SD) and Median (IQR). The dummy table is shown in Appendix III Table 5.

Objective 1: To compare the prevalence of maternal near-miss between adolescents (10-19 years) and other women of reproductive age (20-49 years) who sought PAC at PCMH between January 2018 – December 2019

The prevalence was determined and compared as follows:

%prevalence (10 - 19 years) =

$$\frac{\text{Number of adolescents (10–19 yrs) with MNM between 2018 – 2019}}{\text{Total population who sought post abortion care between 2018 – 2019}} * 100$$

%prevalence (20 – 49 years) =

$$\frac{\text{Number of other WRA (20–49 yrs) with MNM between 2018–2019}}{\text{Total population who sought post abortion care between 2018–2019}} * 100$$

Objective 2: To compare the characteristics of MNM between adolescents and other women of reproductive age.

A Pearson chi-square test or Fischer’s exact test was used to compare categorical variables and outcome variable. Independent samples t-test was used to compare continuous variables and the study outcome variable. Dummy table is shown in Appendix III, Table 6.

Objective 3: To compare the management outcomes of post abortion care between adolescents and other women of reproductive age

A Pearson chi-square test or Fischer's exact test was used to compare categorical variables and outcome variable. The dummy table is as shown in Appendix III, Table 7.

3.10. Ethical Considerations

The study sought approval from the UoN/KNH Ethics Review Committee as well as the Sierra Leone Ethics and Scientific Review Committee which ensured that the study conformed to underlying scientific ethical provisions. Permission was also sought from PCMH hospital to allow access to their health records. Principles of confidentiality and privacy of information were maintained throughout the research process. Patients data was kept confidential at all data abstraction, processing and analysis stages. Data was anonymized and key patient identifiers like names and IP numbers were not extracted.

Anonymity and Confidentiality: The researcher also maintained anonymity and confidentiality by using non identifiers such as codes that cannot link a participant with the information provided during the study. The information obtained was solely for the purpose of this study and improving the implementation of service integration policy and not to divulge personal information to the public. Recorded data will be under custody of the principal researcher until validation within one year and stored for up to five years after which the data will be discarded.

3.11. Study Limitations and strength

Limitations

- The study is limited to a single government facility therefore the study findings may not be representative of all abortion-related near-miss cases in the country.

Mitigation plan for representativeness of study findings:

- Sample size included referral cases from other facilities considering that PCMH is the largest maternity referral hospital in the country.
- Study setting is resource-constrained hence most of the required laboratory investigations were not done therefore not reflecting the true picture of MNM trend at the facility.

Strengths

- First hospital-based study to focus on determining the burden of abortion-related maternal near-miss morbidity and to use it as a measure of unsafe abortion in the country.
- One of very few studies comparing the prevalence of abortion-related maternal near-miss between adolescents (10-19 years) and other women of reproductive age (20-49 years).

3.12 Study result dissemination plan

The study findings will be presented to the Department of Obstetrics and Gynecology, University of Nairobi, PCMH hospital administration and the Sexual and Reproductive Health Division at the Ministry of Health and Sanitation, Government of Sierra Leone. A copy of the book will be available in the University of Nairobi Library. The study will also be published in an international accredited journal.

CHAPTER FOUR: ANALYSIS OF RESULTS

4.1.Introduction

The study sought to compare the prevalence and characteristics of maternal near miss and management outcomes between adolescents (10-19 years) and other women of reproductive age (20-49 years) who sought post abortion care at PCMH between January 2018 - December 2019. The specific objectives included comparing the prevalence of maternal near miss, characteristics of maternal near miss and the management outcomes. A total of 498 patients files were screened where a total of 39 patient files were excluded (15 adolescent files and 24 other WRA. Thus, the total sample size included in the study was 459 (including 153 adolescents and 306 other women of reproductive age (Other WRA) as shown in Figure 5.

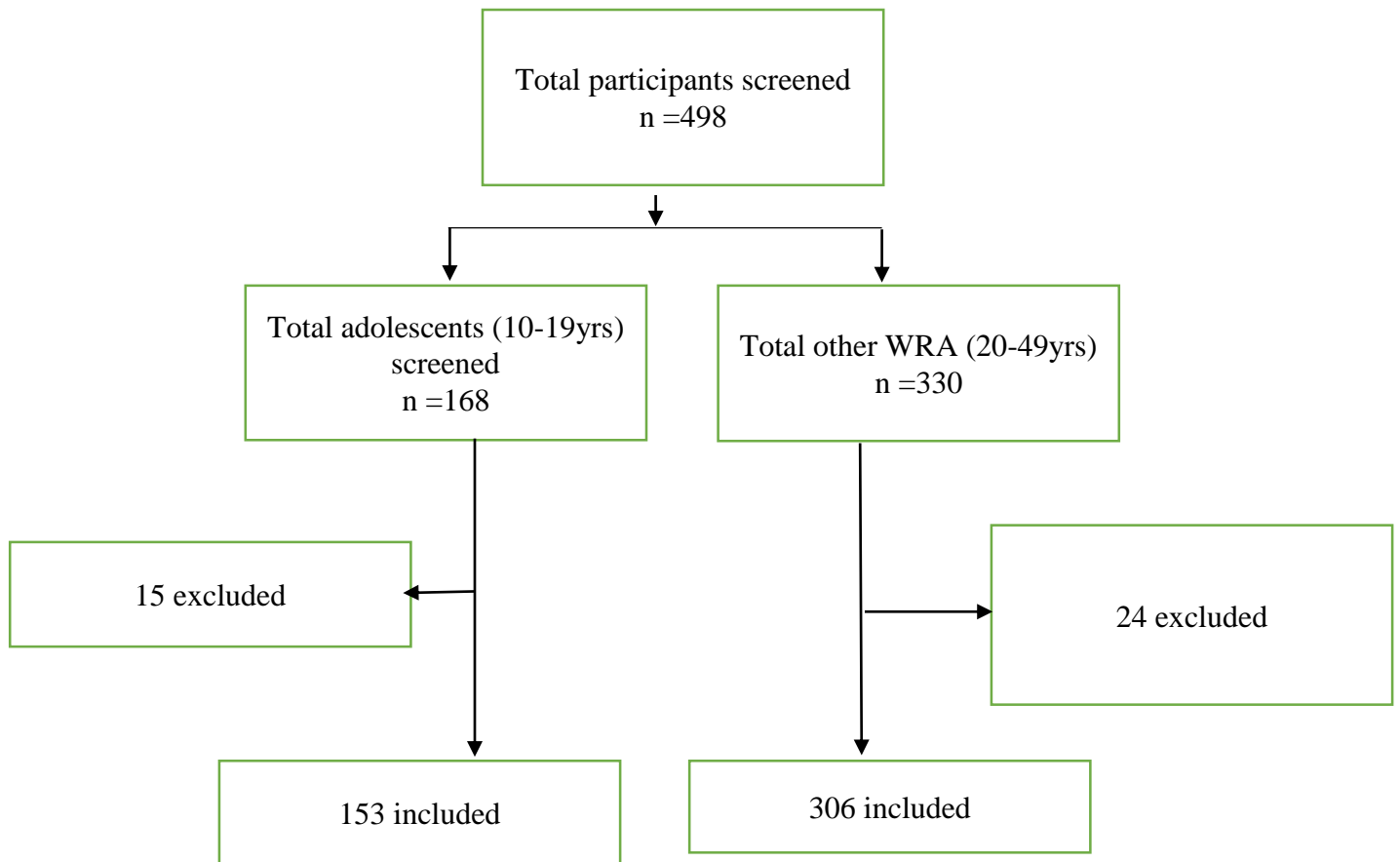


Figure 5: Study Flowchart

4.2. Demographic characteristics of patients seeking Post abortion care at PCMH

The findings from the study showed that, more than half of the patients were married 59.3% (272). However, 71.2% (109) among the adolescents were single compared to 23.5% (72) in other WRA. The findings further showed that 75.2% (230) of other WRA were married compared to 27.5% (42) in adolescents. When investigating the level of education, 87.6% (134) of the adolescents had secondary level education compared to 38.2% (117) of other WRA. The findings also showed that majority of the respondents were Muslim (58.8% vs 66.0%) in adolescents and other WRA respectively. The findings from the study revealed that, 88.9% (136) of adolescents were dependent compared to 23.5% (72) among other WRA as shown in Table 2.

Table 2: Comparison of patient characteristics of women seeking PAC at PCMH hospital

Demographic characteristics	Total n (%)	Adolescent n (%)	Other WRA n (%)
Marital status			
Single	181(39.4)	109(71.2)	72(23.5)
Married	272(59.3)	42(27.5)	230(75.2)
Separated	6(1.3)	2(1.3)	4(1.3)
Level of education			
None	121(26.4)	7(4.6)	114(37.3)
Primary	13(2.8)	11(7.2)	2(0.7)
Secondary level	251(54.7)	134(87.6)	117(38.2)
Tertiary	74(16.1)	1(0.6)	73(23.8)
Religion			
Muslim	292(63.6)	90 (58.8)	202(66.0)
Christianity	167(36.4)	63(41.2)	104(44.0)
Dependency			
Dependent	208(45.3)	136(88.9)	72(23.5)
Self-dependent	251(54.7)	17(11.1)	234(76.5)
Gravidity			
≤2	404(88)	152(99.3)	252(82.4)
>2	55(12)	1(0.7)	54(17.6)
Parity			
≤1	325(70.8)	146(95.4)	179(58.5)
>1	134(29.2)	7(4.6)	127(41.5)
History of previous abortions			
Yes	33(7.2)	10(6.5)	23(7.5)
No	426(92.8)	143(93.5)	283(92.5)
Gestational age			
≤12	301(65.6)	97(63.4)	204(66.7)
>12	158(34.4)	56(36.6)	102(33.3)

Type of abortion			
Inevitable	77(16.8)	25(16.3)	52(17)
Incomplete	356(77.6)	116(75.8)	240(78.4)
Complete	7(1.5)	3(2)	4(1.3)
Septic	19(4.1)	9(5.9)	10(3.3)
Sought treatment elsewhere prior			
Yes	146(31.8)	63(41.2)	223(72.9)
No	313(68.2)	90(58.8)	83(27.1)

4.3. Comparison between HB levels between adolescents and other women of reproductive age

The findings revealed that from a total of 459, 195 patients had their HB laboratory test results documented in the files. Among adolescents, 38% (19) compared to 42% (61) of other women of reproductive age had severe anaemia. The findings however were not statistically significant as shown in Table 4.

Table 3: Comparison between HB levels between adolescents and other women of reproductive age

HB levels	Total		Other WRA	OR	P-value
	n (%)	Adolescent			
Severe Anaemia	80(41)	19(38.0)	61(42.1)	0.89 (0.37 - 2.13)	0.796
Mild Anaemia	57(29.2)	17(34)	40(27.6)	0.65(0.27 - 1.61)	0.355
Moderate Anaemia	12(6.2)	4(8)	8(5.5)	0.56(0.14 - 2.23)	0.407
Normal	46(23.6)	10(20)	36(24.8)	Ref	

4.4. Comparison of treatment and complications of women seeking PAC at PCMH hospital

The findings revealed that, there was significant association between blood transfusion and patients seeking PAC, other WRA had a higher percentage of transfusion, 36.3% (111) compared to adolescents 28.1% (43). The association was significant. The probability of adolescent women receiving blood transfusion was 77% lower compared to other WRA, (OR =0.23, 95%CI:0.18 – 0.94, p =0.049) as shown in Table 5.

Table 4: Comparison of treatment and complications of women seeking PAC at PCMH hospital

	Total	Adolescent	Other WRA	OR(95%CI)	P-value
Definitive treatment					
MVA	41(8.9)	21(13.7)	20(6.5)	0.48(0.07 - 2.80)	0.420
D and C	242(52.7)	87(56.9)	155(50.7)	0.89(0.16 - 4.96)	0.895
D and E	6(1.3)	1(0.7)	5(1.6)	2.50(0.162 - 5.78)	0.512
Misoprostol	32(7.0)	13(8.5)	19(6.2)	0.73(0.12 - 4.59)	0.738
Misoprostol and Oxytocin	74(16.1)	11(7.2)	63(20.6)	2.86(0.47 - 8.56)	0.256
Oxytocin	42(9.2)	10(6.5)	32(10.5)	1.6(0.25 - 5.41)	0.617
Spontaneous expulsion	16(3.5)	8(5.2)	8(2.6)	0.50(0.07 - 3.55)	0.488
Laparotomy	6(1.3)	2(1.3)	4(1.3)	Ref	
Blood transfusion					
Yes	154(33.6)	43(28.1)	111(36.3)	0.23(0.18 - 0.94)	0.049
No	305(66.4)	110(71.9)	195(63.7)	Ref	
Antibiotic use					
Yes	445(96.9)	146(95.4)	299(97.7)	0.49(0.17 - 1.42)	0.146
No	14(3.1)	7(4.6)	7(2.3)	Ref	
Intravenous fluids					
Yes	387(84.3)	127(83)	260(85)	0.86(0.52 - 1.46)	0.338
No	72(15.7)	26(17)	46(15)	Ref	
Laparotomy done					
Yes	6(1.3)	4(2.6)	2(0.6)	0.22(0.15 - 1.65)	0.419
No	453(98.7)	150(97.4)	304(99.4)	Ref	
Hysterectomy done					
Yes	2(0.4)	1(0.7)	1(0.3)	2.01(1.23 - 4.51)	0.559
No	457(99.6)	152(99.3)	305(99.7)	Ref	
Post-abortion counselling done					
Yes	13(2.9)	6(4)	7(2.3)	1.74(0.57 - 5.27)	0.24
No	439(97.1)	145(96)	294(97.7)	Ref	
Referral to a FP clinic					
Yes	12(2.6)	6(3.9)	6(2.0)	2.04 (0.07 - 5.32)	0.175
No	444(97.4)	146(96.1)	298(98.0)	Ref	
Complication encountered during PAC					
None	406(88.8)	141(92.8)	265(86.9)	Ref	
Haemorrhage	46(10.1)	9(5.9)	37(12.1)	1.88(0.117 - 2.76)	0.656
Transfusion reaction	3(0.7)	1(0.7)	2(0.7)	4.11(0.23 - 7.33)	0.334
Cervical laceration	2(0.4)	1(0.7)	1(0.3)	2.00(0.051 - 8.67)	0.711

4.5. Comparison of prevalence of maternal near miss of women seeking PAC at PCMH hospital

The prevalence of maternal near miss among women seeking PAC was investigated in this study, the findings revealed that the total prevalence of maternal near miss was 24.4% (112). The prevalence of Maternal near miss however, was slightly higher in other WRA 25.2% (77) compared to 22.9% (35) among adolescents though the difference was not statistically significant as shown in Table 6.

Table 5: Comparison of prevalence of maternal near miss of women seeking PAC at PCMH hospital

MNM	Total	Adolescent	Other WRA	OR (95%CI)	P-value
	n (%)	n (%)	n (%)		
Yes	112(24.4)	35(22.9)	77(25.2)	0.88(0.55 -1.40)	0.338
No	347(75.6)	118(77.1)	229(74.8)		Ref

4.6. Comparison of Characteristics of Maternal Near Miss among women seeking PAC at PCMH hospital

The results from the study established that transfusion was the common characteristic of maternal near miss in patients seeking PAC at PCMH, 68.6% (24), vs 70.1% (54) in adolescents and other WRA. Sepsis was slightly higher in other WRA 22.4% (17) compared to 14.3% (5). Laparotomy was slightly higher in adolescents 14.3% (5) compared to 5.3% (4) in other WRA. However, the differences were not significantly different as shown in Table 7.

Table 6: Comparison of Characteristics of Maternal Near Miss among women seeking PAC at PCMH hospital

MNM characteristics	Total n (%)	Adolescent n (%)	Other WRA n (%)	OR (95%CI)	P-value
Sepsis	22(19.6)	5(13.9)	17(22.4)	0.57(0.21 – 1.59)	0.357
Transfusion	77(68.8)	24(66.7)	54(70.1)	0.83(0.49 - 1.41)	0.341
Laparotomy	9(8.0)	5(13.8)	4(5.3)	2.55(0.68 – 9.41)	0.211
Hysterectomy	2(1.8)	1(2.8)	1(1.3)	0.51(0.32 - 1.76)	0.143
Shock	1(0.4)	0	1	-	
Severe Malaria	1(0.4)	1(2.8)	0		

4.7. Comparison of management outcomes among women seeking PAC at PCMH hospital

The results from the study showed that many of the patients in adolescent group did not have any evidence of complications, 35.4% (93) compared to 64.6% (170) in other WRA. Maternal near miss was the highly occurring outcome and was slightly higher among other WRA 68.8% (77) compared to 31.3% (35) in adolescents however these differences were not statistically significant as shown in Table 8.

Table 7: Comparison of management outcomes among women seeking PAC at PCMH hospital

Management outcomes	Total n (%)	Adolescent n (%)	Other WRA n(%)	OR (95%CI)	P-value
Severe maternal outcome	112(24.4)	35(31.3)	77(68.8)	0.88(0.56 – 1.39)	0.338
No complication	263(57.3)	93(35.4)	170(64.6)	1.24(0.84 – 1.84)	0.317
Mild complication	15(3.3)	2(13.3)	13(86.7)	0.3(0.08 - 1.34)	0.161
Moderate complication	69(15)	23(33.3)	46(66.7)	1.0(0.58 – 1.72)	0.559

CHAPTER FIVE: DISCUSSION

The present study compared the prevalence and characteristics of maternal near miss and the management outcomes between adolescents and other women of reproductive age. The findings from this present study showed that, majority of the adolescents were single while similarly most of the other women of reproductive age were married. In our present study, adolescents ranged from 10 to 19 years while other women of reproductive age were from 20 to 49 years. The findings showed that 27.5% of the adolescents were married. In Sierra Leone teen and child marriages are common with the country's 2019 Demographic and Health Survey reporting that 13% of girls are married on their 15th birthday while 39% of the girls are married before their 18th birthday. Thus, these findings explain the higher percentage of adolescent who are married (22). However, findings from the current study have shown that 75.2% of women of other reproductive age group seeking post abortion care were married. However, from literature, there is a growing trend of married women seeking post abortion care as evidenced by a study conducted in China by Wang et al.(23) who found that married women were 2.7 times more likely to seek post abortion care although in this study majority of those seeking post abortion care were not married accounting for 55% of the study sample. Similarly, a report published by the African Population and Health Research Center in Kenya also revealed that majority of women seeking abortion services accounting for 64.4% of those seeking abortion services were married (24).

The findings from the current study also revealed that most of the participants in the study had secondary level of education with majority of them being adolescents. However, this means that majority of the adolescents that were included in the study were in their late adolescence age barcket. Nevertheless, less than half of other women of reproductive age had secondary level education. The education dynamics in Sierra Leone are changing where education has become a primary component for everyone which explains the significant increase in those attaining secondary level education. these findings are comparable to study conducted in Kenya by Mutua et al. (25) which revealed that more than half of patients seeking post abortion care had secondary level education. The findings from the present study also showed that majority of the patients in both adolescents and other women of reproductive age were Muslim. Sierra Leone is a predominantly a country with many Muslims which explains the health seeking behaviour (22).

The findings from our current study found that majority of the adolescents were dependent compared to other women of reproductive age. This can be explained by the fact that 71.2% of adolescents were single meaning that they look up to their parents or guardians which could have influenced their decision to procure an unsafe abortion. These findings are comparable to a study conducted among young Mozambican women by Frederico et al (26) investigating factors that influence abortion decision process, it was revealed that women's economic dependence makes them more vulnerable, dependent and subordinated. For economic reasons, women, have no other choice but to obey and follow the family or partner's decisions. Having unwanted pregnancy while being dependent on others can be stressful resulting into irrational decision making to procure abortion.

Our current study has shown that, almost all of the adolescents had a gravidity of less than 2 compared to other women of reproductive age. The findings further showed that there was association between adolescents and other women of reproductive age based on parity. The findings have shown that even though there is association between the groups, majority of patients in both groups had gravidity of ≤ 2 and a parity of ≤ 1 . The high abortion rate among patients with gravidity of less than 2 means that there are other reasons which could have led to the decision to abort in the first place such as child spacing, poverty, inability to take care of the new-born or decision made by partner or caregiver. These findings are comparable to a study conducted in Finland by Heikinheimo et al. (27) who found that, being young in age and parous were significantly associated with abortion. The findings from our study also revealed that older women of reproductive age had increased chance of seeking treatment elsewhere before going to a health facility. In Sierra Leone abortion is illegal and thus majority of women fear being prosecuted which influences the first choice that women make when they seek post abortion care. Another reason could be as a result of their marital status and do not want their partners to know that they have procured abortion and developed complications. In a study conducted in Kenya by Mutua et al. (25) it was revealed that delay in seeking post abortion care was associated with woman's age, education level, fertility intentions, history of contraceptive use and referral status of the patient. Our findings also revealed that other women of reproductive age were more likely to be transfused when compared to adolescents. This association was found to be significant. These findings are in line with a study conducted in Botswana by Tsima (28) who found that transfusion of blood products was associated with time to transfusion. However, in our current study, we did not assess

time to transfusion although the fact that we have found that most of other women of reproductive age sought care from other facilities, they arrived in hospital late which influenced the transfusion of blood products. Blood transfusion is essential especially when an abortion process has been complicated by hemorrhage resulting into reduced blood count or anemia. Blood transfusions may be life-saving in cases of extreme blood loss and shock from abortion. The findings from the study have also shown that the common complication was hemorrhage and was more common in other women of reproductive age which explains the need for transfusion in this group.

Current study established that the total prevalence of maternal near miss was 24.4%. The prevalence of Maternal near miss however, was slightly higher in other WRA 25.2% compared to 22.9% among adolescents. These findings however are lower compared to a study conducted by Aduloju et al. (9) who found that the total prevalence of MNM was 37%. The difference in this case could be as a result of the sample size included in their study. In their study, they incorporated a sample size of 89 compared to 459 in our current study. However, these findings contrast those conducted in Nigeria which revealed a total prevalence of 9.5% (8) and Zambia which found 7% (7). The low maternal near miss could be attributed to the health seeking behavior in these settings as well as the strictness in implementation of laws prohibiting abortion. In terms of comparing the prevalence of MNM between the two age groups (adolescents and other WRA), the Nigerian study showed similar findings where the prevalence of MNM among the other WRA was higher 69.2% and adolescents MNM prevalence 30.8% (8). Only one study was found to provide specific proportion of MNM between adolescents and other women of reproductive age. In our present study, the identification of MNM event was mainly based on the use of clinical and management-based criteria in the modified WHO maternal near miss tool. Most other laboratory investigations were not conducted apart from the HB levels which was conducted in 42% (n =195) of the study sample hence could not form the basis of MNM event identification.

The findings from our current study showed that, the common MNM characteristics that were observed in the patients were sepsis, transfusion and laparotomy. These characteristics were comparable hence there was no association. However, sepsis was more common in other women of reproductive age compared to adolescents. Transfusion occurrence was comparable between the groups although slightly higher in the other women of reproductive group (20-49 years) compared to adolescents (10-19 years). Laparotomy was higher in adolescents compared to other

women of reproductive age. There was one incidence of hysterectomy and shock which occurred in the other women of reproductive age (20-49 years). One adolescent reported severe malaria. A study conducted in Zambia revealed slightly lower occurrence of MNM events, the findings revealed that 44% had anemia, 24% had massive blood transfusion, 27 percent had hypovolemic shock and 10 percent had septic shock (7). In another study conducted in Nigeria, it was also revealed that hemorrhage accounted for 33% of maternal near miss events (8). A study conducted in Cameroon obtained contrasting results considering the characteristics of MNM, it was found that severe anemia (31.4%), shock (5.7%), uterine perforation (4.3%), sepsis (5.7%) and generalized peritonitis (7.1%) were the commonly identified characteristics (12).

More than half of patients in each group did not develop any complication. Fifteen percent (15%) had moderate complications and 3.3% had mild complications. These findings contrast with those from a study conducted in Democratic Republic of Congo by Bankole et al.(29) which found higher incidence of moderate complications (46%), mild complications (33%) with only 5% having no evidence of complication.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

The findings from the study revealed that, 88.9% of adolescents were dependent compared to 23.5% among other WRA.

The probability of adolescents seeking treatment elsewhere before presenting to hospital was 52% lower compared to other WRA (41.2% vs 72.9%)

The total prevalence of maternal near miss was 24.4%. The prevalence of maternal near miss however, was slightly higher in other WRA 25.2% compared to 22.9% among adolescents however, there was no association.

The common characteristics of MNM included Transfusion (69.6%), Sepsis (19.6%) and Laparotomy (8.1%). Other observed characteristics were hysterectomy, shock and severe malaria.

Many of the patients in adolescent group did not have any evidence of complications, 60.8% compared to 55.6% (170) in other WRA. Maternal near miss was slightly higher among other WRA 25.2% (77) compared to 22.9% (35) in adolescents.

6.2. Recommendations

- The current legal restriction on safe abortion should be reviewed with a view to making abortion safer thereby reducing the prevalence of abortion-related maternal near miss.
- Public and private health facilities should have the capacity to provide standard post abortion care services including treatment, family planning and contraceptive services, counselling and specialized gynaecological and obstetric care.
- Enhance health education, community and service provider partnerships to ensure early detection and management of abortion complications to have improved outcomes.

Area for further research

- To assess the quality of post abortion care at public and private health facilities.

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APPENDICES

Appendix I: WHO MNM criteria and SSA MNM criteria.

WHO near-miss criteria	Sub-Saharan Africa near-miss criteria
<p>Clinical criteria</p> <p>Acute cyanosis</p> <p>Gasping</p> <p>Respiratory rate >40 or <6/min</p> <p>Shock</p> <p>Oliguria non-responsive to fluids or diuretics</p> <p>Failure to form clots</p> <p>Loss of consciousness lasting >12 h</p> <p>Cardiac arrest</p> <p>Stroke</p> <p>Uncontrollable fit / total paralysis</p> <p>Jaundice in the presence of pre-eclampsia</p> <p>Laboratory-based criteria</p> <p>Oxygen saturation <90% for ≥60 minutes</p> <p>PaO₂/FiO₂ <200 mmHg</p> <p>Creatinine ≥300µmol/l or ≥3.5mg/dL</p> <p>Bilirubin >100mmol/l or >6.0 mg/dL</p> <p>pH < 7.1</p> <p>Lactate >5 mEq/mL</p> <p>Acute thrombocytopenia (<50,000 platelets/ml)</p> <p>Loss of consciousness and ketoacids in urine</p> <p>Management-based criteria</p> <p>Use of continuous vasoactive drugs</p> <p>Hysterectomy following infection or haemorrhage</p> <p>Transfusion of ≥5 units of red cells</p>	<p>Clinical criteria</p> <p>Acute cyanosis</p> <p>Gasping</p> <p>Respiratory rate >40 or <6/min</p> <p>Shock</p> <p>Oliguria non-responsive to fluids or diuretics</p> <p>Failure to form clots</p> <p>Loss of consciousness lasting more than 12 hours</p> <p>Cardiac arrest</p> <p>Stroke</p> <p>Uncontrollable fit / total paralysis</p> <p>Jaundice in the presence of pre-eclampsia</p> <p>Laboratory-based criteria</p> <p>Oxygen saturation <90% for ≥60 minutes</p> <p>Creatinine ≥300µmol/l or ≥3.5mg/dL</p> <p>Acute thrombocytopenia (<50,000 platelets/ml)</p> <p>Loss of consciousness and ketoacids in urine</p> <p>Management-based criteria</p> <p>Hysterectomy following infection or haemorrhage</p> <p>Transfusion of ≥ 2 units of red cells</p>

<p>Intubation and ventilation for ≥ 60 minutes not related to anaesthesia</p> <p>Dialysis for acute renal failure</p> <p>Cardio-pulmonary resuscitation</p> <p>Severe maternal complications</p>	<p>Intubation and ventilation for ≥ 60 minutes not related to anaesthesia</p> <p>Cardio-pulmonary resuscitation</p> <p>Laparotomy other than caesarean section or ectopic pregnancy</p> <p>Severe maternal complications</p> <p>Eclampsia</p> <p>Sepsis or severe systemic infection</p> <p>Uterine rupture</p> <p>Pulmonary oedema</p> <p>Severe abortion complications</p> <p>Severe malaria</p> <p>Severe pre-eclampsia with ICU admission</p>
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Appendix II: Management outcomes

No complication:

- Normal body temperature ($35.5^{\circ}\text{C} - 37.5^{\circ}\text{C}$)
- No clinical signs of infection
- No systemic or organ failure
- No suspicious finding on evacuation

Mild complication:

- No clinical signs of infection
- Haemorrhage not requiring blood transfusion
- Hemoglobin : 10.0 – 10.9 g/dL

Moderate complication:

- Temperature $>37.5^{\circ}\text{C}$ but $<38.0^{\circ}\text{C}$
- Other clinical signs of infection (chills, rigors, offensive vaginal discharge)
- Offensive products of conception
- Localized peritonitis
- Hemoglobin: 7.0 g/dL – 9.9 g/L

Severe maternal outcomes:

- Maternal near-miss (as per the modified WHO maternal near-miss criteria)
- Maternal death

Appendix III: Questionnaire

Prevalence And Characteristics Of Maternal Near-Miss And Management Outcomes Among Women Who Sought Post Abortion Care At The Princess Christian Maternity Hospital, Freetown Sierra Leone 2018-2019,A Comparative Cross-Sectional Study

A. IDENTIFICATION:

Patient’s study Identification Number _____

B. SOCIO DEMOGRAPHIC DATA.

- 1. Age in years:_____
- 2. Marital status: single, married, separated, others (specify).....
- 3. Level of education:

None
Primary
Secondary
College/ University

4. Religion:

Catholic
Protestant
Islam
Others (specify)

5. Dependency:

Dependant
Self dependant

6. Parity:_____ + _____

7. Number of living children:

C. ABORTION HISTORY

8. History of previous abortions :

Yes
No

9. Gestation by dates (LMP)/USS (state in weeks) _____

10. Type of abortion :

Inevitable abortion

Incomplete abortion

complete abortion

Septic abortion

11. Reason for induced abortion:

Contraceptive failure

Rape

Fear of reprisal

Financial constraint of continuing the pregnancy

Coercion by spouse to terminate the pregnancy

Other reasons _____

12. Sought treatment elsewhere before coming to this current facility :

Yes

No

13. Where did the patient seek treatment?

1. Government facility 2. Private health facility 3. Traditional healer 4. Relatives 5. Friends

6. Other (specify) _____

D. CLINICAL PRESENTATION

14. Was the patient admitted?

1. Yes 2. No

15. If admitted, what was the reason?

1. Anemia 2. Sepsis 3. Uterine perforation/rupture 4. Bleeding

5. Other (specify) _____

16. What was the definitive treatment given?

1. MVA 2. D&C 3. D&E 4. Other (specify) _____

17. Amount of POCS (state in ml) ___

18. What was the complication encountered?

1. None 2. Hemorrhage 3. Sepsis 4. Uterine perforation/rupture 5. Intestinal injuries 6. Death 7.

Other (state) _____

19. Was blood transfusion given?

1. Yes 2. No

If yes, how many units?.....

20. Was antibiotic treatment given?

1. Yes 2. No If yes, specify the antibiotic.....

21. Were Intravenous Fluids given?

1. Yes 2. No If yes, how many liters?

22. Was renal dialysis done? 1. Yes 2. No. If yes how many sessions?.....

23. Was laparotomy done? 1. Yes 2. No

24. What were the laparotomy findings? (State)

25. Was hysterectomy done? 1. Yes 2. No If yes...state the reason why.....

26. What was the duration of hospital stay in days?

27. Was post-abortion counseling and contraception given?

1 Yes 2. No

28. Was a referral to a FP clinic done? 1. Yes 2. No

Laboratory results: (to extract important laboratory findings from the patient's results).

.....
.....

Appendix IV: Study Timelines

The study will be conducted between the period of November, 2020 – December 2021. (Ghannt chart).

Activity	Nov 2020 – Mar 2021	April 2021	May - Aug 2021	Aug - Sept 2021	Sept - Oct 2021	Oct 2021	Nov - Dec 2021
Proposal Development	■						
Proposal Presentation		■					
Ethics Committee Review			■				
Data Collection				■			
Data Analysis					■		
Results Presentation						■	■
Completion of thesis							■
Submission of thesis							■

Appendix V: Budget

Component	Activity	Item	Cost in USD
Research proposal	Document	Printing	20
		Binding	20
		Internet	100
Data collection	Questionnaires	Printing	100
	Research Assistants (RA)	Payment of four (4) RAs	800
		Communication	Mobile top up
	Internet		50
	Analysis of data	Statistician	200
Contingency			100
Total			1,440

Funding source:

Integrated Health Project Administration Unit, Ministry of Health and Sanitation, Government of Sierra Leone with funds from Islam Development Bank.

Appendix VI: Similarity Report

PREVALENCE AND CHARACTERISTICS OF MATERNAL NEAR-MISS AND MANAGEMENT OUTCOMES AMONG ADOLESCENTS (10-19 YEARS) COMPARED TO OTHER WOMEN OF REPRODUCTIVE AGE (20-49 YEARS) WHO SOUGHT POST ABORTION CARE AT

ORIGINALITY REPORT

14%

SIMILARITY INDEX

9%

INTERNET SOURCES

9%

PUBLICATIONS

2%

STUDENT PAPERS

PRIMARY SOURCES

1	A. Briend, P. Nestel. "MALNUTRITION Primary, Causes Epidemiology and Prevention", Elsevier BV, 2005 Publication	3%
2	www.ajrh.info Internet Source	1%
3	www.ijrcog.org Internet Source	1%
4	erepository.uonbi.ac.ke Internet Source	1%
5	researchonline.lshtm.ac.uk Internet Source	1%
6	www.thieme-connect.com Internet Source	1%
7	Submitted to Cumberland University Student Paper	<1%

Appendix VII: ERC Approval



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Ref: KNH-ERC/A/329

Dr. Faustine James
Reg. No.H58/12308/2018
Dept. of Obstetrics and Gynaecology
School of Medicine
College of Health Sciences
University of Nairobi

17th September, 2021



Dear Dr. James

RESEARCH PROPOSAL: PREVALENCE AND CHARACTERISTICS OF MATERNAL NEAR-MISS AND MANAGEMENT OUTCOMES AMONG ADOLESCENTS (10-19 YEARS) COMPARED TO OTHER WOMEN OF REPRODUCTIVE AGE (20-49 YEARS) WHO SOUGHT POST ABORTION CARE AT THE PRINCESS CHRISTIAN MATERNITY HOSPITAL, FREETOWN SIERRA LEONE 2018-2019: A COMPARATIVE CROSS-SECTIONAL STUDY (P352/05/2021)

This is to inform you that the KNH- UoN Ethics & Research Committee (KNH-UoN ERC) has reviewed and **approved** your above research proposal. The approval period is 17th September 2021 – 16th September 2022.

This approval is subject to compliance with the following requirements:

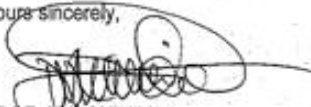
- i. Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
- ii. All changes (amendments, deviations, violations etc.) are submitted for review and approval by KNH-UoN ERC before implementation.
- iii. Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
- iv. Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH- UoN ERC within 72 hours.
- v. Clearance for export of biological specimens must be obtained from KNH- UoNERC for each batch of shipment.
- vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (Attach a comprehensive progress report to support the renewal).
- vii. Submission of an executive summary report within 90 days upon completion of the study.

Protect to discover

This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

For more details consult the KNH- UoN ERC website <http://www.erc.uonbi.ac.ke>

Yours sincerely,



PROF. M.L. CHINDIA
SECRETARY, KNH- UoN ERC

- c.c. The Principal, College of Health Sciences, UoN
The Senior Director, CS, KNH
The Chair, KNH- UoN ERC
The Assistant Director, Health Information, KNH
The Dean, School of Medicine, UoN
The Chair, Dept. of Obstetrics and Gynaecology, UoN
Supervisors: Dr. Anne Kihara, Dept. of Obstetrics and Gynaecology, UoN
Prof. Joseph Karanja, Dept. of Obstetrics and Gynaecology, UoN

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Appendix VIII: Approval from Sierra Leone Ethics



GOVERNMENT OF SIERRA LEONE
Office of the Sierra Leone Ethics and Scientific Review Committee
Directorate of Training and Research
5th Floor, Youyi Building Brookfields, Freetown
Ministry of Health and Sanitation

29th October, 2021

To: Dr Faustine James (MMed Student) Principal Investigator
Department of Obstetrics and Gynecology
University of Nairobi
Kenya
phurstyne12@gmail.com

Study Title: Prevalence and Characteristics of Maternal Near-Miss and Management Outcomes among Adolescents (10-19 Years) Compared to other Women of Reproductive Age (20-49 Years) who Sought Post Abortion Care at the Princess Christian Maternity Hospital, Freetown Sierra Leone 2018-2019: A Comparative Cross-Sectional Study

Version: 1.0 of 13th August, 2021

Submission Type: First protocol version submitted for review

Supervisor: Prof. Joseph Karanja
Department of Obstetrics and Gynecology
University of Nairobi
Kenya
karanjajg@gmail.com

Study Sites: Princess Christian Maternity Hospital

Funding: Islamic Development Bank, through Government of Sierra Leone

Committee Action: Expedited Review

Approval Date: 29 October, 2021

The Sierra Leone Ethics and Scientific Review Committee (SLESRC) having conducted an expedited review of the above study protocol and determined that it presents minimal risk to subjects, **hereby grants ethical and scientific approval for it to be conducted in Sierra Leone.** The approval is valid for the period, **29 October, 2021 – 28 October, 2022.** It is your responsibility to obtain re-approval/extension for any on-going research prior to its expiration date. The request for re-approval/extension must be supported by a progress report.

For further enquiries please contact: efoday@mohs.gov.sl



GOVERNMENT OF SIERRA LEONE
Office of the Sierra Leone Ethics and Scientific Review Committee
Directorate of Training and Research
5th Floor, Youyi Building Brookfields, Freetown
Ministry of Health and Sanitation

Review Comments:

- **Amendments:** Intended changes to the approved protocol such as the study design and key study personnel, must be submitted for approval by the SLESRC prior to implementation
- **Termination of the study:** When study procedures and data analyses are fully complete, please inform the SLESRC that you are terminating the study and submit a brief report covering the protocol activities. Individual identifying information should be destroyed unless there is sufficient justification to retain, approved by the SLESRC. All findings should be based on de-identified aggregate data and all published results in aggregate or group form. A copy of any publication be submitted to the SLESRC for its archive
- Consider revising your topic to read: *Prevalence and Characteristics of Maternal Near-Miss and Management Outcomes among Adolescents Compared to other Women of Reproductive Age who Sought Post-Abortion Care at the Princess Christian Maternity Hospital between 2018 and 2019 in Sierra Leone*
- *Do not use the 2013 Demographic and Health Survey results to present negative results when you have access to the 2019 report of the same survey with better results for the country and subject matter*


CHAIRMAN
Professor Hector G. Morgan
Chair
SIERRA LEONE ETHICS & SCIENTIFIC REVIEW COMMITTEE

For further enquiries please contact: efoday@mohs.gov.sl