



**PREVALENCE, RISK FACTORS AND OUTCOMES OF MATERNAL
NEAR MISS IN THE CENTRAL REGION OF UGANDA: A COMMUNITY
BASED STUDY**

BY

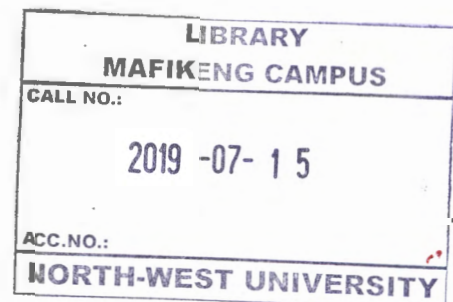
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**A THESIS SUBMITTED IN FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN POPULATION
STUDIES AWARDED BY FACULTY OF HUMAN AND SOCIAL
SCIENCES, NORTH WEST UNIVERSITY – MAFIKENG CAMPUS**

PROMOTER

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MARCH 2016



Declaration

I certify that, to the best of my knowledge, this work titled “**Prevalence, Risk Factors and Outcomes of Maternal Near Miss in the Central Region of Uganda: a Community based Study**” is my original research work, and has never been submitted for any degree or examination in any other University or Institution.

I declare that the information contained in this document is a true copy of my thesis and has been approved for submission by my thesis supervisor. This work was supervised by Professor Natal Ayiga of the Population Research and Training Unit of North West University, South Africa.

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Acknowledgement

To God Be the Glory!!! My accomplishments in completing this thesis would not have been possible and evident without the Lord Almighty. For the Lord gave me the strength to endure and overcome several challenges throughout my studies, and also made my PhD studies, a period of endless opportunities, miracles and testimonies! Thank You Jesus, Praise You Jésus!!!

I would like to express my sincere gratitude to my PhD promoter – Professor Natal Ayiga for his invaluable input towards the completion of my studies. I am grateful for the mentoring, invaluable suggestions and constructive criticism that greatly led to the completion of my doctoral studies.

Special thanks go to my parents and family! To you, I owe my lifetime educational achievements! I am grateful for the moral, financial and technical support accorded to me throughout my educational journey. To my dad - your words “*we are in this together*” always echoed in my mind and were a constant reminder of your parental love. To my mum, no words can express my sincere gratitude. Special mention goes to my brother - Anthony Kigoonya – you are the hero of my PhD journey! I will forever be indebted for your unwavering consistent support throughout my PhD studies. To the rest of my family members - without your prayers, air tickets, constant communication, finances among others, timely completion of my studies would have been impossible!

This work would not have been possible without the generous support from various funders or organizations. This research was partially funded by the African Population and Health Research Center in partnership with the International Development Research Centre through an African Doctoral Dissertation Research Fellowship award; North West University, South Africa, Research Focus Area and Makerere University, Uganda.

My deepest thanks also go to my friends and colleagues who offered commendable technical and moral support throughout my PhD studies. Professor Robert Wamala, Patricia Ndugga Nkeeto, Simon Kibira, Peninah Agaba, Carol Nanzen Kaphagwani, Stella Kigozi and Maureen Akugizibwe, I will forever be indebted!!!

Also, I would like to thank all staff and students of the Population Training and Research Unit of North West University for all the support accorded to me throughout my studies. Lastly, I would also like to thank my colleagues at Department of Population Studies for all the support accorded to me during my doctoral studies.

Dedication

I would like to dedicate this piece of work to both my parents whose value for education has seen me reach this far. Additionally, I dedicate this work to my niece – Catherine Nampiima, who remains a source of daily inspiration. To you Cathy, may this remain to be a source of inspiration to achieve your dreams of becoming a “doctor.”

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Abbreviations

C.I	-	Confidence Interval
EAs	-	Enumeration Areas
EmOC	-	Emergency Obstetric Care
FGD	-	Focus Group Discussion
FY	-	Financial Year
HELLP	-	Haemolysis Elevated Liver enzymes and Low Platelets
IDI	-	In-depth Interview
MoFPED	-	Ministry of Finance, Planning and Economic Development
MoH	-	Ministry of Health
NPHC	-	National Population and Housing Census
O.R	-	Odds Ratio
eMTCT	-	Elimination of Mother to Child HIV Transmission
RESCUER	-	Rural Extended Services for Care and Ultimate Emergency Relief
RMNCH	-	Reproductive Maternal, Newborn and Child Health Sharpened Plan for Uganda
SDGs	-	Social Development Goals
TBA	-	Traditional Birth Attendant
UBOS	-	Uganda Bureau of Statistics
UNICEF	-	United Nations Children's Fund
UNFPA	-	United Nations Fund for Population Activities
WHO	-	World Health Organization

Abstract

Despite the commendable reduction in global maternal mortality ratios, more women continue to suffer from severe maternal morbidities, which poses serious health risks to survivors (maternal near misses) and their new-born babies. In Uganda, maternal near miss events occur frequently. As such, the Government of Uganda has implemented numerous programmes and initiatives in order to improve maternal and child health. Despite such investment in maternal health programmes, less attention has been paid to the occurrence of maternal near miss situation causing extensive vulnerability on maternal health well-being. Therefore, the study sought to estimate the prevalence and examine the causes, risk factors and birth outcomes of maternal near misses, in addition to the role of spouses in women's access to emergency obstetric care in Central Uganda. The information obtained will guide development of strategies for reduction of maternal near miss morbidity and mortality.

The study employed a cross-sectional design and a multi stage sampling technique to select respondents. Data was collected from Rakai district using both quantitative and qualitative methods. As such, 1,557 women were interviewed. Additionally, 40 women and men were purposefully selected for in-depth interviews, while 9 focus group discussions were conducted. The disease and management criteria were used to identify maternal near misses. The prevalence rate was computed and binary logistic regression was used to predict the risk factors and birth outcomes of maternal near misses. Furthermore, content analysis was employed for qualitative analysis in examining of men's roles.

Overall, majority of the study respondents had a low-socio-economic status, were married, Catholics, resided in rural areas, and were of Baganda ethnicity. Their partners had similar characteristics. Additionally, utilization of maternal health services was low. Women who were less likely to attend antenatal care were also less likely to deliver from a health facility, and consequently less likely to receive postnatal care.

The prevalence of maternal near miss was 287.7 per 1000 pregnancies. Haemorrhage was the main cause of maternal near miss. Women with unwanted pregnancies (odds ratio (OR): 1.379), history of pregnancy complications (OR: 0.295), first birth order (OR: 1.827), who experienced pregnancy danger signs (OR: 1.725) were at higher risk of experiencing maternal near miss. Ethnicity and partner's education were also associated with occurrence of maternal near miss. Additionally, men's roles were three-fold including: supportive roles, contraceptive uptake and management of obstetric complications at household level.

Maternal near miss morbidity in Central Uganda is high and is majorly caused by postpartum haemorrhage. To reduce these events, supervised deliveries, access to emergency obstetric care, access to postnatal care services and contraceptives should be increased. Maternal health needs of ethnic minorities should also be taken into account. More importantly the need to encourage male involvement in maternal health programmes is paramount.

Chapter One: Introduction

1.1 Background

Over the past two decades, the global maternal mortality ratio has been greatly reduced. In the developing regions, it decreased from 440 in 1990 to 240 per 100,000 live births in 2010 while the developed regions recorded a moderate reduction of 26 to 16 per 100,000 live births over the same period (WHO, 2012b). Although the reduction is commendable in developing regions, more women continue to suffer from severe maternal morbidities. For instance, in the developing regions, mostly in sub-Saharan Africa, 42% of the 120 million women who give birth annually experience life-threatening maternal morbidities, a situation which in turn, poses serious health risks to survivors and their unborn babies or infants (Ashford, 2002). Women who survive these conditions have come to be known as maternal near misses. WHO (2010) defines maternal near miss as a woman who nearly died from a life-threatening condition during pregnancy, delivery and the postpartum period.

Previous studies have identified the causes of maternal near miss as the same as those of maternal mortality and they include haemorrhage, pre-eclampsia or eclampsia, sepsis, unsafe abortions, obstructed labour, ruptured uterus, ectopic or molar pregnancies (Khan et al., 2006; Pacagnella et al., 2012; Ronsmans and Graham, 2006). These conditions are caused by a set of three broad risk factors. The first set of risk factors are demographic factors including high parity, short birth intervals, first and last order births, young age (teenage) and late age (35 years or older) at birth (Goffman et al., 2007; Oxaal and Baden, 1996; Storeng et al., 2010; Waterstone et al., 2001). The second set of risk factors are underlying medical conditions including malaria, anaemia, obesity, HIV/AIDS, previous caesarean deliveries, organ dysfunctions such as hypertensive disorders, diabetes and cardiovascular problems (Goffman et al., 2007; Mbonye et al., 2007; Waterstone et al., 2001); inaccessibility to health

facilities, untimely referral mechanisms, lack of antenatal and obstetric services and unskilled deliveries (Almerie et al., 2010; Bantebya-Kyomuhendo, 2004; Storeng et al., 2010); and behavioural factors such as drug and alcohol use, and experience of violence (Goffman et al., 2007; Oxaal and Baden, 1996). The third group of risk factors are the socioeconomic attributes of women including level of education, level of income, religious beliefs, livelihood systems and culture (Bantebya-Kyomuhendo, 2004; McCarthy and Maine, 1992; Oxaal and Baden, 1996; Tinker et al., 1994). These risk factors may exacerbate the risk of maternal near miss or mortality. Although most maternal near misses have detectable risk factors, a large number of women with no known risk factors have developed such life-threatening complications (McCarthy and Maine, 1992; Pacagnella et al., 2012; Thaddeus and Maine, 1994).

There exists a large disparity in the prevalence of maternal near miss between developing and developed countries with regard to differences in the magnitude; causes and risk factors of maternal near miss. In the developed countries, maternal near misses are very rare due to the access to high quality of emergency obstetric services. For example, there were 12 maternal near misses per 1,000 live births in United Kingdom (Waterstone et al., 2001); 4.62 maternal near misses per 1,000 live births in Canada (Rusen et al., 2004); and 2 maternal near misses per 1,000 deliveries in Italy (Donati et al., 2012). Similarly, a systematic review by Tunçalp et al. (2012) reported maternal near miss rates to range between 0.04% to 0.79% in Europe, 0.07% to 1.38% in North America, 0.34% to 4.93% in Latin America and Caribbean, while that of Asia ranged between 0.02% and 5.07% between 2004 and 2010. In developing countries however, maternal near miss is a relatively frequent occurrence, ranging between 0.05% to 14.98% in Africa (Tunçalp et al., 2012). For example, in South Africa and South Nigeria, there are 5 maternal near misses per maternal death (Mantel et al., 1998; Oladapo et

al., 2005); 15 and 18 maternal near misses per maternal death in Benin and Cote d'Ivoire respectively (Filippi et al., 2005); and 7 maternal near misses per maternal death in Malawi (van den Akker et al., 2011). The urgency of the situation in sub-Saharan Africa, a region with more than half of the global maternal morbidities and mortalities, is evidenced by the fact that improvement in maternal health is one of the Social Development Goals (SDGs). Social Development Goal 3 is to "*ensure healthy lives and promote well-being for all at all ages*", with several targets to be achieved by 2030 including "*reducing global maternal mortality to less than 70 per 100,000 live births, ending of preventable deaths of new-borns and under-five children, universal access to sexual and reproductive health care services, and achievement of universal health coverage*", among other targets (United Nations, 2014).

In Uganda, the magnitude of maternal near miss remains unclear. An institutional study at the national referral hospital reported a maternal near miss rate of 10.1%, with maternal near misses occurring six times as frequently as a maternal death (Kaye et al., 2004a). However, this is likely to be an underestimate because of the limited access or utilization of maternal health services (antenatal care, health facility deliveries, postnatal care, and emergency obstetric care services) and high proportion of women who attend ill-equipped health facilities with low skilled staff, coupled with the over-reliance on the traditional health system in Uganda. Moreover, adverse maternal health outcomes are closely linked with infant outcomes, yet little is known about the effect of maternal near miss morbidity on birth outcomes. Furthermore, men's roles in women's access to emergency obstetric care (EmOC), remains unknown, yet access to EmOC is the overriding factor in averting maternal near miss and maternal deaths in Uganda (Mbonye et al., 2007). As of the above mentioned conditions, the magnitude, main causes, risk factors, and birth outcomes of maternal near misses; and men's roles in women's access to EmOC in Uganda remain unclear or unknown. Yet, this

information is necessary for improving the overall health of mothers and children, and achievement of SDG 3. This paucity of knowledge calls for a comprehensive examination of the magnitude, patterns, predictors and birth outcomes of maternal near miss, and men's role in women's access to EmOC in Uganda, using a community based approach.

1.2 Maternal Health Situation in Uganda

Uganda has a strong policy environment which recognises maternal health as a critical health and development problem requiring a multi-sectoral approach. A number of national plans and policies including National Development Plan 2010/2011- 2014/2015 (National Planning Authority, 2015), Roadmap for accelerating the reduction in maternal and neonatal mortality and morbidity 2007- 2015 (MoH, 2007), National Health Policy II 2010/11- 2019/20 (MoH, 2010c), Health Sector Strategic Plan III 2010/11-2014/15 (MoH, 2010a), and Reproductive Maternal , Newborn and Child Health Sharpened Plan for Uganda (RMNCH) (MoH, 2013) have been adopted to operationalize the multi-sectoral approach aimed at improving the health or well-being of the population with special emphasis on maternal and child health. At the international level, Uganda has made several commitments including UN Secretary General's Global Health Strategy, Family Planning 2020, Life Saving Commodities for Women and Children's Health, Preventing Premature Births and Deaths – Born Too Soon, Scaling up Nutrition, Global Newborn Action Plan, and The Call to Child Survival – A Promise Renewed (MoH, 2013), all of which aim at improving maternal and child health, and enhancement of the achievement of SDG 3. Other international declarations ratified by Uganda, still aiming at improving maternal and child health outcomes have included Safe Motherhood Initiative (WHO, 1987), International Conference on Population and Development Programme of Action (UNFPA, 1994a), Abuja Declaration, 2001 (African Union Secretariat, 2006b); Maputo Plan of Action, 2006 (African Union Secretariat, 2006a);

and the Kampala Declaration (Partners in Population and Development, 2008), all of which aim at enhancement of the achievement of SDG 3.

These policy initiatives are aimed at improving or increasing: health budget allocation, usage of modern contraceptive methods, contraceptive method mix, access to maternal health services (antenatal care, skilled deliveries at health facilities, postnatal care, post-abortion care, and emergency obstetric care services), women's nutritional status during pregnancy, male involvement in reproductive health programmes, access and availability of essential medicines, proportion of pregnant women and children using mosquito nets, health personnel, health infrastructure and elimination of mother to child HIV transmission. Additionally, these policies should contribute to reduction of the: high unmet need for family planning, high total fertility rates, closely spaced births while increasing the age at first birth. These programmes are viewed in totality as the strategies that would curb the high maternal and child mortality rates in Uganda.

Although Uganda has made some progress in improving the maternal and child health outcomes, the situation is still appalling. Despite reducing the maternal mortality ratio from 505 deaths per 100,000 live births in 2001 to 438 deaths per 100,000 live births in 2011 (UBOS and ICF, 2012), the rate of decline is very slow. Similarly, institutional maternal deaths remain high at 146.4 deaths per 100,000 live births in the financial year 2013/2014, despite a modest decline from 167.6 deaths per 100,000 live births in the preceding financial year (MoH, 2014) as shown in Table 1.1. The Central region recorded the highest institutional maternal deaths while the Eastern region recorded the lowest institutional maternal deaths in the last two financial years, as shown in Table 1.1. The continued high maternal mortality in the country partly accounts for the continued high infant mortality rate

(54 deaths per 1,000 live births) with half of the infant deaths occurring in the neonatal period (UBOS and ICF, 2012).

Table 1. 1 Health Facility Based Deaths by Region

Region	FY2012/2013			FY 2013/14		
	Live births in unit	Maternal deaths	Maternal deaths/ 100000 live births	Live births in unit	Maternal deaths	Maternal deaths/ 100000 live births
Central	206,322	433	209.9	222,199	366	164.7
Eastern	168,221	190	112.9	189,504	180	95.0
Northern	137,385	233	169.6	172,697	247	143.0
Western	185,729	313	168.5	199,274	354	177.6
NATIONAL	697,657	1169	167.6	783,674	1,147	146.4

Source: MoH (2014)

The direct causes of maternal near miss complications and maternal deaths in Uganda are haemorrhage, obstructed labour, abortion complications, ruptured uterus, sepsis, pre-eclampsia, ectopic pregnancies, while the indirect causes of maternal deaths include malaria, anaemia, HIV/AIDS and sickle cells (Mbonye et al., 2007; MoH, 2014). The underlying causes of maternal deaths in the country are attributed to inadequate health personnel, inadequate access to emergency obstetric care, lack of laboratory services, stock out of essential medicines and lack of amenities such as water, and electricity, poor health seeking behaviour, poverty, and lack of transport means (Mbonye et al., 2007; MoH, 2014).

Utilization of maternal health services in Uganda remains low. Although 95% of pregnant women receive antenatal care from a skilled provider, slightly more than half (52%) do not make the four World Health Organization (WHO) recommended antenatal care visits necessary for the detection and cure of pregnancy complications (UBOS and ICF, 2012). Additionally, less than a quarter (21%) of pregnant women attend antenatal care in the first trimester while the median duration of the pregnancy at first antenatal care visit is 5.1 months (UBOS and ICF, 2012).

Despite improvement in the quality of antenatal care over the last ten years, the overall quality of antenatal care received by women is still inadequate. Testing of proteinuria and measurement of blood pressure are useful in detecting women at risk of developing hypertensive disorders. However, only 22.3% of women have their urine samples taken while 59% have their blood pressure measured (UBOS and ICF, 2012). Additionally, only half of the pregnant women in Uganda receive drugs for intestinal worms or have knowledge on the key pregnancy danger signs (UBOS and ICF, 2012). Lack of knowledge may lead to failure in detecting the pregnancy complications once they manifest, leading to further delays in seeking of health care. HIV/AIDS testing is important in elimination of mother-to-child transmission and management of opportunistic infections among HIV infected pregnant women, while iron tablets prevent anaemia and have a protective effect during occurrence of haemorrhagic complications. Additionally, tetanus toxoid vaccinations safeguard pregnant women from infections or sepsis. Notably, 81% of women are tested for HIV/AIDS, 75% take iron tablets, 79% are weighed, 84% have immunity against tetanus from a prior pregnancy and 55.5% are immunized against tetanus during pregnancy (UBOS and ICF, 2012).

With regards to skilled birth attendance, 57% of women deliver from a health facility while 58% of women are delivered by a skilled provider (UBOS and ICF, 2012). Additionally, most of the women deliver from public health facilities and are assisted by a nurse or midwife. Furthermore, only a third of women in Uganda receive postnatal care in the first two critical days after child birth. Overall, women who are older, with low education, employed in the agricultural sector, residing in rural areas, from Karamoja region, belonging to poor households and with a high birth order are less likely to utilize maternal health services (UBOS and ICF, 2012).

1.3 Problem Statement

The implementation of maternal health programmes in Uganda is guided by several policies or frameworks at both national and international level. These policies are aimed at improving maternal and child health outcomes and attainment of SDG 3. These policy initiatives have caused the implementation of several interventions including Making Pregnancy Safer initiative whose motto is *“for each mother, there must be a baby to go back home with and for each baby, there must be a mother to go back home with”* (MoFPED, 2010); the Rural Extended Services for Care and Ultimate Emergency Relief (RESCUER) programme which focussed on improving communication and referral systems for pregnant women with obstetric complications; Elimination of Mother to Child HIV Transmission (eMTCT); prevention of malaria in pregnant women and children under five years through distribution of insecticide treated mosquito nets; expanding access to family planning services; training of traditional birth attendants (TBAs); construction of health facilities; improved access to health facilities; recruitment of more health workers; and expanding access to Emergency obstetric care services (EmOC).

However, despite these policy and programme environment, 15% of the 1.5 million women who become pregnant annually in Uganda develop life-threatening complications which may result into death (MoH, 2010b). This is in part due to the high proportion (89%) of women with no access to EmOC services, high unmet need for family planning (41%); high total fertility rates (6.2 children), a large percentage of women delivering at home or in health facilities characterized by lack of equipment, essential medications and skilled personnel, low postnatal care attendance (MOH & UNICEF, 2004; UBOS and ICF, 2012); and over-reliance on traditional health systems (Bantebya-Kyomuhendo, 2004).

Since maternal near miss presents exactly the same complications as for women who die, it has emerged as a new paradigm for investigating and programming maternal and child health programmes (Pacagnella et al., 2012; Pattinson and Hall, 2003; Say et al., 2009). However, most research on maternal near miss in sub-Saharan Africa have used the gold standard approach (hospital based audits), which is unable to comprehensively estimate the magnitude and identify the risk factors associated with maternal near miss because most maternal conditions occur outside health facilities. In Uganda, as indicated already, only 48% of women make the four WHO recommended antenatal care visits; 43% of births occur at home; and 67% of the women do not receive postpartum care (UBOS and ICF, 2012). Given this backdrop, crucial information about maternal near miss status, including the associated risk factors and birth outcomes, is very limited. It is against this backdrop of limited information on maternal near miss in Uganda that the present study was undertaken using a community based approach.

1.4 Aim of the Study

The aim of this study was to estimate the magnitude, describe the main causes, examine the risk factors of maternal near miss, and its birth outcomes in an underserved and poor district in the Central region of Uganda. Additionally, the study sought to explore the role of men in women's access to emergency obstetric care after occurrence of maternal near miss events.

1.4.1 Specific objectives

The specific objectives of the study were to:

- i. estimate the magnitude of maternal near miss at the community level;
- ii. describe the main causes of maternal near miss;
- iii. explore the risk factors influencing occurrence of maternal near miss events;
- iv. examine the birth outcomes of maternal near misses;

- v. explore the role of male involvement in women's utilization of emergency obstetric care and aversion of maternal deaths

1.5 Research Hypotheses

The present study sought to test the following central hypotheses:

- i. Women with unwanted pregnancies are more likely to experience maternal near miss complications than those women with wanted pregnancies.
- ii. Women with a history of life-threatening pregnancy complications are more likely to experience maternal near miss complications than women with no history of life-threatening pregnancy complications.
- iii. Women with parity 1 or high parity (5+) are more likely to experience maternal near miss complications than women of parity 2 to 4.
- iv. Women who experience pregnancy danger signs are more likely to experience maternal near miss complications than women who did not experience any pregnancy danger signs.
- v. Women who experience violence during pregnancy are more likely to become maternal near misses than their counterparts.
- vi. Women who often take alcohol during pregnancy are more likely to experience maternal near miss complications than their counterparts.
- vii. Women with chronic medical conditions are more likely to experience maternal near miss complications than women with no chronic conditions.
- viii. Maternal near misses are more likely to have poor birth outcomes than good birth outcomes.

1.6 Significance of the Study

Maternal health has profound ramifications on the production, reproduction and socialization functions of the family mostly because of its disruptive effects on these functions. In poor settings such as in Uganda, where mothers play a central role in the above processes, the health of mothers impacts strongly on the family as well as on the entire community. To address this problem Uganda has adopted a number of policies and programmes at the national level and ratified a number of international and regional conventions aimed at improving the maternal health situation in the country.

Despite these initiatives, the maternal health situation in Uganda has remained dire, indicated by the high maternal mortality ratio, low proportion of pregnant women (estimated at 15%) with access to obstetric care; and the associated high infant mortality rate. These indicators suggest that Uganda is most unlikely to achieve the Social Development Goal 3 targets on the health and well-being of mothers and their infants. This may also imply a high prevalence of maternal near miss reflecting the poor state of health services, cultural practices, demographic and socioeconomic conditions that impede access to care, and medical conditions that exacerbate the already poor maternal health situation. Even though the adoption of the policies and programmes to address the problem of maternal health should have contributed substantially to reversing the bad situation of maternal near miss and mortality in Uganda, the problem persists because of the gaps in the existing body of knowledge about the problem.

Given that maternal near miss cases are more common than maternal mortality and present the same causes, investigating the causes, patterns, risk factors and birth outcomes of maternal near miss using a community approach, where most cases of maternal mortality and maternal near misses occur, offers a unique opportunity to increasing our understanding of the maternal health, maternal mortality and infant mortality from the perspectives of women

who are at risk or have experienced these life events. Based on the gaps identified in the theoretical and literature review, the study used a community based approach and addressed the following: estimation of the magnitude of maternal near miss in the communities, identification of the prevalent causes of maternal near miss, examination of risk factors that have not been previously explored in the Ugandan setting, exploring the effect of maternal near miss on birth outcomes in Uganda, in addition to exploring the roles of women's partners during women's access to emergency obstetric care.

The new knowledge obtained will guide the development of scientifically sound and appropriate strategies to respond to the challenge and contribute to the attainment of SDG 3 in Uganda in the near future, and be replicated elsewhere. In addition to expanding our knowledge on the dynamics of maternal health, its causes and predictors, the study results will be useful in designing effective programmes to address the high level of maternal and infant mortality in Uganda. The knowledge acquired will also contribute to programmes or strategies geared towards increased male involvement in maternal health particularly access to emergency obstetric care.

1.7 Structure of the thesis

The thesis has nine chapters. Chapter one presents the introduction, problem statement, study objectives, hypotheses, and significance of the study. Chapter two presents the theoretical frameworks, literature review and operationalization of the conceptual framework that guided the study and a synthesis of the literature. A detailed description of the methodology is explained in Chapter three and Chapter four presents the profile of the study respondents. Chapter five presents the maternal health care knowledge and practices of the study respondents. Chapter six presents the study definitions of maternal near miss, prevalence, causes, and risk factors of maternal near miss. In Chapter seven, the birth outcomes of

maternal near misses are discussed while Chapter eight presents the role of women's partners in access to emergency obstetric care and aversion of maternal deaths. Lastly, Chapter nine presents the summary of the major findings, conclusions, policy recommendations and areas for future research.

Chapter Two: Literature Review

2.1 Introduction

This chapter broadly presents work on the theoretical frameworks that have guided research on issues related to maternal health in general, and maternal near miss morbidity and mortality in particular. Besides these theoretical frameworks, the chapter also examines the review of the literature related to such issues as the concept, magnitude, causes, risk factors, birth outcomes of maternal near miss, and the role of women's partners in maternal health care. Additionally, a synthesis of the theoretical frameworks and literature review is presented in this chapter. This information is important in identifying the gaps in maternal near miss literature, operationalizing the conceptual framework which guided this study, and justifying the study methodology.



2.2 Concept of Maternal Near Miss

Following reduced cases of maternal deaths in the developed countries, generalizability of findings from maternal death enquiries became difficult (Pattinson and Hall, 2003). Consequently, maternal near miss audits were conceptualized as an alternative in analysing maternal deaths (Pattinson and Hall, 2003). Moreover, there was an increasing need to focus on maternal near misses due to the ill-health and severe consequences associated with these events (Firoz et al., 2013).

The term "near miss" originates from the aviation industry, where two aeroplanes narrowly or nearly collide but an accident is avoided (Pattinson and Hall, 2003; Say et al., 2009). Although there is no universally accepted definition of maternal near miss, three have gained general acceptance. WHO (2010) defines maternal near miss as a woman who nearly died from a life-threatening condition during pregnancy, delivery and postpartum period, while

Mantel et al. (1998) defines it as an acute organ dysfunction which occurs during pregnancy, childbirth or postpartum period, which could result in death, Waterstone et al. (2001) defines maternal near miss using morbidity conditions which include pre-eclampsia, eclampsia, ruptured uterus, severe sepsis, severe haemorrhage and Haemolysis Elevated Liver enzymes and Low Platelets (HELLP) syndrome during pregnancy, child birth or the postpartum period. From these definitions, some scholars have referred to a maternal near miss as a woman who experiences a life-threatening pregnancy complication but either survives by luck or receives urgent medical attention (Filippi et al., 2000; Mantel et al., 1998; Prual et al., 2000).

Thus, maternal near misses can be identified using three criteria including disease conditions (Waterstone et al., 2001), management or intervention procedures, and organ dysfunction (Mantel et al., 1998). Say et al. (2009) discussed the advantages and disadvantages of each criterion and recommended the use of the organ dysfunction criterion in developed countries where the level of obstetric care is advanced and similar across countries unlike in the developing countries. On the contrary, Nelissen et al. (2013) recommended use of the disease-based criterion, that is applicable to the local settings in low developing countries where the level of health care is still low and a high proportion of births take place in the communities.

2.3 Magnitude and Patterns of Maternal Near Miss

The magnitude of maternal near miss largely depends on the criteria used to identify maternal near miss cases. Wide disparities exist in the magnitude of maternal near miss using the different criteria (Kaye et al., 2011a; Moraes et al., 2011; Tunçalp et al., 2012). A longitudinal study in Brazil by Moraes et al. (2011) showed marked differences in the incidence of maternal near miss using Mantel et al. (1998) organ dysfunction criteria (3.4

cases/1000 deliveries) and Waterstone et al. (2001) disease specific criteria (14.1 cases per 1,000 deliveries). Similarly, Tunçalp et al. (2012) reported higher magnitude of maternal near miss among studies that used the disease specific criteria compared to those that used the management and organ dysfunction criteria. Such inconsistencies in use of different criteria may lead to over-estimation or under-estimation of the magnitude of maternal near miss in a given population. Therefore applicability of each criterion should be done with maximum caution based on the number of limitations surrounding each criterion and the local setting taking into account the level of health care service in a given area. Although WHO recommends the organ dysfunction criterion as the gold standard in identifying maternal near misses, it is subject to bias where proper clinical and laboratory records are missing or lacking (Adisasmita et al., 2008; Pattinson and Hall, 2003; Ronsmans and Filippi, 2004). For instance, in settings such as Uganda, use of the organ dysfunction criteria has major limitations including lack of, or inadequate diagnostic facilities to accurately identify the markers of organ dysfunction, use of different criteria to admit patients into the Intensive Care Unit (ICU), lack of laboratory facilities and poor documentation of clinical markers of organ dysfunction (Okong et al., 2006). In addition, this criterion omits women who develop complications which do not lead to any organ dysfunction hence leading to under-estimation of maternal near misses.

Moreover, wide disparities have been noted in the magnitude of maternal near miss between and within sub-Saharan African countries. These differences can be attributed to the variations in the study context or settings, measurement issues, criteria for identifying cases, study design and various definitions of maternal near miss (Kaye et al., 2011a; Tunçalp et al., 2012). In their systematic review, Kaye et al. (2011a) showed that the magnitude of maternal near miss in sub-Saharan Africa ranged between 1.1% to 33.4% between 1995 and 2010.

This review also revealed huge contrasts in the magnitude of maternal near miss in Uganda: 33.4% (Okong et al., 2006) and 10.1% (Kaye et al., 2004b), although both studies used the organ dysfunction criterion to identify maternal near misses and both studies were hospital based. These mixed findings present a vague picture of the true estimate of maternal near miss in Uganda.

Additionally, the computation of the magnitude of maternal near miss differs from one study to another. Apart from most studies synonymously using incidence and prevalence rates or ratios interchangeably, different reference or base populations are used in computing the magnitude of maternal near miss which affects comparison across different countries and settings (Kaye et al., 2011a; Tunçalp et al., 2012). Kaye et al. (2011a) observed that several studies (Bernis et al., 2000; Filippi et al., 1998; Mantel et al., 1998; Oladapo et al., 2005; Schoon, 1999; Vandecruys et al., 2002) considered total deliveries, while other studies (Prual et al., 2000; Prual et al., 1998) considered total live births or total pregnancies (Kaye et al., 2004b; Okong et al., 2006) as the reference or base category in computing the magnitude of maternal near miss. Inclusion of only live births or deliveries excludes pregnancy complications arising due to ectopic pregnancies and unsafe abortion complications, hence under-estimating the magnitude of maternal near miss in a given population.

It is against this backdrop of different criteria that existing studies have used to examine the incidence or prevalence, causes, patterns, risk factors and outcomes of maternal near miss and the concomitant inconsistent findings that the present study was conducted. The study sought to estimate the magnitude of maternal near miss using a different study approach (community based), criteria (disease and management specific) and an all-encompassing base population (total pregnancies), so as to compare findings with previous results and also to get a better understanding of the problem in terms of its magnitude in Uganda.

2.4 Causes of Maternal Near Miss

While a substantial amount of literature has shown that the common causes of maternal mortality and maternal near miss are the same, Pattinson and Hall (2003) observed otherwise. Pattinson and Hall (2003) attributes this variation to advances in medical sciences in managing some of these complications and deaths due to certain complications being very rare, and thus hinder meaningful analysis or generalizability of research findings.

There is a contrast between the main causes of maternal near miss in developed and developing regions. While hypertensive disorders such as pre-eclampsia, eclampsia and HELLP syndrome are the main causes of maternal near miss in the developed regions (Amaral et al., 2011; Moraes et al., 2011), obstructed labour, haemorrhage, ruptured uterus and sepsis are the main causes of maternal near miss in the developing regions (Kaye et al., 2011a). Such variations can be explained by the advanced medical technology in developed regions used to prevent or manage severe haemorrhagic and sepsis complications unlike in the developing countries. This can partly explain the continued high prevalence of maternal mortality and maternal near miss rates or ratios in the developing regions compared to the developed regions. Furthermore, more variations in the causes of maternal near miss are evidenced between and within countries in the developing region. Therefore, although the causes of maternal near miss are known, there are variations in different settings or populations.

Furthermore, the causes of maternal near miss can be classified by level of severity, with the level of severity having an effect on the risk of death. Moraes et al. (2011) categorized causes of maternal near miss complications as either extremely severe based on the organ dysfunction criterion or less severe based on disease specific criterion; with less severe cases having a lower risk of death. Admission to the intensive care unit and prolonged hospital stay

were associated with extreme severe causes of maternal near miss, while previous chronic hypertension was associated with less severe causes of maternal near miss cases. Similarly, hypertensive disorders were associated with a lower risk of death compared to haemorrhage complications (Moraes et al., 2011). Despite the variations in severity, generally, there was no significant difference in the socio-demographic and pregnancy care factors between these two subgroups (Geller et al., 2006; Moraes et al., 2011). However, Geller et al. (2006) noted that it was women with preventable events who were more likely to experience severe maternal near miss or death as compared to those without preventable events.

2.5 Theoretical Frameworks and Empirical Literature

A number of scholars have advanced theories to explain the factors influencing the occurrence of severe maternal mortality and morbidity, maternal health behaviour, child survival, and birth outcomes. These include the framework for analysing the determinants of maternal morbidity and mortality (McCarthy and Maine, 1992), safe motherhood conceptual framework (Tinker et al., 1993), Three Delays model (Thaddeus and Maine, 1994), health belief model (Janz and Becker, 1984), behavioural model of health service use (Andersen, 1995), analytical framework for the study of child survival in developing countries (Mosley and Chen, 2003) and new-born conceptual framework (Marsh et al., 2002). A review of each of these theories or frameworks, critical analysis of related empirical findings and its applicability to the study is presented below.

2.5.1 A Framework for Analyzing the Determinants of Maternal Morbidity and Mortality

The framework proposed by McCarthy and Maine (1992) discusses the factors that influence the process leading to adverse maternal outcomes including maternal near miss and maternal mortality. The framework shows that the process leading to adverse maternal outcomes

involved three stages including occurrence of a pregnancy and pregnancy complications, which are influenced by proximate factors and underlying factors respectively. The proponents of the framework note that for maternal death or maternal near miss events to occur, pregnancy complications must occur but with a pregnancy as the first pre-requisite. The focus of pregnancy complications is on the direct obstetric causes of maternal deaths. The mechanisms, through which the life-threatening pregnancy complications occur are explained through a set of five proximate determinants including women's health status, reproductive status, access to health services, woman's health care behaviour and unknown factors.

In this model (McCarthy and Maine, 1992), it is postulated that a woman's health status prior to and during the pregnancy influences the risk of occurrence of pregnancy complications that may lead to adverse maternal outcomes. For instance, poor health status, characterized by chronic diseases, poor nutrition, anaemia, infectious diseases such as malaria and history of pregnancy complications not only reduces a woman's immunity but also exacerbates her risk of experiencing life-threatening pregnancy complications. Similarly, the reproductive factors, including age at birth, parity, birth order, timing of a pregnancy, and marital status also influence occurrence of life-threatening pregnancy complications. In this framework, it is hypothesized that both young and older women; nulliparous and multiparous women; single women; and women with unwanted pregnancies and closely spaced births are at a higher risk of experiencing life-threatening pregnancy complications compared to their counterparts.

Additionally, limited access to health services is another contributor to the occurrence of life-threatening pregnancy complications in this model. Access to health facilities comprises several dimensions including access to contraceptives, safe abortion services, emergency obstetric care after the onset of severe complications and finances. It also comprises physical

distance to health facilities, inadequate health personnel and poor health infrastructure. Furthermore, the framework posits that maternal health behaviour influences the occurrence of pregnancy complications through inadequate antenatal care, unskilled deliveries and inadequate postnatal care. Women's poor health behaviour hinders early identification of pregnancy danger signs and treatment of complications. Moreover, McCarthy and Maine (1992) argues that there are unknown factors which lead to occurrence of maternal near miss and mortality events. Likewise, women with no known factors have been found to experience adverse maternal outcomes.

Finally, the framework highlights the role of underlying factors in occurrence of adverse maternal outcomes which exist at individual, family and community levels. On the individual level, women of low socio-economic status (low education, poor, non-wage employment) and those with family members or that belong to households of low socio-economic status are disadvantaged and vulnerable to pregnancy complications. Most likely, these women are less autonomous; less likely to be in good health during pregnancy; and have limited access to health services, while availability of community resources also plays a great role in women's access to and utilization of health services.

Although widely accepted, this framework has been criticized for underestimating the effects of socioeconomic characteristics (Oxaal and Baden, 1996; Tinker et al., 1993). Specifically, the critics disagree that all underlying factors should operate through the proximate determinants. The relationship between the proximate determinants and occurrence of maternal near miss morbidity as postulated by this framework is supported by empirical findings as discussed below.

Chronic medical conditions have been found to influence occurrence of maternal near miss complications (Evers et al., 2004; Goffman et al., 2007; Gray et al., 2012; Smith et al., 2001; Waterstone et al., 2001; Wen et al., 2005). These authors found that women who had pre-existing or chronic medical conditions including hypertension, heart diseases and diabetes had increased odds of experiencing maternal near miss complications compared to women with no chronic conditions. These conditions are often exacerbated during pregnancy causing severe complications such as hypertensive disorders (pregnancy induced hypertension, pre-eclampsia, eclampsia), and gestational diabetes (Catov et al., 2007), which put both the life of the mother and foetus at an increased risk of death.

Additionally, the presence of other parasitic or infectious diseases during pregnancy exposes women to low body immunity. This, further exposes them to a higher risk of experiencing complications during child birth (Lule et al., 2005; Storeng et al., 2010). Diseases like malaria, anaemia, hepatitis, tuberculosis and HIV/AIDS are aggravated by pregnancy and cause miscarriages, obstructed labour, antepartum haemorrhage, sepsis, still births and sometimes maternal deaths (Steketee, 2003; Storeng et al., 2010). These diseases are highly prevalent among pregnant women in Uganda and hence the need to examine their effect in causing maternal near miss. Furthermore, Goffman et al. (2007) linked obesity with occurrence of chronic medical conditions and caesarean deliveries, further pre-disposing women to experiencing maternal near miss.

Additionally, HIV/AIDS is an indirect cause of maternal death and accounts for a great proportion of maternal deaths in Uganda. The effect of HIV/AIDS on maternal morbidity and mortality is well documented (McIntyre, 2005; Moran and Moodley, 2012). It reduces a pregnant woman's immunity thereby increasing her risk to contracting opportunistic infections including malaria and tuberculosis; in addition to increasing her susceptibility to

life-threatening pregnancy complications including haemorrhage, sepsis and anemia, hence increasing her risk of a maternal death (McIntyre, 2003; van Eijk et al., 2003). A previous study also showed that maternal HIV/AIDS was associated with occurrence of spontaneous abortions (Ezechi et al., 2013) which often result in sepsis and haemorrhagic complications. While in Uganda, pregnant women infected with HIV/AIDS were found to have 70% increased odds of experiencing major morbidities including severe malaria and sepsis (Nuwagaba-Biribonwoha et al., 2011).

Furthermore, experience of pregnancy danger signs exhibits ill-health during a woman's pregnancy and may have negative consequences on the pregnancy outcome. Several studies have identified key danger signs or complications in pregnancy to include nausea, excessive vomiting, night blindness, swelling of the face, swelling of legs (oedema), blurred vision, fits, paleness, difficulty in breathing, weight loss, fever, bleeding, cough, severe headache, convulsions, unconsciousness, severe weakness, severe abdominal pains, accelerated or reduced fetal movement, water breaks without labour, and malaria (Chortatos et al., 2015; UBOS and ICF, 2012). A study in Norway found that women who experienced pregnancy danger signs such as nausea and vomiting were at a higher risk of maternal near miss complications resulting from severe pregnancy induced hypertension and pre-eclampsia (Chortatos et al., 2015).

Previous studies have shown that women with a history of life-threatening pregnancy complications are at a higher risk of experiencing the same complications in subsequent pregnancies (Camargo et al., 2011a; Fullerton et al., 2013; Waterstone et al., 2001). Women who experienced maternal near miss complications including ectopic pregnancy, postpartum haemorrhage, pre-eclampsia in previous pregnancies were found to experience the same

complications in subsequent pregnancies (Bantebya-Kyomuhendo, 2004; Waterstone et al., 2001).

McCarthy and Maine (1992) stated that in order to prevent or reduce the risk of pregnancy complications leading to maternal near miss or mortality, controlling the risk of conceiving among women through family planning services is foremost. Use of family planning methods affects maternal health outcomes through several pathways including timing of pregnancy, appropriate birth spacing, age at birth, and number of children. All these pathways have previously been found to influence occurrence of maternal near miss events and mortality. However, Adeoye et al. (2013) found that maternal near miss events were not dependent on contraceptive use prior to conception.

A woman's age at birth is critical in influencing maternal outcomes. The risk of maternal mortality is higher in extreme ages of the reproductive cycle (Oliveira et al., 2014). Similarly, young (< 19 years) and older (> 35 years) women are more likely to experience maternal near miss events compared to the middle aged women (Gray et al., 2012; Lampinen et al., 2009; Oliveira et al., 2014; Ozalp et al., 2003). Childbirth at young ages is associated with maternal near miss complications including pre-eclampsia, abortion complications and obstructed labour (Amaral et al., 2011; Lule et al., 2005; Ozalp et al., 2003) while at older ages, it is associated with postpartum haemorrhage, obstructed labour, and pre-eclampsia complications (Amaral et al., 2011; Berkowitz et al., 1990; Callaghan and Berg, 2003; Goffman et al., 2007; Jolly et al., 2000; Lampinen et al., 2009; Oliveira et al., 2014; Waterstone et al., 2001). Occurrence of maternal near miss complications among older women is often associated and aggravated by the woman's obstetric history including pre-existing chronic diseases (diabetes, hypertension, kidney, liver and cardiac diseases), high parity and ageing of her reproductive system (Jolly et al., 2000; Oxaal and Baden, 1996; Van Katwijk and Peeters,

1998). While at younger ages, occurrence of these complications is associated with poor nutrition, low maternal weight gain, use of unsafe abortion methods to terminate unwanted pregnancies and under developed pelvic systems (Oliveira et al., 2014; Oxaal and Baden, 1996).

Parity of a woman has been evidenced to influence the occurrence of maternal near miss. However, the empirical evidence on the relationship between maternal near miss and parity is mixed. It is widely hypothesized that first order and high parity births are associated with occurrence of adverse maternal outcomes. While several studies (Bai et al., 2002; Ikeako and Nwajiaku, 2010; Iyoke et al., 2010; Kaye et al., 2004a; Lule et al., 2005; Mgya et al., 2013) support this hypothesis, other studies (Teguete et al., 2012) state otherwise. In their study, Teguete et al. (2012) found that grand multiparas had reduced odds of maternal deaths in Mali. Grand multi-parity is associated with maternal near miss complications including postpartum haemorrhage, ruptured uterus and obstructed labour which may be as a result of the reproductive stress that occurs with each additional birth and the advanced maternal age among these women (Bantebya-Kyomuhendo, 2004; Storeng et al., 2010). While complications among primi-paras are due to the fear or anxiety associated with first births, lack of knowledge or inexperience with child birth, poor nutrition and young age at birth. Complacency by women who had normal deliveries previously could lead to neglect of care leading to life-threatening complications among older women. Furthermore, multiple pregnancies have also been linked with occurrence of maternal near miss events (Gray et al., 2012; Waterstone et al., 2001).

Similarly, a woman's birth order is closely linked to her pregnancy outcome. First order and higher order births (five and above) increase chances of experiencing pregnancy complications. First order births may be associated with lack of experience in childbirth while

higher order births may be affected by the reproductive fatigue with each additional birth. Such women tend to use previous birth experiences to determine current pregnancy outcomes yet each pregnancy carries its own risks. In addition, higher order births are associated with less utilization of health services, delayed start of antenatal care, inadequate antenatal care and unsupervised deliveries (Celik and Hotchkiss, 2000; Navaneetham and Dharmalingam, 2002). This poor maternal health behaviour poses a great risk for the occurrence of maternal near miss complications and negative pregnancy outcomes. Adequate attendance and early start of antenatal care is important in identifying and treating women who are at risk of developing life-threatening complications (Carroli et al., 2001). In addition, supervised deliveries reduce the occurrence of obstetric complications and ensure timely access to emergency obstetric care if required.

Literature on the effect of inter-pregnancy interval and occurrence of maternal near miss complications is also mixed. Although a substantial body of literature on inter-pregnancy interval relates to infant or child survival (Oxaal and Baden, 1996), there is increasing scientific evidence on the effect of inter-pregnancy interval on pregnancy outcomes. Pregnant women with short and long inter-pregnancy intervals are equally at risk of experiencing maternal near miss complications (Conde-Agudelo and Belizán, 2000; Conde-Agudelo et al., 2007). Women with long inter-pregnancy intervals of five years and above have an increased risk of experiencing complications such as pre-eclampsia, eclampsia, antepartum haemorrhage and obstructed labour while women with short birth intervals of less than a year have an increased risk of having a ruptured uterus during vaginal deliveries, antepartum haemorrhage, and anaemia (Bujold and Gauthier, 2010; Conde-Agudelo and Belizán, 2000; Conde-Agudelo et al., 2007; Skjærven et al., 2002). Maternal near miss complications attributed to short inter-pregnancy intervals can be explained by maternal nutrition depletion,

and scar dehiscence in case of previous caesarean deliveries, while those attributed to long birth intervals can partly be explained by change of partner, and women's reproductive stress (Conde-Agudelo et al., 2012). However, the overall evidence on inter-pregnancy intervals and maternal health outcomes remains largely unclear partly due to the low quality research as reported in several systematic studies (Wendt et al., 2012).

Timing of a pregnancy maybe wanted or unwanted. Women with unwanted pregnancies are more likely to experience maternal near miss events (Kaye et al., 2004a; Waterstone et al., 2001). Unwantedness of a pregnancy affects the chances of a woman experiencing maternal near miss in mainly two ways. First, unwanted pregnancies often end up in unsafe abortions leading to maternal near miss through complications due to sepsis and severe haemorrhage (Santana et al., 2012). Secondly, these pregnancies are associated with poor maternal health behaviour including inadequate antenatal care, home births or unskilled deliveries, late start of antenatal care, smoking and alcohol intake (Erci, 2003; McCrory and McNally, 2013; Singh et al., 2013a; Singh et al., 2013b; Sunil et al., 2010). Such poor maternal health behaviour has been previously associated with adverse maternal outcomes including maternal near miss events and maternal mortality. Contrary to the above notion, a study in Nigeria found no relationship between timing of a pregnancy and occurrence of maternal near miss events (Adeoye et al., 2013).

Adverse pregnancy outcomes such as maternal near miss events may largely be influenced by women's health seeking behaviour. Carroli et al. (2001) explicitly explored the pathways through which antenatal care procedures provide opportunities for prevention, detection, and treatment of potentially life-threatening pregnancy complications. Previous studies have shown that attendance of antenatal care has a protective effect in occurrence of maternal near miss complications (Adeoye et al., 2013; Chigbu et al., 2009; Galvão et al., 2014). Similarly,

Bantebya-Kyomuhendo (2004) observed that maternal near misses had not received antenatal care but relied on the traditional health system (indigenous medicines and traditional birth attendants). Importantly, RÖÖSt et al. (2010) found that attendance of antenatal care influenced utilization of emergency obstetric care especially among disadvantaged populations, through providing initial contact between the women and the health care system in addition to other known benefits. Similarly, Hirose et al. (2011) observed that antenatal care attendance influenced timely decision-making during emergency obstetric care. On the contrary, Goffman et al. (2007) found that the attendance of antenatal care had no association with occurrence of maternal near miss events or maternal mortality.

Extensive literature exists on the importance of both health facility deliveries and skilled birth attendance in averting or reducing maternal near miss morbidity and mortality. The majority of the life-threatening pregnancy complications leading to maternal near miss and maternal mortality occur during child birth or soon after delivery and require skilled health personnel to manage them (de Bernis et al., 2003). A study in India found that 34.7% of women who delivered in the communities experienced life-threatening pregnancy complications which needed medical attention, out of which 15% required emergency obstetric care (Bang et al., 2004). Therefore, women who give birth in the communities or without the assistance of skilled health personnel are at a greater risk of experiencing adverse pregnancy outcomes.

Although a breadth of scientific evidence emphasizes the negative effects of alcohol consumption during pregnancy on the fetus and new-born (Henderson et al., 2007), pregnant women who consume alcohol are equally at a great risk of severe maternal complications. Previous studies showed that alcohol consumption during pregnancy is associated with premature mortality (Berg et al., 2008) and maternal near miss complications such as pre-eclampsia (Kiondo et al., 2012; Salihu et al., 2011). In addition, maternal alcohol intake,

through its negative effects on the placenta, is also associated with occurrence of spontaneous abortions (Chiodo et al., 2012; Rasch, 2003; Sokol et al., 2009) leading to maternal near miss complications including haemorrhage and sepsis (Camargo et al., 2011b). In Uganda, the prevalence, patterns and predictors of alcohol intake during pregnancy have previously been examined by Namagembe et al. (2010). However little is known about the effects of alcohol on occurrence of maternal near miss events.

Pregnancy termination is a result of either a spontaneous abortion (miscarriage), induced abortion or an ectopic pregnancy. In Uganda, where induced abortion is illegal except for the purpose of saving the mother's life, it is mostly undertaken by unskilled personnel using unsafe methods and under unhygienic conditions (Singh et al., 2006). These unsafe abortion procedures significantly increase the risk of severe abortion-related complications such as sepsis and haemorrhage, which complications can progress to maternal near miss or even death (Bankole et al., 2006; Camargo et al., 2011b; Grimes et al., 2006; Santana et al., 2012; Singh et al., 2006). In addition, Grimes et al. (2006) assert that unsafe abortions also increase the risk of recurrence of ectopic pregnancies and spontaneous abortions in subsequent pregnancies.

Violence (physical, sexual, psychological) during pregnancy puts the mother and the fetus at risk of developing complications. Coker et al. (2004) reported that violence during pregnancy affects maternal and new born health leading to adverse pregnancy outcomes through stress, sexual or physical trauma and infections. Indirectly, stress exacerbates the pre-existing health conditions and influences poor maternal health behaviour including poor nutrition, substance use and late start of antenatal care thereby increasing the risk of occurrence of pregnancy complications and negative pregnancy outcomes. In addition, sexual and physical trauma or

infections also aggravate pre-existing health conditions and can result in spontaneous abortions, other pregnancy complications and adverse pregnancy outcomes.

Women who experience violence during pregnancy are at a greater risk of experiencing key pregnancy danger signs including vaginal bleeding, severe nausea, vomiting, urinary tract infection and pregnancy induced hypertension (Kearney et al., 2003; Silverman et al., 2006), which are significantly associated with occurrence of maternal near miss. A systematic review by Sharps et al. (2007) stated that women who had experienced intimate partner violence were at a higher risk of experiencing complications leading to maternal near miss including haemorrhage and sepsis or infection. Similarly, other studies also showed that occurrence of ante-partum haemorrhage (Janssen et al., 2003) and pre-eclampsia (Sanchez et al., 2008) maternal near miss complications were associated with violence during pregnancy. In addition, violence during pregnancy is associated with poor maternal behavioural risks including delayed start of antenatal care, smoking and alcohol intake (Kearney et al., 2003; Quelopana et al., 2008; Silverman et al., 2006) which are linked with occurrence of negative maternal outcomes.

Socio-cultural and resource determinants play a vital role in pre-disposing women to severe maternal complications. A qualitative study by Bantebya-Kyomuhendo (2004) provided insights into the socio-cultural determinants leading to maternal near miss events to include lack of decision-making autonomy, low male involvement in reproductive health, over reliance on traditional health systems such as use of herbs and traditional birth attendants, desire for high numbers of children and witchcraft beliefs. Lack of, or inadequate resources and institutional factors were the main cause of delays experienced by maternal near miss cases. These determinants can in part explain why majority of the women reach health facilities in a critical condition putting them at a greater risk of death. Although this study

provided valuable insights into the socio-cultural determinants of maternal near miss in Uganda, it was limited in scope and lacked methodological rigour in terms of the sample size, representativeness of the cases and number of socio-cultural attributes investigated. The study fell short in exploring a number of other cultural issues such as cultural understanding of pregnancy complications, early marriages, pregnancy taboos in relation to nutrition, reproductive health care and infant care beliefs and practices which may impact on the occurrence and outcomes of maternal near miss in Uganda. In addition, only six maternal near miss cases each representing a pregnancy complication formed the basis of the conclusions hence these findings cannot be generalised to the wider community or population in which the study was undertaken as each case could have been unique. Therefore, this study employed a rigorous method mix of both qualitative and quantitative approaches; and use of a large sample size of women from diverse socio-economic backgrounds in identifying the patterns, risk factors and pregnancy outcomes of maternal near miss in Uganda.

Documented evidence shows that a number of socio-economic factors including education, residence, wealth status, religion and occupation are associated with occurrence of maternal near miss. Many studies (Amaral et al., 2011; Bantebya-Kyomuhendo, 2004; Kaye et al., 2004a; Okong et al., 2006) revealed that most maternal near miss cases had little or no education. However, in developed countries, maternal education was not associated with maternal near miss (Goffman et al., 2007) possibly due to the high literacy levels in these countries. While unemployed women were more likely to face financial barriers, delays in seeking health care and have low social status which put them at an increased risk of experiencing pregnancy complications (Amaral et al., 2011; Bantebya-Kyomuhendo, 2004; Kaye et al., 2004a; Storeng et al., 2010). Furthermore, religion may deter some women from utilizing health services and use of modern drugs which puts women at a great risk of

experiencing maternal near miss events irrespective of their socio-economic background (McCarthy and Maine, 1992). A study in Uganda (Nattabi et al., 2011) revealed that religion had an impact on family planning uptake at institutional level and not at individual level. From this study, current use of family planning methods was significantly associated with non-attendance of a Catholic-based hospital while being Catholic was not associated with current use of family planning methods among persons living with HIV/AIDS in Northern Uganda. This is because Catholic-based health facilities do not promote use of modern contraceptives in their facilities while persons living with HIV/AIDS regardless of their religion are encouraged to use safer sex practices so as to avoid re-infections hence the contradictory findings. Religion has similar attributes to culture in influencing risks of maternal near miss. Some of the ways through which religion affects maternal near miss are health seeking behaviours, family planning, beliefs about fertility and childbearing and age at onset of childbearing.

Few studies have explicitly explored the socio-economic characteristics of the women's spouses in influencing maternal near miss yet men play a great role in reproductive health decision-making at household level. Women with uneducated or unemployed husbands have been found to be at a higher risk of experiencing maternal near miss (Bantebya-Kyomuhendo, 2004; Kaye et al., 2004a). However, these studies had methodological limitations including being descriptive in nature and lacked statistical validity of the relationship between the partner's major socio-economic characteristics and occurrence of maternal near miss events; hence the inability to generalize such findings to the wider population. Thus, this study examined the effect of the spouse's education and occupational status on the occurrence of maternal near miss events.

Cultural values are important in influencing the status of women, reproductive and health behaviour which may explain occurrence of maternal near miss events. A previous study in Uganda observed that culture is central in determining reproductive behaviours including age at childbearing, number of children ever born, birth intervals, child sex preferences and sexual behaviour. Other factors that are culturally influenced and affect maternal health and mortality include nutritional behaviour, gender relations and decision-making and access to productive resources (Bantebya-Kyomuhendo, 2004).

2.5.2 Safe Motherhood Conceptual Framework

The *Safe Motherhood conceptual framework* (Tinker et al., 1993), in an attempt to improve the model or framework proposed by McCarthy and Maine (1992) noted that any safe motherhood programme should focus at least on one of the following outcomes including prevention of maternal morbidity or mortality, recognition and management of pregnancy complications, and promotion of health mothers and their new-borns. This framework outlines two possible outcomes including healthy mothers and new-borns or maternal and perinatal morbidity and mortality. These outcomes are influenced by proximate determinants, including pregnancy, development of pregnancy complications and management of the pregnancy states (pregnancy, labour and postpartum). These proximate determinants are influenced by the intermediate factors including access to and quality of family planning and maternal care, reproductive and health behaviour and women's health and nutritional status. Additionally, the immediate factors are influenced by contextual factors which include women's status (education, nutrition, income, level of isolation, access to resources), political commitment (resources, health infrastructure) and social economic development (transport, communication, and sanitation). The proponents of this framework (Tinker et al., 1993) note that while all proposed factors can influence maternal and child outcomes, some factors such

as family planning services and management of obstetric complications have greater impact than socio-economic development factors.

Its major contribution is the separation of the proximate determinants of maternal morbidity and mortality, management of the pregnancy states, and inclusion of infant outcomes by describing the causal relationship among the proximate and contextual factors on maternal and new-borns morbidity or mortality. Despite their efforts in expanding the maternal mortality framework, the relationship between the proximate determinants was not clearly elaborated. More emphasis was placed on the role of immediate and proximate determinants in influencing maternal and perinatal outcomes as compared to the background factors.

2.5.3 The Three Delays Model

The *Three Delays Model* proposed by Thaddeus and Maine (1994) explains the circumstances leading to maternal near miss or mortality after the onset of pregnancy complications. These circumstances are explained using three types of delays that often manifest after onset of obstetric complications which may hinder access to or utilization of EmOC. The first delay occurs at household level and is characterized by delay to seek health care. Several reasons account for delays at household level including lack of autonomy in decision-making by women, poverty, lack of knowledge or failure to recognise onset of disease, cultural perceptions about pregnancy and child birth, and negative attitudes about biomedical health service utilization by women or their household members (Filippi et al., 2009; Hirose et al., 2011; Kabali et al., 2011).

The second delay relates to impediments in accessing health facilities which is attributed to the inaccessible roads, long distances, poor referral mechanisms, lack or inadequate finances for transport, complications occurring at night or weekend, and or lack of transport to health facilities (Filippi et al., 2009; Hirose et al., 2011; Kabali et al., 2011), while the third delay

relates to delays in receiving medical care at health facilities. Delays at health facilities can be attributed to the quality of maternal care, lack of emergency obstetric services, lack of essential medicines, unskilled or negligent health workers, absenteeism of health workers, inadequate numbers of health workers, lack of services such as water and electricity, and non-functional equipment (Kabali et al., 2011).

This framework is credited for its ability to explain causes of maternal mortality beyond the known demographic and medical or obstetric factors, linking factors at household, community and health facility level with demographic and proximate causes of mortality (Kalter et al., 2011; Pacagnella et al., 2012). However the framework has been faulted because it does not account for complications that could have developed earlier and could have been detected or prevented during antenatal care (Filippi et al., 2009; Gabrysch and Campbell, 2009). The weakness of this framework is further accentuated by its failure to examine other intervening factors that could lead to maternal near miss or mortality including underlying medical and clinical conditions such as malaria, HIV/AIDS and diabetes. Notably, Pacagnella et al. (2012) proposes a fourth delay associated with maternal near miss experiences. Maternal near misses may experience secondary infections or conditions in the postpartum period that require medical attention but may still delay to receive care due to psychological problems or increased economic burden on the family (Pacagnella et al., 2012).

There is extensive empirical literature on the role of the three delays in occurrence of maternal near miss events. Women who experienced any of the three delays in Brazil were found to be at a higher risk of experiencing maternal near miss events (Pacagnella et al., 2014). Near misses often arrive at health facilities in a critical condition and this can partly be attributed to delays at household level or delays in accessing health facilities. (Filippi et al., 2009; Hirose et al., 2011; Kabali et al., 2011; Lori and Starke, 2012). Delays in seeking

health care (first delay) and delays in receiving health care (third delay) are the most frequent types of delays that account for the occurrence of maternal near miss events. A systematic review by Filippi et al. (2009) showed that a higher proportion of maternal near misses experienced delays at household level (19% - 58%) compared to maternal near misses who experienced delays in accessing health facilities (7% - 53%). Likewise, David et al. (2014) found that 70% and 64% of maternal near misses cases in Mozambique reported factors contributing to delays in receiving health care and delays in seeking health care respectively.

Research also shows that experience of the first delay (Adeoye et al., 2013; Bantebya-Kyomuhendo, 2004), second and third delays (Pacheco et al., 2014) influences occurrence of maternal near miss events. Additionally, Kabali et al. (2011) and Cavallaro and Marchant (2013) reported that delays in receiving obstetric care at health facilities resulted from shortage of essential drugs, lack of blood, lack of oxygen, shortage of equipment or infrastructure, poor attitudes of health personnel towards the women, negligent health workers and lack of qualified health personnel. On the contrary, Adeoye et al. (2013) did not find any association between the second delay (accessing health facilities) and occurrence of maternal near miss events.

2.5.4 Health Belief Model

Borrowing from three dimensions of the Health Belief Model (Janz and Becker, 1984), it can be conceptualized that men's perceived severity of pregnancy complications, and perceived benefits less barriers determines their role in women's access to or utilization of emergency obstetric care and aversion of maternal deaths. Similarly, men's perceived severity of maternal near miss events may be influenced by their demographic characteristics or stimulus for action. In addition, "*beliefs about the threat of illness and efficacy of medical care are consistently related to the use of services*" (Janz and Becker, 1984) hence men's perceived

threat to the consequences of maternal near miss events such as death or disability may influence their involvement in women's access to emergency obstetric care.

2.5.5 Behavioural Model of Health Service Use

The *Behavioural Model of Health Service Use* is based on the premise that predisposing factors (health beliefs, demographic factors), enabling factors (community and personal) and the perceived need, respectively, influence the use of health services (Andersen, 1995). In the study context, it can be postulated that after the onset of maternal near miss events, the perceived severity of the woman's condition necessitates the need for utilization of emergency obstetric care and hence the possible involvement of men in a bid to improve the woman's health status.

2.5.6 An analytical framework for the study of child survival in developing countries

This framework was developed by Mosley and Chen (2003) who proposed that socio-economic determinants operate through proximate determinants to influence child survival. They identified the proximate determinants as maternal characteristics (age, parity, birth interval), environmental contamination (air, food/water/fingers, skin/inanimate objects, insect vectors), nutritional deficiency (calories, proteins, micronutrients), injury (accidental or intentional) and personal illness control (personal preventive measures and medical treatment) while socioeconomic determinants identified were individual, household and community factors.

Child health and survival is greatly linked to maternal health before pregnancy, during and after pregnancy (Koblinsky et al., 2012; Lule et al., 2005; Mosley and Chen, 2003; Tinker et al., 1993). Although this framework was developed to better understand factors influencing child survival, it can also be used to study the net effect of maternal near miss and mortality on infant survival outcomes while controlling for socio-economic, cultural, and demographic

factors. This is because all proximate determinants identified by Mosley and Chen (2003) are potential risk factors associated with pregnancy complications leading to maternal near miss or mortality.

2.5.7 New-born Survival Conceptual Framework

This framework was conceptualized by Marsh et al. (2002) and discussed five pathways through which new-born care practices could be addressed to improve infant outcomes. These include use of routine maternal and new-born care and good-quality services, response to maternal danger signs, response to the non-breathing new-born, care for the low birth weight baby, and response to new-born danger signs, particularly those of infection.

Maternal health affects pregnancy outcomes and is also inseparable from infant survival. Information on birth outcomes of maternal near misses is important in assessing the quality of care for both the mother and new-born (Say et al., 2009). Maternal near miss cases are more likely to have negative pregnancy outcomes including still births and neonatal deaths (Kyomuhendo, 2004; Storeng et al., 2010). Maternal near miss cases have also been associated with early pregnancy losses due to induced abortions, miscarriages and ectopic pregnancies (Storeng et al., 2010). Despite an attempt to explore the pregnancy outcomes of maternal near miss in these qualitative studies, the patterns or statistical differentials of the proportion of infant deaths by maternal near miss status; and the net effect of maternal near miss on infant deaths remain largely unexplored.

Maternal complications during pregnancy adversely affect the foetus and new born babies. According to Shapiro-Mendoza et al., (2008), high occurrence of new born morbidity especially among late pre-term infants was associated with severe pregnancy complications exacerbated by chronic medical conditions and organ dysfunctions experienced by the women. In addition, maternal near miss cases resulting from hypertensive disorders were

greatly linked with perinatal deaths. In linking the secondary outcomes of maternal near miss, Amaral et al., (2011) asserted that complications arising from hypertensive disorders were responsible for 33% of the still births and 17% of the neonatal deaths.

A quarter of intra-partum and early neonatal deaths in low-income countries occur during labour or delivery resulting from pregnancy complications (WHO, 2005b). These adverse pregnancy outcomes partly result from poor management of life-threatening complications and poor new-born care practices in the first critical hours after birth (McClure et al., 2006; WHO, 2006a; Zupan, 2005). Maternal near miss complications have a negative effect on perinatal mortality. These complications have previously been found to be the main risk factors of perinatal mortality (Kusiako et al., 2000; Weiner et al., 2003). Zupan (2005) further illustrated that the risk of a perinatal death in a pre-eclamptic woman is 13%, which condition if untreated, increases the risk to 28%.

There is scanty scientific information on the effect of the life-threatening conditions or severe pregnancy complications on the foetus and infant health. Most studies carried out in sub-Saharan Africa are qualitative and lack statistical validity hence causality cannot be inferred. Thus, this study employed rigorous methodological approaches to explore the pregnancy outcomes, patterns and net effect of maternal near miss on birth outcomes in Uganda.

With similar causes of maternal near miss and maternal deaths, analysis of maternal near miss cases has several benefits in maternal health care studies (Pattinson and Hall, 2003; Say et al., 2009). First, maternal near misses occur more frequently than maternal deaths. With more cases for analyse of adverse maternal outcomes, inferences and generalizability can easily be made. Secondly, maternal near misses can be interviewed to obtain detailed information. This is unlike in the case of maternal deaths, where information on events that occurred during pregnancy is got from women's family members, which may be unreliable.

Most importantly, maternal near misses can be used to assess the quality of obstetric care at health facilities explaining the continuum of care associated with these adverse maternal events (Say et al., 2009).

2.6. Synthesis

The theories and literature reviewed present a wide spectrum of information on the magnitude, patterns, socio-economic, risk factors and birth outcomes of maternal near miss in different settings in both developed and developing regions. Most of the studies reviewed attempted to estimate the magnitude and identify the main indicators of maternal near miss. The magnitude of maternal near miss largely depends on the criteria used to identify maternal near miss cases. The organ dysfunction criterion provides the least estimate while the clinical presentation of specific diseases provides a higher estimate of maternal near miss, regardless of the study population. Variations were also observed to exist in the reference populations used in the estimation of maternal near miss. Reference categories used to compute the magnitude of maternal near miss included: pregnancies, total live births and deliveries. The causes of maternal near miss in developed regions differed from those in developing regions. While hypertensive disorders were the main cause of maternal near miss in developed regions, studies in developing regions revealed that haemorrhage, sepsis and obstructed labour were the main causes of maternal near miss.

From the literature review, it was also evident that there are variations in the criteria used for identifying maternal near miss cases, study designs, measurement issues and study settings. Three criteria including organ dysfunction, clinical presentation of diseases and management procedures were used to identify maternal near miss cases. The study setting varied from hospital based to community based approaches of investigating maternal near miss, although the majority of the studies were institutional based. The study designs ranged from cross

sectional, retrospective, case-control to longitudinal studies. All these wide variations affect comparisons of the maternal near miss between and within countries.

A wide range of risk factors have been investigated by different researchers. The common and cross-cutting risk factors across different settings included: age at birth, parity, chronic medical conditions, previous pregnancy complications, antenatal care attendance and emergency caesarean deliveries. Risk factors such as smoking, substance use, family history, obesity and multiple pregnancies have been mainly investigated in studies undertaken in developed regions. Among the socio-economic factors, education, residence and marital status of the maternal near miss cases have been documented. However, few studies, especially in sub-Saharan Africa have further explored the education and occupational status of the women's spouses yet men play an important role in decision-making at household level. Social attributes like religion have also been omitted in most studies yet religion too affects utilisation of health services by women in a number of settings. Furthermore, cultural attributes have not been explicitly explored by most of the studies in sub-Saharan Africa yet culture plays a great role in influencing utilization of health services.

Only one study reviewed focussed primarily on the effect of maternal near miss on birth outcomes as one of the pregnancy outcomes of maternal near miss. Most studies focused on estimating the magnitude, causes or patterns and identifying the risk factors of maternal near miss in different settings. Only one study in Burkina Faso investigated the consequences of maternal near miss but with focus on the women. Furthermore, most of the maternal near miss studies undertaken in sub-Saharan Africa have lacked in methodological rigour. The majority of these studies reviewed are descriptive in nature hence causality cannot be inferred and generalizations cannot be made. A number of studies have employed a sample size of less than 1000 women and have been limited in scope.

From the review, the following knowledge gaps have been identified:

- Magnitude of maternal near miss remains largely unknown as very few (2) quantitative studies have been previously undertaken in Uganda. Additionally, these studies were institutional maternal near miss audits hence excluding home births; and used the organ dysfunction criteria whose limitations such as lack of or inadequate diagnostic facilities, scarcity of ICUs, different criteria to admit patients into the ICUs and poor documentation of clinical markers of organ dysfunctions in poor settings are widely known. With such limitations, the findings have limited relevance to maternal and child health programming and thus the need for new study approaches in the investigation of maternal near miss in Uganda.
- A number of cultural attributes including cultural understanding of pregnancy complications, early marriages, pregnancy taboos in relation to nutrition, reproductive health care and infant care beliefs and practices, have not been previously explored in influencing the occurrence of maternal near miss in Uganda. The effect of these cultural attributes on the occurrence and outcome of maternal near miss cannot be underscored given widely documented importance of culture in health in sub-Saharan Africa.
- A number of socioeconomic attributes including religion, partner's education, partner's occupation status, alcohol intake during pregnancy, and decision-making have often been excluded in maternal near miss studies. This study sought to widen the scope of the factors investigated through inclusion of the above attributes.
- There is lack of scientific documented evidence on the patterns and net effect of maternal near miss on birth outcomes in sub-Saharan African countries and particularly in Uganda. Only circumstantial evidence linking the effect of maternal near miss on

pregnancy outcomes and birth outcomes have been found, thus the need for further exploration and assessment of these relationships.

- The scope of maternal near miss studies in Uganda has been limited. Previous studies on maternal near miss in Uganda considered women in the intra-partum or labour period yet women continue to experience complications during pregnancy and postpartum period. This led to under-estimation of the magnitude of maternal near miss in Uganda.
- Lastly, most studies in sub-Saharan Africa have lacked methodological rigour in terms of sample size, use of different base populations in the computation of the magnitude of maternal near miss, in addition to being descriptive in nature. This study used a large sample size to estimate the magnitude of maternal near miss, in addition to employing qualitative data to further understand the underlying attitudinal and behavioural influences on maternal near miss.

2.7. Conceptual framework

All the models reviewed were developed on the premise that socio-economic determinants operate through proximate determinants to influence maternal or child health outcomes and share at least one of the following attributes: the importance of maternal characteristics and role of delays in determining both maternal and child morbidity or mortality; no single proximate determinant works independently to influence maternal and child health outcomes; more emphasis on the proximate determinants; and under-score the importance of the socioeconomic determinants in influencing maternal and child health outcomes. It is therefore clear that none of the models reviewed can individually explain occurrence of maternal near miss, its magnitude, causes, risk factors and birth outcomes. The conceptual framework presented in Figure 2.1 was modified based on three frameworks including the Framework for analysing the Determinants for Maternal Morbidity and Mortality (McCarthy and Maine,

1992), Safe Motherhood framework (Tinker et al., 1993) and the Three Delays Model (Thaddeus and Maine, 1994).

Figure 2.1 shows that background factors operate through the immediate factors to influence pregnancy outcomes. Socio-economic and demographic factors may influence women's reproductive status or maternal attributes, health status, health seeking behaviour of women, access to health services and timely seeking of medical care. In this study, several background characteristics including age, place of residence, educational attainment, wealth status, occupational status, marital status, religion, ethnicity, partner attributes and decision-making, were examined in determining their role in influencing maternal near miss complications. It is envisaged that women with low social economic status have poor health status, poor health seeking behaviour and limited access to health services, hence being at a higher risk of experiencing maternal near miss events. Religion and ethnicity may influence women's norms, beliefs and practices which may impact on women's maternal health seeking behaviour and consequently their pregnancy outcomes. Cultural norms may have an effect on the reproductive decision-making processes, cultural division of labour, and women's status in the household and health care beliefs. Additionally, partner attributes such as educational attainment, occupation and age may also affect women's health seeking behaviour, thus determining occurrence of maternal near miss events.

A woman's reproductive status or maternal attributes can determine her pregnancy outcome. As shown in Figure 2.1, reproductive status or maternal characteristics are part of the immediate factors that directly influence whether a woman will have a safe or complicated pregnancy leading to maternal near miss events. A set of reproductive status or maternal attributes were considered in this study to influence pregnancy outcomes including age at birth, parity, gravidity, inter-pregnancy interval, birth order and timing of pregnancy. Women

at extreme ages (below 19 years and above 35 years) may have a higher risk of experiencing maternal near miss complications while women with unwanted pregnancies may also have a higher risk of experiencing pregnancy complications. Additionally, extremes of parity (1 child and 5+ children), gravidity (1st pregnancy and 5+ pregnancies), birth order (birth order 1 child and birth order 5+), and inter-pregnancy intervals (short and long inter-pregnancy intervals) may also be associated with an increased risk of experiencing maternal near miss complications.

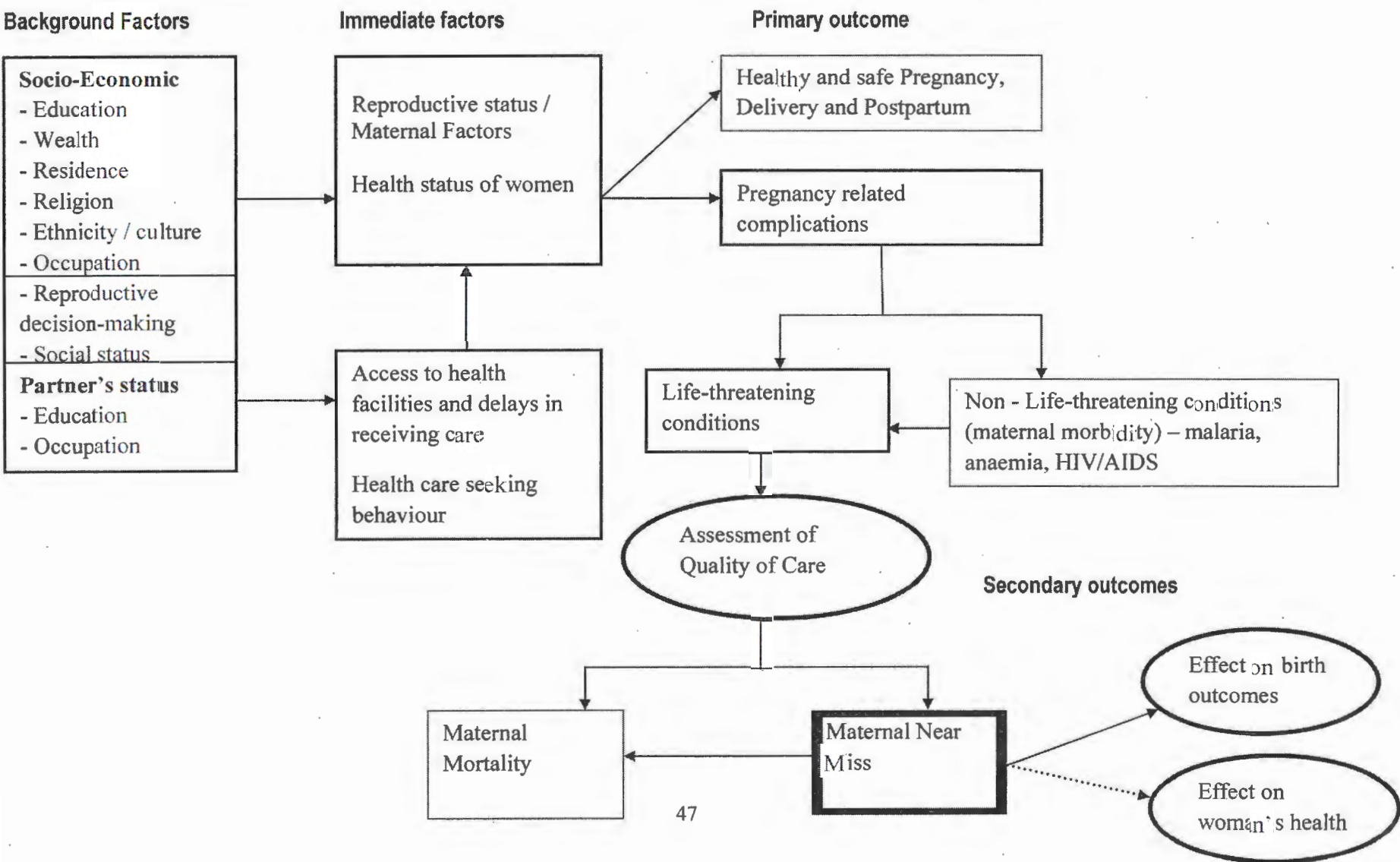
The health status of a woman was hypothesized to determine the occurrence of maternal near miss complications in this study. A woman's health status was characterized by four attributes including history of maternal near miss complications, experience of pregnancy danger signs, infectious diseases (HIV/AIDS, malaria), and presence of any chronic medical conditions (diabetes mellitus, hypertension, asthma, sickle cells, cardiovascular diseases). Based on scientific evidence, women with chronic conditions, history of maternal near miss complications and those with infectious diseases and experienced pregnancy danger signs may have an increased risk of experiencing maternal near miss complications.

Limited access to health services may also contribute to the occurrence of maternal near miss complications. Women who lack finances to pay for medical services or those who have to walk long distances to access health services may be at an increased risk of experiencing maternal near miss events compared to their counterparts. In addition, women who experience delays at household level or delays in accessing health facilities and at health facility level also have an increased chance of experiencing maternal near miss complications compared to those who do not experience any delays.

The health seeking behaviour of women before conception, during and after pregnancy are possible predictors of maternal near miss complications. Attendance of antenatal care, skilled birth delivery or health facility delivery and attendance of postnatal care may determine whether a woman experiences a safe delivery or maternal near miss events. Specifically, the number of times a woman attends antenatal care, timing of first antenatal care visit, quality of antenatal care, place of delivery, attendance and timing of postnatal care may determine a woman's pregnancy outcome. It is hypothesized that women with poor maternal health seeking behaviour are more likely to experience adverse maternal outcomes such as maternal near miss. Additionally, maternal behaviour such as non-use of family planning prior to conception, alcohol intake during pregnancy and intimate partner violence may also increase chances of pregnant women experiencing maternal near miss complications.

As illustrated in Figure 2.1, the immediate factors determine whether a woman experiences a safe pregnancy or complicated pregnancy. In a complicated pregnancy, the complications may either be life-threatening or non-life-threatening. The life-threatening pregnancy complications can result into maternal near miss events or maternal deaths, depending on the obstetric care received by the woman at that critical time. In addition, maternal near miss events have repercussions on both the life of the mother (survivor) and the foetus or new-born. This study also assessed the birth outcomes of maternal near misses. Maternal near misses may be at an increased risk of having negative or poor birth outcomes including early pregnancy losses, still births, infant complications and poor new-born care practices.

Figure 2. 1 Conceptual Framework explaining the risks factors associated with maternal near miss and its outcomes



Chapter Three: Methodology

3.1. Introduction

This chapter describes the methodology that was used in achieving the study objectives including estimation of the magnitude of maternal near miss, the causes, risk factors, and birth outcomes of maternal near miss, in addition to men's role in maternal near misses' access to emergency obstetric care. It covers the study setting, research design, sample size, sampling design, study population, data collection techniques, study variables, data measurements, data management and data analysis plan. Data quality and assessment procedures are also explained in this chapter. In addition, ethical considerations and limitations of the study have also been presented herein.

3.2. Study Setting

The study was undertaken in Uganda's Central region in Rakai district. Therefore this section describes the study setting in terms of the geographical, administrative, demographic, health, social, and economic profile of Uganda, the Central region and Rakai district respectively.

Uganda, a landlocked country, is one of the countries that comprise the Eastern African region. It is bordered by Kenya in the East, South Sudan in the North, Democratic Republic of Congo in the West, Rwanda in the South West, Tanzania in the South, and a large portion of Lake Victoria in the South. Figure 3.1 shows the map of Uganda, location of the Central region and an insert of Rakai district while Table 3.1 presents a summary of the demographic, socio-economic, administrative and health profile of Uganda and Rakai district. Results of the National Population and Housing Census (NPHC) show that Uganda has a total population of 35 million, a population density of 174 persons per square kilometre and annual growth rate of 3.03% (UBOS, 2014a). More than half (51%) of Uganda's population are females; 81% reside in rural

Centre IIs (parish level), Health Centre IIIs (sub-county level), Health Centre IVs (county level) and a district hospital. From the district hospital is the regional referral hospital and two national referral hospitals, respectively. The community health workers are responsible for mobilizing and sensitizing the population about health issues and utilization of health services. Additionally, the level of health service or care provision increases as the hierarchy goes up. In terms of maternal health care services, Health Centre IIs offer antenatal care services while Health Centre IIIs offer basic obstetric care and Health Centre IVs onwards offer comprehensive obstetric care.

Uganda's health policy recommends that the population should live within a walking distance of 5 kilometres to a health facility (MoH, 2010a). It is estimated that 72% of the Ugandan population lives within the 5 kilometre radius of a health facility (MoH, 2010a). While the average distance to a health facility is 3.6 kilometres, the average distance to a government hospital is 7.6 kilometres (UBOS, 2014b). This distance has implications on access to maternal health services, particularly access to emergency obstetric care. Research shows that long distances to health facilities hinder health service utilization (UBOS, 2014b; UBOS and ICF, 2012). Additionally, only 34.9% and 37.5% of the population live within the 5 kilometres' radius of a government health centre and a private health facility or clinic respectively (UBOS, 2014b).

Overall, the health status of the population is poor as shown in Table 3.1. Uganda's infant mortality remains high at 54/ 1000 live births, with half of the deaths occurring in the neonatal period (UBOS and ICF, 2012). This is coupled with a high maternal mortality ratio of 438/ 100,000 live births, low skilled deliveries (58%), low contraceptive prevalence rate (30%), and high HIV/AIDS prevalence of 7.3% (UBOS and ICF, 2012).

Table 3. 1 Profile of Uganda and Rakai district

No.	Indicators	Uganda	Rakai district
A. Population / Demographic Indicators			
1.	Population Size (persons)	35 million	518,008
2.	Female population (persons)	18 million	264,954
3.	Male population (persons)	17 million	253,054
4.	Sex Ratio (males / 100 females)	94.5	95.5
5.	Rural population (persons)	28.5 million	484,163
6.	Urban population (persons)	6.5 million	33,845
7.	Population growth rate (%)	3.03	2.06
8.	Number of households	7,353,427	117,077
9.	Average household size	4.7	4.4
10.	Rural household size	4.8	-
11.	Urban household size	4.2	-
12.	Total fertility rate (average children per woman)	6.2	-
13.	Population Density (persons/ square kilometre)	174	-
14.	Number of districts	112	n/a
B. Health Indicators ^a			
15.	Infant mortality rate (per live births)	54	-
16.	Maternal mortality ratio (per 100,000 live births)	438	-
17.	HIV prevalence (%) ^b	7.3	-
18.	Contraceptive Prevalence Rate (%)	30	-
19.	Skilled deliveries (%)	58	20 -39% ^c
C. Social Indicators			
20.	Literacy level (%)	71	75.9 ^c
21.	Male literacy level (%)	77	80.2 ^c
22.	Female literacy level (%)	65	70.2 ^c
23.	Ethnic group(s)	56	Baganda
24.	Main Religious affiliation	Christians	Catholics
D. Economic Indicators			
25.	Main economic activity	Agriculture	Agriculture
26.	GDP at current market prices (shillings)	58,865 billion	n/a
27.	Per capita GDP at current market prices (shillings)	1,638,939	n/a
28.	% of health budget of the national budget (FY 2013/14)	8.7	n/a
29.	Unemployment rate (%) ^d	9.0	-
30.	Poverty level (%)	19.7	-

Sources: (UBOS, 2014a, ^a UBOS and ICF, 2012, ^b MoH, 2011, ^c Rakai District Local Government, 2009, ^d UBOS, 2014b)

Education, ethnicity and religion are some of the social indicators of a population that shape people's beliefs and behaviours. Seventy one percent of Ugandans aged 10 years and above are literate, although there is a wide disparity between male and female literacy levels as shown in Table 3.1. The highest proportion of Ugandans has attained primary education. Additionally, Uganda has 56 ethnic groupings with about 9 main ethnic groupings (UBOS, 2006). The highest proportion (18%) of the population are Baganda (UBOS, 2006). The majority of the population is Christian with the highest proportion being Catholics followed by Anglicans or Protestants. (UBOS and ICF, 2012).

Table 3.1 presents selected economic indicators of Uganda. The gross domestic product (GDP) is 58.9 billion Ugandan shillings. From the national budget, 8.7% is allocated to the health sector. This is below the continental agreed 15% of national budgets to the health sector (African Union Secretariat, 2006b) and has implications on health financing, particularly maternal health services. The main economic activity of Ugandans is agriculture, with the majority of the population engaged in subsistence agriculture (UBOS, 2014b; UBOS and ICF, 2012). Lastly, about 20% of Ugandans are poor, which translates to 6.7 million Ugandans. There exists a huge disparity between poverty levels in the urban and rural populations. About 22.8% of the rural population are poor compared to only 8.3% of the urban population (UBOS, 2014b).

The Central region covers a total land area of 61,403 km². It has an estimated population of 9.6 million people which accounts for 26.7% of the country's population (UBOS, 2014b). The region consists of 24 districts, of which one is an island. This region comprises Uganda's largest ethnic group – the Baganda. Except in the capital city, the main occupation of the population is farming followed by fishing and trading activities. In addition, the majority of the population in this region are Christians, with Catholics accounting for the highest proportion. Despite being most developed region and home to the capital city, a larger part of this region is rural and

underdeveloped, with poor reproductive health indicators which are not different from other parts of Uganda.

The study was undertaken in Rakai district in the south western part of the Central region of Uganda. The demographic, socio-economic indicators are presented in Table 3.1. The district has a population of 518,008 persons with a total female population of 264,954 persons, out of which 41.5% are aged between 15 – 49 years. The district is comprised of 21 lower administrative units (sub-counties), out of which, 18 are rural and 3 are urban. The socio-economic characteristics of the district are similar to those of the Central region, with majority of the population being employed in the agricultural sector, belonging to the Catholic religion and mainly being Baganda.

Particularly, data was collected from Kalisizo town council and Lwamaggwa sub-county. Kalisizo town council is located in an urban area and is characterised by a flat landscape; the infrastructure includes a government hospital, private health facilities, relatively good transport network, in addition to access to electricity and clean water facilities. In contrast, Lwamaggwa sub-county is located in the far distant rural and remote area of the district. The sub-county is characterised by a hilly landscape; poor housing and sanitation facilities; lack of social amenities; no access to electricity supply, poor road network and no safe, clean water facilities. In addition, the sub-county is serviced by lower-level health facilities such as health centre III at sub-county level and health centre IIs at parish level. Only a third of pregnant women in the district have supervised deliveries while the ratio of midwives to pregnant women is 1:360 (Rakai-District, 2009).

3.3 Research Design

This study used a cross-sectional retrospective research design in which the population is classified according to the presence or absence of an outcome (Porta et al., 2014). The primary purpose of cross sectional studies is to measure prevalence and identify associations between explanatory and outcome variables (Mann, 2003). With this study design, data was collected from a representative sample at a particular point in time. This research design is advantageous because of its probabilistic and large sample, and higher external validity, which allow findings to be generalized to the larger population from which the sample was drawn (Bowling, 2002). However, cross-sectional designs have three limitations including inability to establish causality, recall bias and inapplicability in measuring rare outcomes. To address these limitations, this study focused on the last pregnancy in the last three years and employed a large sample size.

Both quantitative and qualitative methods were used to collect data. Quantitative methods (structured questionnaire) were used to collect data on the demographic, socio-economic profile of the respondents in addition to the risk factors and birth outcomes of maternal near miss. While qualitative methods (focus group discussions, in-depth interviews, narratives) were also used for several reasons. The qualitative findings were partly used to contextualize and supplement the quantitative findings as discussed by Onwuegbuzie and Leech (2005). Additionally, the qualitative methods were used to examine knowledge, attitudes, perceptions and cultural beliefs that determine women's reproductive behaviours. Furthermore, the qualitative methods were used to assess men's role in women's access to emergency obstetric care. Primary data collection was justified because available secondary data had 4 major limitations including exclusion of women who deliver at home, inadequate inclusion of socio-demographic profiles of women, limited data on maternal health indicators, and lack of data on cultural beliefs or attributes.

3.4. Sample Size

Appropriate sample size is important for validity and representativeness of the sample to the population of interest. It is also important in determining the choice robustness of the sample for multivariate analyses (Israel, 1992). The sample size for this study was determined by using the Kish (1965). This method was chosen as appropriate for determining the sample size because the number of women who had a pregnancy in the three years prior to the study was unknown and also because it is a good method to obtain a robust sample size for estimation of rare events such as maternal near miss. The Kish scientific method is expressed as:

$$n = \frac{Z_{\alpha/2}^2 P (1 - P)}{SE^2}$$

where:

- n = required sample size;
- $Z_{\alpha/2}$ = standard normal curve corresponding to the desired confidence level of 95% (1.96);
- P = estimated proportion of women (15-49years) who got pregnant in the last three years. Given that this proportion of women was unknown, P was be assumed to be 0.5 for maximum variability;
- SE = standard / permissible error or desired level of precision which is 5%

$$n = \frac{1.96^2 * 0.5 * 0.5}{0.05^2}$$

$$n = \frac{0.9604}{0.0025}$$

$$n = 384.16 \approx 384 \text{ respondents}$$

A design effect of 4 was considered in the computation of the sample size leading to an estimated sample size of 1536 respondents. The design effect was doubled from the default design effect of 2 used in most studies for two main reasons. First, maternal near miss is a rare event and in order to achieve a reliable true estimate of its prevalence and risk factors, there was

need to have a relatively large sample size. Secondly, it accounted for the numerous stages of sampling that were taken into account in selecting the study respondents, in addition to accounting for the sampling errors or variance for the rare occurrence of events of maternal near miss similar to maternal mortality. In addition, a non-response rate of 1.5% was assumed, which brought the final sample size (n) to 1559. Only two respondents refused to be interviewed and thus a total of 1,557 respondents were interviewed.

3.4.1 Sample size for qualitative methods

The sample size for the qualitative component of the study varied for each method used. A total of 9 focus group discussions (FGDs) were done and these were stratified by both place of residence and gender. A total of 5 focus group discussions were conducted in the rural areas while a total of 4 focus group discussions were conducted in urban areas. More focus group discussions were undertaken in the rural areas compared to the urban areas. This was because of the large proportion of the study population that resided in the rural areas, in addition to the wide variation in ethnicities in the rural areas compared to the urban areas. With regards to gender distribution, a total of 4 women's and 5 men's focus group discussions were conducted. The focus group discussions conducted among men were slightly higher than those conducted among women. This was because focus group discussions were one of the main sources of information from women's partners compared to women whose information was majorly collected through individual interviews. Secondly, there was need for more in-depth information from men on several maternal health issues regarding male perceptions, knowledge and involvement in maternal health care. Overall, the maximum number of focus group discussions for the study was determined by the level of saturation from the information that had been collected from the 9 focus group discussions. The focus group discussions were distributed as follows.

- 2 Focus Group Discussions for women residing in the rural areas (Mudaala and Kiweeka) who had a pregnancy in the last three years.

- 2 Focus Group Discussions for women residing in the urban areas (Kalisizo Town Council – South and Bulinda A) who had a pregnancy in the last three years.
- 3 Focus Group Discussions for men residing in the rural areas (Mudaala, Lutete, Kiweeka) whose partners had a pregnancy in the last three years.
- 2 Focus Group Discussions for men residing in the urban area (Kalisizo Town Council – North and Bulinda A) whose partners had a pregnancy in the last three years.

The sample size for the in-depth interviews was 30. This sample size included 20 maternal near miss and 10 men whose partners experienced maternal near miss complications. This sample was selected purposively based primarily on women's experiences of maternal near miss complications. In addition to that criterion, these interviews were varied not only to include each disease condition leading to maternal near miss complications in the study population but also to include women with one of the risk factors being investigated. These risk factors included chronic medical conditions, high parity, young or old age at birth, alcohol intake during pregnancy, intimate partner violence, gravidity, history of pregnancy complications, experience of pregnancy danger signs and unwantedness of the pregnancy.

The sample size for the narratives was not pre-determined and was based on the number of women who experienced maternal near miss complications in the study population. Narratives from a total of 434 women who were maternal near misses were collected.

3.5. Sampling Design

A multi-stage sampling design involving four stages was used to conduct the sampling for this study. The first stage comprised of selection of one district from the Central region with the poorest health status particularly maternal health indicators including low health facility deliveries or low skilled birth attendance. These indicators were obtained from the District League Table (MoH, 2012). The district which met the above criteria was Rakai district.

The District League Table is a tool used to assess or compare health sector performance between districts using management and service delivery output indicators. The key health indicators compiled include: health facility deliveries, antenatal care visits, proportion of pregnant women who receive the 2nd dose of malaria treatment, HIV/AIDS service availability, proportion of new smear tuberculosis cases, outpatient utilization per capita, pit latrine coverage and the percentage of infants who receive the three doses of diphtheria vaccine on schedule. All these indicators are scored and districts are ranked based on their total score performance. The District League Table was chosen because it compiles information on health facility deliveries for all districts in the country, thus giving a better representation of health service delivery for each district.

The stratified sampling method was then used to select two (one urban and one rural) sub-Countries from sample frames of rural and urban sub-Countries in the second stage. After stratifying by place of residence, purposive sampling was then used to choose the two sub-Countries based on having the highest number of pregnancies in the preceding year of the study (2012). In the third stage, villages or enumeration areas (EAs) were selected from each sub-county using the Uganda Population and Housing Census (2002) listing of EAs developed by Uganda Bureau of Statistics. Using the list of EAs as a sampling frame for each sub-County, the simple random sampling was then used to select four out of a total of eight EAs in the urban sub-County and fifteen out of a total of fifty eight EAs in the rural sub-County leading to a total of 19 EAs.

Households were sampled at the fourth stage. To facilitate efficient sampling of eligible households, a complete listing of all households in which there was a pregnancy or a live birth in the last three years in each selected village was done with the support of Village Chairpersons and enumerators. It is from this sampling frame that households were selected. All households where a pregnancy or live birth occurred were eligible for selection and were contacted. Two

call-backs were made to households where the eligible respondents were absent on the day of the interview.

3.6 Criteria for identifying Maternal Near Misses

The need for clear identification criteria of maternal near miss cases in research is emphasized in maternal health literature (Pattinson and Hall, 2003; Say et al., 2004). The disease and management criteria were used to identify maternal near misses in this study. The benefits of both criteria include easy identification of cases, easy interpretation of data, allowing calculation of incidence or prevalence rates for each disease, and ability to obtain data retrospectively especially in communities where deliveries by skilled personnel are low and there is limited access to emergency obstetric care (Pattinson and Hall, 2003; Say et al., 2004; Say et al., 2009).

The operational definition of maternal near miss for this study was any woman who survived by luck or received urgent medical attention after experiencing a life-threatening pregnancy complication including severe haemorrhage (postpartum or antepartum haemorrhage), retained placenta, hypertensive disorders (pre-eclampsia and severe hypertension), severe sepsis, ruptured uterus, obstructed labour, prolonged labour, severe malaria, abortion complications and ectopic pregnancy. In addition, the management procedures including admission to intensive care unit, blood transfusion, laparotomy, hysterectomy, caesarean section, manual removal of the placenta, uterine evacuation, and prolonged hospital stay of at least 2 days were also taken into account while identifying maternal near misses.

Due to the self-reported nature of disease conditions experienced by women, validation of all reported cases was done before final classification of a woman as a maternal near miss. Validation of cases was done at three different levels. Research assistants were trained to identify severe cases based on the study definitions for each disease condition. The second level of validation was through quality control where the field supervisor and principal investigator

randomly re-interviewed women to ascertain severity of the disease condition or the near-death experiences of these women. Thirdly, with the help of a senior midwife, all narratives were assessed for key identifiers or symptoms for each reported disease condition and also to ascertain if cases had been correctly categorized.

3.7 Data collection methods

Collection of good quality data is the basis of all scientific inquiry because it is the most important determinant of valid and reliable estimates and conclusions. In this study data was collected using both quantitative and qualitative methods.

3.7.1. Quantitative data collection techniques

A structured questionnaire, administered through the interview method, was used to collect data. This is the commonest method of data collection used in cross sectional studies (Mann, 2003; Bowling, 2002). Questionnaires were pre-coded before data collection. All questionnaires were translated into Luganda, which is the main local language spoken in both study district. Back translation was done to ensure that the original meanings of the questions were not lost. The questionnaire is attached as Appendix 1.

3.7.1.1. Dependent variables

The variables collected by the questionnaire were categorised into dependent and independent variables. The main outcome or dependent variable for this study was maternal near-miss. A composite index with a dummy variable was created where women who experienced any of the above conditions were categorized as a maternal near miss and coded as "1", and "0" if otherwise. Regarding the birth outcomes of maternal near miss, the dependent variable was maternal near miss.

3.7.1.2 Independent variables

The independent variables included socioeconomic attributes including level of education categorized as no education, primary, secondary and tertiary education; marital status categorized as not in union, cohabiting, married, formerly married; place of residence categorized as rural and urban; wealth status categorized as poorest, poorer, middle, richer and richest; religion categorized as Christian, Muslim and others; and type of occupation categorized as formal, informal and not working. Additionally, data was collected on cultural practices including food taboos during pregnancy, taboos towards antenatal care, delivery care taboos, workload, sex preferences of children and the role of men during pregnancy and childbirth. Data on antenatal care attendance and post delivery care was measured according to the number of times a woman attended these services while data on delivery care was measured as delivered in a health facility or at home. Furthermore, data on behavioural factors including substance use was collected using a likert scale categorized as never, rarely, often and very often; type of previous delivery was collected as normal or caesarean, multiple pregnancies and previous pregnancy complications. Presence of chronic conditions such as hypertension, diabetes, asthma and cardiovascular diseases was collected as multiple responses. Regarding demographic attributes, data was collected on current age, age at first birth, age at birth of the most recent child or pregnancy in single years; and data on parity, pregnancy or birth order, and previous birth intervals was collected as continuous data.

Regarding the birth outcomes of maternal near misses, the independent variables included pregnancy outcome which was defined as a live birth, still birth or a spontaneous abortion; and new-born care practices, dichotomous in nature, which included breastfeeding in the first hour of birth, dry cord care, dry and wrap of infants, eye care prophylaxis, and infant complications; and coded 1 for yes and 0 for no.

3.8. Qualitative data collection technique

To collect the qualitative data, focus group discussion and in-depth interview methods were used. This was because in addition to providing in-depth information about the individual knowledge, attitudes and perceptions that shape reproductive behaviour, the method ensures openness on discussing sensitive reproductive matters which may not be sharable in other qualitative data collection processes such as focus group discussions and community meetings. The information collected was used to contextualize the quantitative findings and also explore the role of cultural attributes in influencing maternal near miss events and outcomes. This method was used to collect the following qualitative data:

- i. Reproductive beliefs, values and norms surrounding pregnancy, childbirth and postpartum period;
- ii. Reproductive taboos including but not limited to:
 - a) Health care taboos
 - b) Delivery taboos
- iii. Family and community support structures and practices regarding reproduction;
- iv. Reproductive decision-making including the role of spouses and kin;
- v. Knowledge of reproductive problems and actions to address them;
- vi. Cultural perceptions regarding pregnancy, childbirth and postpartum care;
- vii. Cultural understanding of pregnancy complications;
- viii. Role of men in reproductive health; and
- ix. Infant care knowledge, attitudes and practices.

In addition, maternal near miss cases were asked to give a narrative of their last pregnancy. This narrative sought to collect information on a number of issues including places visited to seek help, use of herbs, medication or type of assistance got from each place visited, means of

transport to reach place where assistance was sought, type of illness or complication suffered by the woman, possible delays at household level, accessing health facility and at the health facility, medical intervention received for last place of referral, male involvement and the decision-making processes. The in-depth guide is attached as Appendix 2.

3.9. Data Quality Assurance

Data quality assessment is critical for any study to ensure validity and reliability of the study findings. This allows the study findings to be generalized to the wider population and also to have a bearing or implication in the policy decision-making and programming spheres. In this regard a number of data quality control measures were implemented including the following:

- i. Data collection was done by a team of trained research assistants in the area of population and reproductive health. Furthermore, only female research assistants, who had ever given birth, were recruited for this study so as to minimize possible gender bias and to ensure common grounds for both the respondents and research assistants.
- ii. A pre-test of the study instruments was undertaken in Kiboga district – a district with similar characteristics as that of the study area prior to the actual data collection. This allowed the research assistants to familiarise themselves with the study tools, identify errors and also to test the logical flow of questions.
- iii. The team was headed by a supervisor who edited all questionnaires before leaving each enumeration area and later checked for any inconsistencies in the data before data entry.
- iv. Narratives of all maternal near miss cases were validated through an expert review process by an experienced midwife. The intended purpose of this validation process was to ascertain whether the respondents had correctly classified the pregnancy complications

as narrated by the respondents and also to further ascertain the severity of the cases based on the women's descriptives.

- v. To minimize errors during the data entry process, double entry was done by an independent team of data entrants using Epi-data software. Epi-data software was used because of its check and control abilities during double data entry.
- vi. To assess the quality of data in this study, the accuracy of the age data collected was measured. Pardeshi (2010) noted that age is an important variable in demography and epidemiological studies; and forms an invariable part of community studies. Furthermore Pardeshi (2010) asserts that age is a common socio-demographic variable related to the respondent in descriptive studies and commonly assessed risk factor in analytical studies. Age data is affected by a number of irregularities including digit preference, age heaping and lack of knowledge on one's age leading to age estimations. Therefore, in this study, data was assessed for validity and reliability by using the Whipple's Index. Whipple's index measures age heaping through digit preferences at "0" and "5" and thus was used to measure the accuracy of age reporting from the data collected. Whipple's index is constructed for the age group of 23–62 years using the following formula:

Whipple's index for the 5-year range

$$= \frac{\sum (P25 + P30 + P35 + \dots + P60) * 100}{1/5 \sum (P23 + P24 + P25 + \dots + P62)}$$

Whipple's index varies from 0 to 500. A value of 0 indicates that digits '0' and '5' are not reported, 100 means there is no preference for '0' or '5', and a maximum of 500 is seen when only the digits '0' and '5' are reported in the age data. The inference about age distribution based on this index is as follows: <105 = highly accurate; 105–109.9 = fairly accurate, 110–124.9 = approximate, 125–174.9 = poor or rough, ≥175 = very rough.

Age of respondent

$$\begin{aligned} &= \frac{\sum (P25 + P30 + P35 + P40 + P45) * 100}{1/5 \sum (P25 + P26 + P27 + P28 + \dots + P49)} \\ &= \frac{281 * 100}{1/5 * (1214)} \\ &= \frac{28100}{242.8} = 115.7 \end{aligned}$$

With index of 115.7, it can be concluded that the age reporting of the respondents was approximate since the index lies within the range 110 – 124.9.

3.10. Data processing and analyses

Quantitative and qualitative data processing and analyses methods were used. These are outlined in the following sections.

3.10.1 Quantitative data processing

These included data editing, coding, entry and cleaning. Data was edited both in the field during data collection and also in the office before data entry by a team of data editors to identify and correct errors that may have occurred during data collection. Data coding was done by editors to code all open ended questions after compiling all responses to such questions and assigning codes. Data entry was done by use of Epi-Data software, which compared to other data entry programmes such as SPSS and STATA, has check and control abilities which greatly helped to minimize errors during data entry. In addition, there was double data entry which was done by another independent team of data entrants. Data cleaning involved the identification and correction, where possible, of missing values and outliers in data recode files using the original questionnaires.

3.10.1.1 Estimation of maternal near miss

STATA (version 12) was used for data analysis. Analysis was done at three levels including: univariate, bivariate and multivariate levels. At univariate level, descriptive statistics were done by categorizing the socio-economic and demographic characteristics of the respondents. In addition, summary statistics or frequency distributions were obtained to ascertain levels of maternal health indicators and the magnitude of maternal near miss. To establish the magnitude of maternal near miss, the following measure was computed.

$$MNMR = \frac{MNM}{LB} * 1000$$

where:

MNMR is the Maternal Near Miss Ratio and MNM refers to the Maternal Near Miss cases that occurred during the last three years prior to the study; and LB refers to the number of live births.

In addition, maternal near miss ratios for each specific disease or condition were computed so as to allow profiling of maternal near miss complications in Uganda. This was computed as shown below:

$$MNMR_x = \frac{MNM_x}{LB} * 1000$$

where:

MNMR_x refers to the maternal near miss ratio for disease/condition x eg haemorrhage; MNM_x refers to the number of disease x cases identified; and LB refers to the number of live births.

3.10.1.2 Risk factors of maternal near miss

To identify the risk factors associated with maternal near miss, analysis was done at three levels including univariate, bivariate and multivariate. At univariate level, descriptive statistics were done which showed the frequency distribution of both the background characteristics and

maternal health attributes of the respondents. At bivariate level, contingency tables or cross-tabulations between the dependent variable (maternal near miss) and the independent variables (background characteristics and maternal health attributes) were initially done. All bivariate associations were tested using the chi-square test at 95% confidence interval with the level of significance at 5% ($p < 0.05$) to ascertain the probability of independence between the categories of the variables. The chi-square took the form:

$$x^2 = \sum_{i=1}^k \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

where:

O_{ij} is the i th observation of the j th item; and E_{ij} is the i th expected value of the j th item

Any statistical association with $p < 0.05$ showed that that the categories in the variables were not independent while a $p > 0.05$ showed that the categories in the variables were independent.

To identify the significant predictors of maternal near miss, further analysis was done at the multivariate level using the binary logistic regression model. This form of analysis was chosen because the dependant variable was dichotomous or binary which followed a Bernoulli distribution and took the form of “1” if maternal near miss occurred and “0” if maternal near miss did not occur. The presence of maternal near miss was measured by examining the log odds for every unit change in the independent variables. The binary logistic regression model took the form below:

$$y = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_n X_{ni} + \epsilon_i$$

$$y = \text{Log}_e \frac{P_i}{1 - P_i}$$

where: y = dependent variable / maternal near miss; α = constant, Y intercept; β = gradient which is the change in log odds of p for every unit change in the independent variable; and the

exponential of the Beta coefficient ($\text{Exp } \beta$) is the ratio of odds associated with a unit increase in the exposure variable. Only independent variables that had significant statistical relationships ($p < 0.05$) at bivariate level were added in the model at the multivariate level of analysis. The decision rule was to reject the null hypothesis in favour of the alternative if the p-value was found to be less than 5% (0.05).

Several diagnostics were run to test the goodness of fit for the binary logistic regression model predicting the risk factors of maternal near miss in Central Uganda. The goodness of fit was tested by two measures including the linktest and estat gof measures as shown below.

- i. Linktest results for Model A and Model B showed that the models correctly predicted the risk factors of maternal near miss with a hat value: 0.000 and hat square values of 0.560 and 0.080 respectively.
- ii. Goodness of fit (estat gof) for both models was 0.126 (Model A) and 0.260 (Model B). This also shows that the models correctly predicted the risk factors of maternal near miss in Central Uganda.
- iii. Multicollinearity for the model was also tested using the variance inflation factor (vif) and none of the variables reached the threshold of 10 meaning that there was no multicollinearity of variables in the model.
- iv. Collinearity of variables in the model was also tested and all variables that were collinear were removed from the model.

3.10.1.3 Birth outcomes of maternal near miss

One of the objectives of this study was to assess the effect of maternal near miss on birth outcomes. This was done by the use of binary logistic regression. Several birth outcomes were considered including pregnancy outcome, initiation of breastfeeding in the first hour after birth,

dry cord care, eye care prophylaxis, dry and wrap of infants, and infant complications. In this analysis, maternal near miss was the dependent variable while the birth outcomes were the independent variables.

3.11. Qualitative data processing and analyses

Data collected by use of in-depth interviews was transcribed before capture using Atlas-ti (version 7) software. Atlas-ti was used to capture responses to questions from the transcribed notes of the interviewer. Each question was assigned codes and labels which were used during data analysis. To analyse the qualitative data, the report agent module in Atlas-ti which uses the assigned codes and the unique ID numbers of each question was used to generate data which corresponds to each question, each woman and their responses. Generated data was then summarised in matrix format and interpreted.



3.12. Ethical Consideration

Ethical approval was sought from the different Institutional Review Boards (IRBs) at different levels. The first approval was obtained from the Higher Degrees Committee of Faculty of Human and Social Sciences at North West University-Mafikeng Campus, South Africa. Furthermore, informed consent was obtained from respondents after explaining to them the objectives and processes of the study. The informed consent form is attached as Appendix 5. To ensure confidentiality of the results, data was also analysed in aggregate form and information on the respondents was collected anonymously. All respondents were also assured that the data collected would be used for study purposes only.

3.13. Study Limitations

This study was affected by some limitations. Firstly, most variables of sexual and reproductive nature that were collected in this study were sensitive and had legal, social and cultural desirability implications. These included abortion, teenage pregnancy and childbearing,

legitimacy of pregnancies and births. Some respondents were therefore likely to incorrectly report data on some of these leading to systematic biases in estimating them and their effects. Secondly, some respondents could not easily or accurately determine whether or not they experienced maternal near miss complications as some of the indicators were difficult to report accurately. This limitation was however mitigated by validating all narratives through an expert review of cases. Thirdly some respondents experienced memory lapse which may have led to inaccurate dating of events. Due to the severity of the complications experienced by some women, these women were unable to report what happened in circumstances when they were unconscious. The cross-sectional design of the study also affected reporting of time varying dependent and independent variables.

Chapter Four: Profile of Study Population

4.1 Introduction

This chapter presents the profiles of the study respondents by selected socio-demographic and household characteristics. In addition, it also describes the maternal health attributes of the study population. Information on respondents' background characteristics is of importance because empirical or scientific evidence has shown that these characteristics influence adverse maternal health outcomes.

4.2 Description of the respondents' demographic characteristics

This section describes the socio-demographic characteristics of the respondents including age, place of residence, occupation, educational attainment, marital status, religion, ethnicity, partners' characteristics (age, occupation, educational attainment) and spousal age difference. Additionally, the importance of these characteristics on maternal health behavior and pregnancy outcomes is also summarized in this section.

4.2.1 Age

Age is an essential demographic characteristic that is used to describe the structure of any given population. Information on the age distribution of a given population is important in understanding the population dynamics including fertility, mortality and migration of the different age segments of that population. In addition, information on age can be used in planning and effective allocation of resources based on the different needs of each age segment (Johri et al., 2005; Persad et al., 2009). In this regard, it is important to know the proportion and distribution of the study population by age and how it interacts with various aspects of maternal and child health. Previous studies have shown that women's age is linked to maternal near miss (Amaral et al., 2011; Goffman et al., 2007).

Likewise, women who were in union were asked about their partner's age. This is because spousal age differences play an important role in decision-making regarding health care at the household level in addition to reproductive decisions. Furthermore, spousal age differences also contribute to intimate partner violence (UBOS and ICF, 2012) which negatively impacts on maternal and child health (Campbell, 2002; Silverman et al., 2006).

Results in Table 4.1 show that the median age of the women was 28 years. Only 5.6% of the women were aged between 15 – 19 years while women aged 20 – 24 and 25 – 29 years comprised 27.8% and 27.1% respectively. Women in the age group 20 – 29 years are a representative reflection of the ages where most child bearing or reproduction occurs. The percentage distribution of women in the subsequent age groups decreased as age increased. As this study targeted recently pregnant women in the reproductive ages (15 – 49 years), the age distribution pattern observed is very similar to the overall country's age patterns of childbearing (UBOS and ICF, 2012).

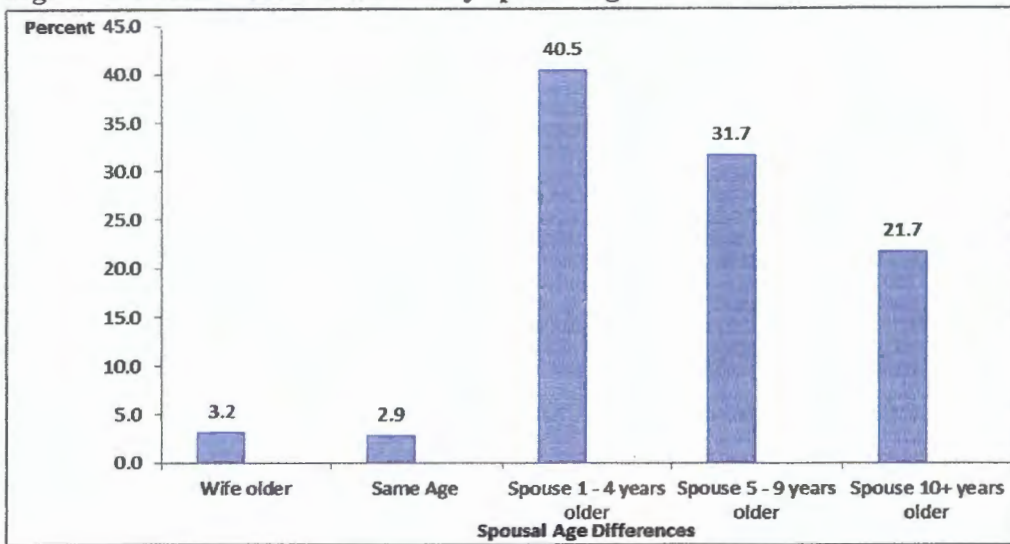
Table 4. 1 Percentage Distribution of Women and their Partners by Age

Age Group	Women		Men	
	n	%	n	%
15 – 19	87	5.6	-	-
20 – 24	432	27.8	116	8.6
25 – 29	422	27.1	245	18.1
30 – 34	312	20.0	275	20.3
35 – 39	210	13.5	249	18.4
40+	94	6.0	326	24.1
Don't Know	n/a	n/a	141	10.4
Mean Age (years)	28.3		34.5	
Median Age (years)	28		34	
Total	1557	100.0	1352	100.0

Table 4.1 also presents the distribution of the women's partners by age. The median age of the men was 34 years and almost a quarter (24.1%) of the women's partners were aged forty years and above while 20.3% were aged between 30 – 34 years. Only 10.4% of the women did not

know their partner’s age. In addition, out of the 1,211 women in union, who knew their spouses’ age, 40.5% had spouses who were older by 1 – 4 years followed by 31.7% whose spouses were older by 5 – 9 years. Less than a quarter of the respondents (21.7%) were in cross generational marital unions while 3.2% of the women were older than their spouses (See Figure 4.1).

Figure 4. 1 Distribution of women by spousal age differences



4.2.2 Place of residence

Place of residence is an important socio-demographic characteristic which has significant linkages with women’s health. This relationship is explicitly explained by MacKian (2008) in her paper on “therapeutic” landscapes of women’s health while other studies have broadly examined the linkages between health and place of residence or location (Curtis and Rees Jones, 1998; Macintyre et al., 2002; Macintyre et al., 1993). Place of residence is not only associated with the physical location but also neighbourhood characteristics which have a bearing on access to social amenities, type of health facilities, access to health facilities, sanitation in addition to cultural norms. Rural and urban neighbourhoods are faced with different health challenges (MacKian, 2008). A study in Haiti (Gage and Guirlène Calixte, 2006) showed that women living in rural neighbourhoods, characterized by mountainous topography, poor unpaved roads, long

distances to health facilities, had poor maternal health-seeking behaviour including late attendance of antenatal care, less than four antenatal care visits, and home births. Table 4.2 shows that almost two-thirds (65.4%) of the respondents were rural residents and 34.6% were urban residents.

Table 4. 2 Percentage Distribution of Women by Occupation and Place of Residence

Place of Residence	Agricultural Sector	Non		Total
		Agricultural Sector	Unemployed	
Urban	83	303	153	539 (n)
	15.4	56.2	28.4	100 (%)
	8.7	73.9	77.7	34.6 (%)
Rural	867	107	44	1,018 (n)
	85.2	10.5	4.3	100 (%)
	91.3	26.1	22.3	65.4 (%)
Total	950	410	197	1,557 (n)
	61.0	26.3	12.7	100 (%)
	100	100	100	100 (%)

4.2.3 Occupation

This study assessed both women's and their partners' occupation for two major reasons: first as a socio-economic characteristic that is used to describe a population and secondly, because of its observed impact on women's health outcomes. Previous studies (Artazcoz et al., 2004; Borrell et al., 2004) have found occupation to have a bearing on an individual's health status, hence the need to explore the different economic activities that women are engaged in. A Nepalese study by Furuta and Salway (2006) showed that occupations associated with cash earnings enhanced women's autonomy, involvement in decision-making processes, spousal discussion on family planning usage and utilization of maternal health services. Thus women who are gainfully employed are able to pay for maternal health services hence the increased utilization of health services leading to improved maternal health. In addition, the same study also found men's

occupation to have a positive bearing on maternal health outcomes, hence the need to explore women's partners' occupations as part of this study.

Figure 4.2 shows that majority of women (61%) were engaged in agricultural activities while 26.4% were involved in non-agricultural activities and 12.7% of the women were housewives. It is the bulk of the rural women (85.2%) who were involved in the agricultural activities while more than half (56.2%) of the urban women were involved in non-agricultural occupations such as businesswomen, technical or skilled labourers among others.

Figure 4. 2 Percentage Distribution of Women and their Partners by Occupation

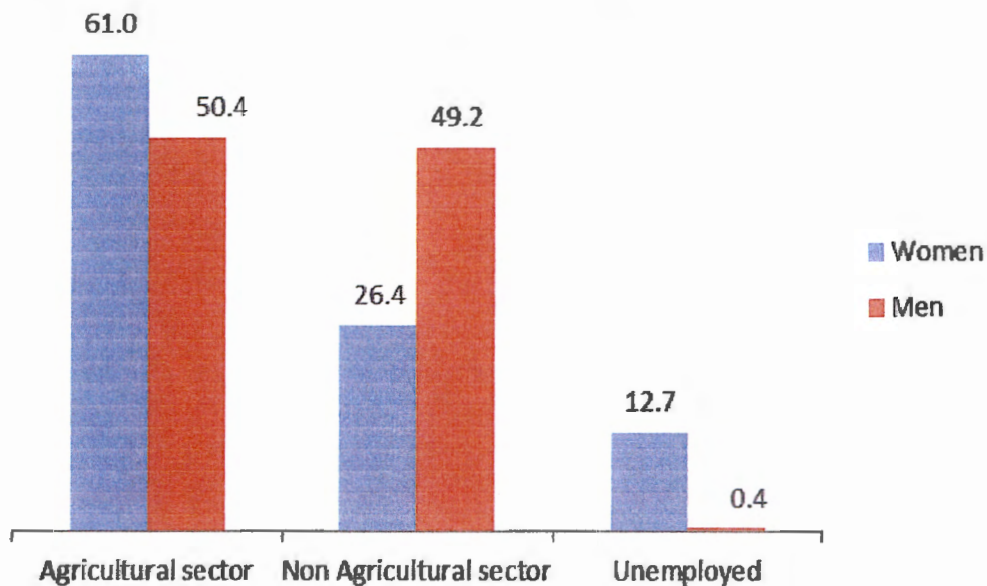


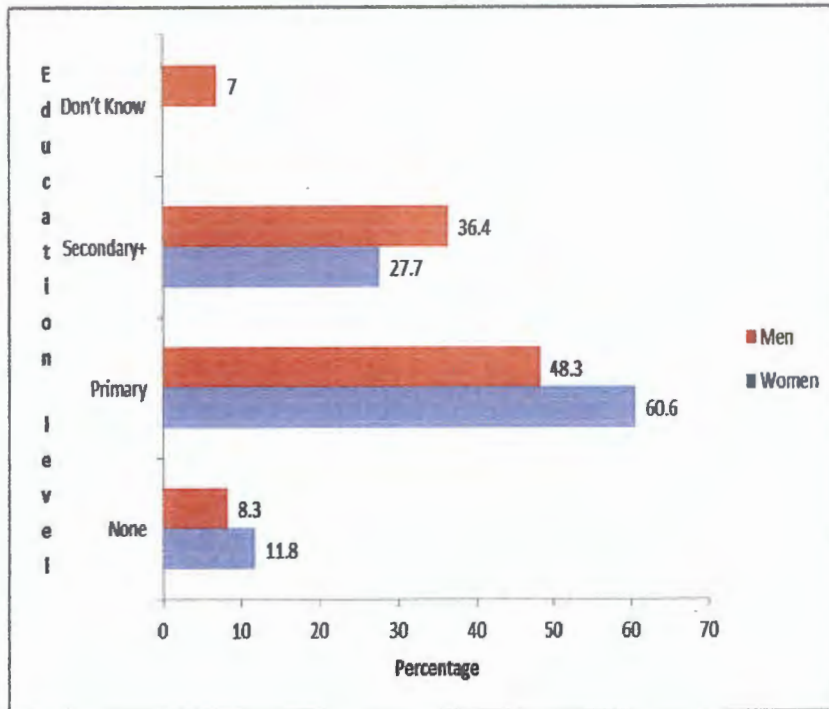
Figure 4.2 shows that almost equal numbers of the women's partners were engaged in the agricultural sector (50.4%) and non-agricultural sector (49.2%). Only less than 1% of the men were unemployed. This general observed pattern of residence and employment distribution in the study area is similar to the overall distribution of the country's population by residence and occupation (UBOS and ICF, 2012) which shows that the majority of the population resides in rural areas and is mainly engaged in agricultural activities.

4.2.4 Educational attainment

Educational attainment is a fundamental socio-economic attribute that needs to be explored in any population and health study because it influences the health behaviour and status of individuals. The theoretical and scientific evidence associated with education and health has overtly been discussed by Cutler and Lleras-Muney (2006). In addition, there is a vast body of literature that discusses the effect of maternal or spousal education on maternal and child health outcomes. Several studies have shown that women's education affects maternal health behaviour through various pathways including: acquisition of maternal health knowledge, family planning usage and utilization of maternal and child health services (Ahmed et al., 2010). Studies have also shown that parental education is associated with improved child health outcomes (Aslam and Kingdon, 2012; Luo et al., 2006). In this study, women were asked about their highest level of education and the educational attainment of their spouses.

Results presented in Figure 4.3 shows that overall, the educational attainment of the women in this study sample was low. The figure shows that the majority of the women (60.6%) attained primary education, 27.7% of the women attained secondary or higher education and only 11.8% of the women had no education. Conversely, Figure 4.3 shows that the spouses of the women were better educated with 48.3% and 36.4% having attained primary and secondary or higher education respectively. Only 8.3% of the partners of the women had no education and a small proportion of the women (7%) did not know the educational status of their spouses. The findings on the education status of the women and their spouses is consistent with the national data observed by UBOS and ICF (2012) which found that 12.9% of Ugandan women in the reproductive age group (15 – 49 years) have no formal education, 59.4% have primary education and 27.7% have secondary or higher education.

Figure 4. 3 Percentage Distribution of Women and their Partners by Level of Education



4.2.5 Marital status

It is envisaged that childbearing occurs within marital unions and that these unions play an important role of social support during pregnancy. Social support during pregnancy can be associated with both emotional support and psychosocial resources which are important in influencing pregnancy outcomes. Previous studies show that partner support during pregnancy and delivery is associated with a lower likelihood of occurrence of severe complications (Elsenbruch et al., 2007; Zachariah, 2009). Results in Table 4.3 show that almost all the women in this study (87.1%) were in union and only 12.9% were not in union (widowed, divorced, separated or single).

Table 4. 3 Percentage Distribution of Respondents by Background Characteristics

Background Characteristics	Frequency	Percentage
Marital Status		
Currently Married / In Union	1,355	87.1
Currently Not in Union	201	12.9
Religion		
Catholics	620	39.9
Anglicans	497	31.9
Pentecostals	231	14.9
Muslims	192	12.3
Others	16	1.0
Ethnicity		
Muganda	742	47.7
Munyakore	482	31.0
Others	331	21.3
Total	1,556	100

4.2.6 Religion

Religion shapes individual's beliefs and behavior and thus may have direct effects on utilization of maternal health services. The linkage between religion and maternal and child health outcomes has previously been examined (Addai, 2000; Gyimah et al., 2006). Gyimah et al. (2006) asserted that traditionalists and Muslims, respectively, were less likely to deliver at health facilities. In addition, traditionalists were less likely to receive antenatal care from a health professional compared to Catholics in Ghana. Traditionalists are more likely to rely on either traditional health systems (indigenous medicines and traditional birth attendants) or natural powers for healing while some religious groups may have beliefs that may deter utilization of health facilities (Addai, 2000; Gyimah et al., 2006).

In this study, women were asked about their religious affiliations. The results in Table 4.3 show that the highest proportion of the women (39.9%) were Catholics followed by Anglicans (31.9%) and Muslims (12.3%). This pattern is comparable to the religious affiliation patterns reported by

UBOS and ICF (2012) where Catholics constituted 40.6% of the Ugandan population followed by Anglicans (30%), Pentecostals and Muslims (13.3%) and other religious groups which constituted less than 2% of the study population.

4.2.7 Ethnicity

Ethnicity is another important socio-economic characteristic of women that impacts on maternal health. Culture shapes the norms, beliefs and practices of a given population which often shape women's health behaviour including utilization of maternal health services, preferences for traditional birth attendants and reliance on indigenous medicine. A study by Bantebya-Kyomuhendo (2004) found that there was over-reliance on traditional health systems including use of herbs, traditional birth attendants and witchcraft which hindered utilization of modern medical services hence explaining the occurrence of maternal near miss complications. Table 4.3 also shows that the main ethnic groupings in the study area were the Baganda (47.7%) followed by the Banyakore (31%). Other ethnic groupings (21.3%) included mostly the Banyarwadda, Bakiga and Bafumbira ethnicities.

4.3 Socio-economic status

According to UBOS and ICF (2012), household characteristics and ownership of different possessions including household items, means of transport, agricultural land and livestock reflect the socio-economic status or welfare of a given population. The type of household characteristics has an impact on one's risk of exposure to disease thus affecting one's health. The importance of given household possessions in relation to health issues has also been explained in another previous report (UBOS and ICF, 2012).

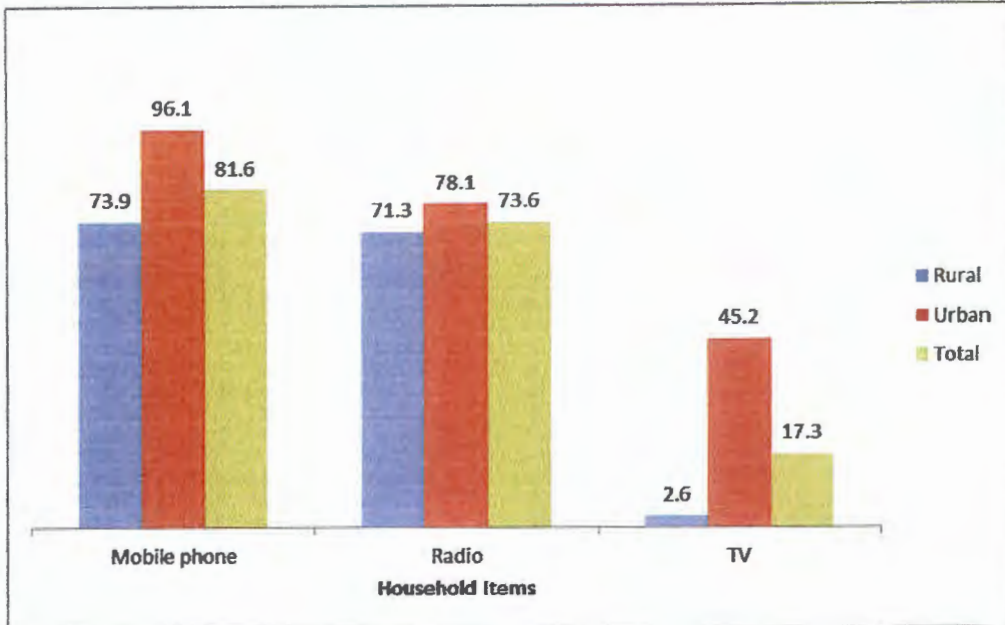
In this study, respondents were asked about several household characteristics including electricity, main type of fuel used for cooking, main material of the floor, roof and exterior walls. Respondents were also asked if their households had the following items: radio, television set

and a mobile phone among other household items. In addition, information was collected on ownership of: different means of transport (car, motorcycle, bicycle, boat, animal drawn cart), agricultural land and different farm animals (local cattle, exotic cattle, goats, pigs, sheep, chickens, horses or donkeys or mules and any other animals). The rationale of collecting information on the respondents' household possessions and characteristics was two-fold: first to describe the general welfare of the women and secondly to construct a wealth index that was used to categorize respondents into different wealth classes. Figure 4.4 shows the overall ownership of household items by place of residence while Table 4.4 shows the percentage distribution of selected household possessions by place of residence.

4.3.1 Description of Respondent's Household Possessions

Exposure to mass media including radio and television may have direct benefits on maternal health service utilization. Studies have shown that household ownership of a radio or television is associated with increased maternal health knowledge and uptake of family planning methods (Amin et al., 2002; Gupta et al., 2003). Figure 4.4 shows that out of 1,557 households, 73.6% owned a radio with almost equal proportions in rural (71.3%) and urban (78.1%) residents possessing a radio. This suggests that the radio as a means for media exposure can be used as an effective means of transmitting maternal health information to this population as compared to the use of the television set, owned by only 17.3% of the study population with wide ownership disparities between rural (2.6%) and urban (45.2%) residents. The wide variation in television set ownership could partly be due to lack of electricity in this rural sub-county as compared to the urban sub-county with access to electricity (Figure 4.5).

Figure 4. 4 Percentage of Ownership of Household Items by Place of Residence



Similar to radio ownership, mobile phones may also prove as another effective channel of communication between mothers and the health programmers or health system network. Mobile phone technology has been found to lead to improved maternal health service utilization including increased number of antenatal care visits and prompt referral after onset of emergency pregnancy complications (Lund et al., 2014; Noordam et al., 2011). These authors observed that health service utilization increased among expectant women who received text messages reminding them about antenatal care visits while community members in possession of mobile phones were also able to call for medical assistance during emergency situations that occurred during home births. Figure 4.4 shows that the majority of the households (81.6%) owned a mobile phone. Almost all urban households (96.1%) owned a mobile phone compared to 73.9% of rural households.

Household ownership of any means of transport improves access to maternal health facilities. Such households are less likely to be affected by transport delays in seeking maternal health

services. Gage and Guirlène Calixte (2006) found that household ownership of transport means led to increased utilization of antenatal care services compared to women who belonged to households without any means of transport. Similarly, ownership of transport means plays an important role in enabling timely access to health facilities and prompt referral of women during emergencies. Table 4.4 shows that there were evident variations in the means of transport owned by rural and urban residents. Although the bicycle (35.7%) was the commonest means of transport owned by the respondents, it was mainly owned by rural households (40.8%) compared to the urban households (26.2%). The motorcycle (24.9%) was the second commonest means of transport, and it was mostly owned by urban residents (31.9%) compared to rural residents (21.2%).

Table 4. 4 Percentage Distribution of Household Possessions by Place of Residence

Household Possession	Rural	Urban	Total
Means of transport			
Bicycle	40.8	26.2	35.7
Motorcycle / Motor scooter	21.2	31.9	24.9
Animal drawn-cart	0.1	0.4	0.2
Car / Truck	1.4	8.9	4.0
Boat with motor	0.0	0.4	0.1
Boat without motor	1.5	0.0	1.0
Ownership of Agricultural Land			
	83.1	58.8	74.7
Livestock^a			
	75.6	49.5	66.6
Total	1,018	539	1,557

^a Includes cattle, goats, sheep, pigs, chickens, horses/ mules/ donkeys and ducks

Only 4% of the study population belonged to a household with a car or truck with 8.9% of the urban households owning a car or truck and only 1.4% car ownership in the rural areas. The least owned means of transport were the boat without a motor (1%), animal drawn cart (0.2%) and boat with a motor (0.1%). Among households which owned boats, there was no urban household

which owned a boat without a motor and likewise no rural household owned a boat with a motor as shown in Table 4.4.

Ownership of land is a factor of production and may affect one's ability to participate in economic activities. It is widely known that a household's economic status impacts on access to health services with households with access to economic resources being more likely to access health services compared to those with little or no access to economic resources (Allendorf, 2007). In addition, land is a high value asset which can be exchanged for money which can be used to access maternal health services. Three-quarters of the women (74.7%), most of them (83.1%) in rural areas, owned agricultural land compared to only 58.8% in urban areas. This can partly explain why most of the rural residents compared to their urban counterparts were engaged in agricultural activities.

Rearing of livestock is another form of economic activity and is a key aspect of the study population which may impact on maternal health service utilization. Anecdotal reports show that during obstetric emergencies, families do sell part of their livestock or exchange it in kind in order to access maternal health services. Results in Table 4.4 show that two-thirds of the study population owned livestock. Three-quarters of the rural households and half (49.5%) of the urban households owned livestock.

4.3.2 Description of Respondent's Household Characteristics

In general, the selected household characteristics have a bearing on women's health. The type of cooking fuel has an impact on the fumes the woman inhales which may impact on her health during pregnancy while the building materials too also have health implications in terms of harbouring disease transmitting agents. Rudimentary roofs, floor materials and walls are porous and thus may easily harbor vectors leading to disease transmission.

Figure 4.5 shows that only a quarter (25.7%) of the 1,557 women lived in households with electricity or solar supply. Wide disparities exist in access to electricity with only 8.9% of rural households having access to solar energy as an alternative to electricity supply in Lwamaggwa sub-county. However, more than half (57.6%) of the urban respondents lived in households with electricity supply. More than two-thirds (68.6%) of the study population used firewood as their main source of fuel for cooking followed by 31% who used charcoal as shown in Table 4.5. The majority of the firewood users were rural residents while the majority of the charcoal users were found in urban areas. Other respondents either used kerosene or paraffin.

Figure 4. 5 Percentage Distribution of Women by Source of Energy and Place of Residence

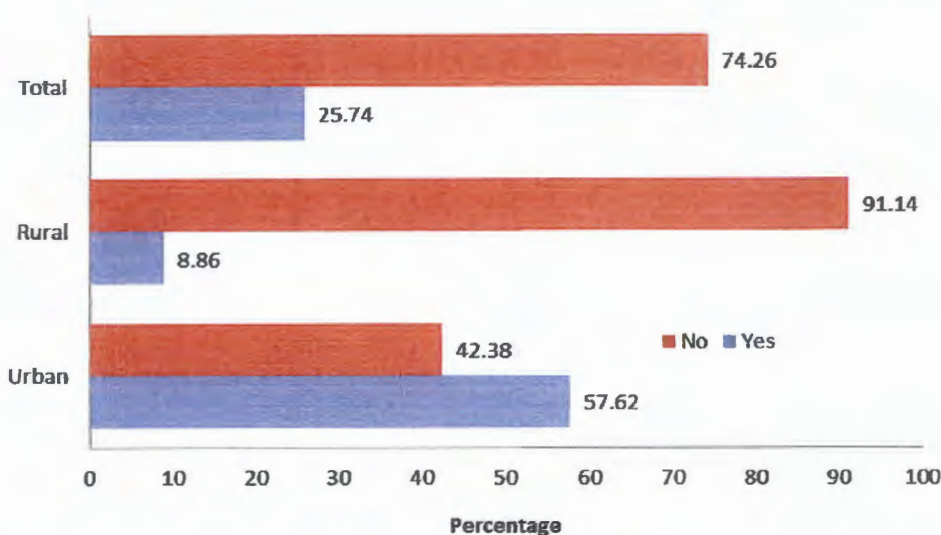


Table 4.5 shows that more than half (55.8%) of the respondents lived in houses with natural floors made of either earth and sand or earth and dung and these were found significantly in the rural areas. Respondents who lived in houses with cement floor accounted for 43.5% of the respondents and these were also mostly found in the urban areas. In addition, almost all houses (92.2%) were roofed with iron sheets with only 6.9% of the houses with thatched roofing. Other roof materials included asbestos, tiles, tin and cement. In addition, the highest proportion of exterior walls were plastered with cement (31.6%) followed by mud and poles (24.6%).

Table 4. 5 Percentage distribution of selected household characteristics

Household Characteristics	Urban	Rural	Total	N
Fuel used for cooking				
Charcoal	67.0	12.3	31.2	486
Firewood	32.8	87.6	68.6	1068
Others	0.2	0.1	0.1	2
Main Floor Material				
Natural Floor	11.5	79.3	55.8	868
Cement Floor	87.9	20.0	43.5	677
Other Finished Floor	0.6	0.8	0.7	11
Main Roof Material				
Natural Roof	0.0	10.6	6.9	108
Iron sheets	98.1	89.0	92.2	1434
Other Materials	1.9	0.4	0.9	14
Main material of Exterior walls				
Thatched/Straw	0.0	0.9	0.58	9
Rudimentary Walls	9.1	56.6	40.1	624
Finished Walls	90.2	40.2	57.5	894
Others	0.7	2.4	1.8	28
Total	100 (539)	100 (1,018)	100	1557

Although the overall housing facilities of the study respondents were still inadequate, urban respondents exhibited better housing facilities and may thus be inferred to have better standards of living and a higher socio-economic status than rural residents.

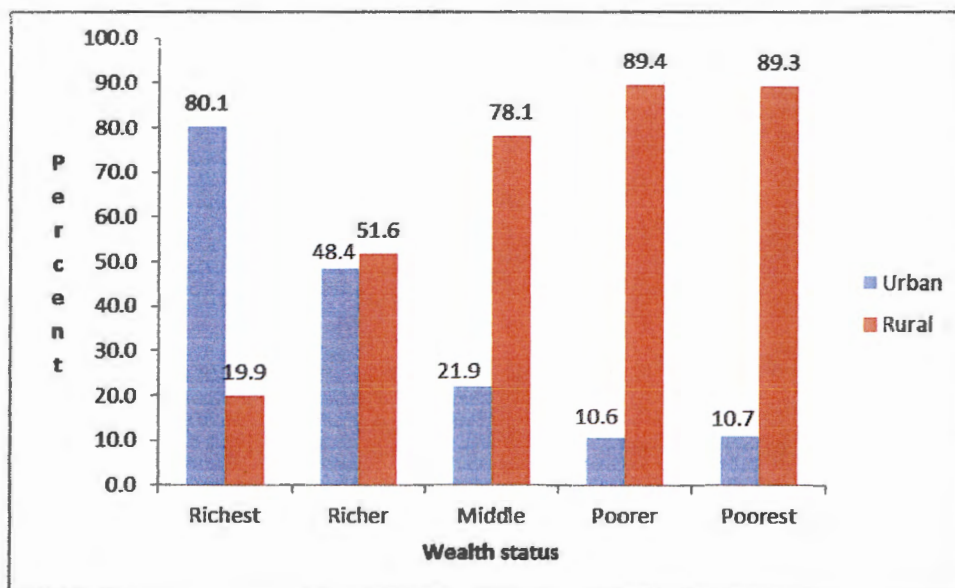
4.3.3 Wealth status

Using principle component analysis, a wealth index was constructed, based on the household characteristics and possessions, to depict the overall socio-economic status of the women. Studies have shown that household wealth status is important in influencing utilization of maternal health services (Ahmed et al., 2010; Celik and Hotchkiss, 2000). Women belonging to

the poorest quintile are less likely to use a skilled birth attendant (Ahmed et al., 2010) yet skilled birth attendance is important in preventing occurrence of maternal near miss events.

Findings from this study show that about 18.1% and 20.7% of the women belonged to the poorest and poorer quintiles respectively. In addition, equal proportions of women belonged to the richest and richer quintiles (20.1%) while the middle quintile accounted for 20.9% of the women. Figure 4.6 shows that there were wide disparities in wealth status by place of residence. Urban residents belonged mostly to the richer and richest quintiles and rural residents mostly belonged to the poorer and poorest quintiles. The observed pattern of wealth distribution is comparable to that observed in the Central region and the national level where the majority of the poor are found in rural areas (UBOS and ICF, 2012).

Figure 4. 6 Percentage Distribution of Wealth Status by Place of Residence



4.4 Description of Maternal Health attributes

Several attributes are widely used to describe the maternal health of any given population. In this study, information was collected on maternal health indicators including but not limited to: age at first birth, age at last pregnancy or birth, pregnancy wantedness, alcohol intake during

pregnancy and violence during pregnancy. Additionally, data was also collected on gravidity, parity, pregnancy termination, birth order, inter-pregnancy interval, chronic conditions, antenatal care behaviour, place of delivery, skilled birth attendance, decision-making processes, pregnancy danger signs and postpartum care behaviour. The purpose of collecting this data was to establish the relationship between these attributes and the occurrence of maternal near miss. Below is a description of the maternal health attributes of the study population as shown in Table 4.6 and Figure 4.7.

4.4.1 Age at birth

Data on age at birth (age at first birth, age at last birth or pregnancy) is important in both demographic and maternal health analysis. Information on the median age at childbearing, first birth and last birth can be used in understanding fertility and mortality events. The age at birth has implications on fertility through total number of children ever born while it impacts mortality through life-threatening complications that may arise as a result of early (below 19 years) or late (35+ years) age of childbearing. Cleary-Goldman et al. (2005) found that older women aged 35 years and above were at an increased risk of having a caesarean delivery and also experiencing pregnancy complications including gestational diabetes and haemorrhage resulting from placenta previa.

Results in Table 4.6 shows that the median age at first birth was 18 years. The age at first birth ranged between 10 to 33 years. In addition, the median age at last pregnancy or birth of the women was 26 years. Almost three-quarters (73%) of the respondents were aged between 20 – 34 years at their last birth. More than a quarter of the women (26.7%) belonged to the high-risk childbearing age groups of 15 – 19 years (adolescence) and the 35 years and above and these age groups accounted for 11.1% and 15.6% respectively. Ozalp et al. (2003) stated that adolescents

and older women are at an increased risk of experiencing complications leading to maternal near miss compared to their counterparts.

4.4.2 Wantedness of pregnancy

Unwanted pregnancies may have implications on the maternal health outcomes of these women and may result in unsafe abortions which may lead to occurrence of septic infections and haemorrhagic complications (Singh et al., 2006). Women were asked about the timing of their last pregnancy, whether it was wanted then, later or not at all. According to results shown in Table 4.6, more than one third (34%) of the women did not want their pregnancy at the time it occurred. Almost a quarter of these women wanted to delay their pregnancies by three years.

4.4.3 Pregnancy termination

In this study, pregnancy termination included all pregnancies that ended in ectopic pregnancies, spontaneous (miscarriages) and induced abortions. Due to the legal implications and socio-cultural norms against having an abortion in Uganda, many women who abort do so unsafely (Singh et al., 2006). The maternal health consequences of unsafe pregnancy termination are dire. While women who have unsafe abortions may experience haemorrhagic complications and severe infections leading to death, those who survive suffer from long term ill-health (Haddad and Nour, 2009). Results in Table 4.6 show that almost a quarter (23.6%) of the women have ever terminated a pregnancy. A higher proportion of women reported to have had miscarriages as compared to induced abortions or ectopic pregnancies.

Table 4. 6 Description of Maternal Health Attributes of Respondents

Maternal Health Attributes	Frequency	Percent
Age at First Birth		
Median Age: 18 years		
Age at last pregnancy / birth		
15 – 19	173	11.1
20 – 34	1,138	73.2
35+	243	15.6
Median Age: 26 years		
Wantedness of pregnancy		
Wanted	1,028	66.0
Unwanted	529	34.0
Alcohol intake during pregnancy		
Never	1,153	74.1
Rarely	313	20.1
Often	91	5.8
Violence during pregnancy		
Yes	173	11.2
No	1,379	88.9
Pregnancy termination		
Yes	366	23.6
No	1,186	76.4
Inter – pregnancy interval		
18 months	183	13.7
< 24 months	136	10.2
< 36 months	427	32.0
< 48 months	264	19.8
60+ months	324	24.3
Chronic diseases		
Yes	67	4.3
No	1,490	95.7
Health conditions		
Malaria	329	21.2
HIV/AIDS	54	3.7
History of pregnancy complications		
Yes	243	15.6
No	1,314	84.4
History of previous caesarean births		
Yes	83	5.6
No	1,406	94.43

n = 1,557 though it may vary due to different subsets of women for some variables.

4.4.4 Alcohol intake

Frequent alcohol intake is known to have negative consequences on both the mother and fetus leading to spontaneous abortions (Chiodo et al., 2012). Women were asked about alcohol intake during their last pregnancy. Information in Table 4.6 showed that the majority of the women (74.1%) did not take alcohol during their last pregnancy while 5.8% of the respondents reported taking alcohol often. Previous research in Uganda shows that 30% of pregnant women in an urban setting consumed alcohol during pregnancy (Namagembe et al., 2010) This is comparable to the study population where 25.9% of women consumed alcohol during their last pregnancy.

4.4.5 Violence during pregnancy

Violence in pregnancy has severe health consequences on both the mother and the fetus. Campbell (2002), in his review of the health consequences of partner violence, showed that women who experience violence in pregnancy are at risk of being maternal near misses. Information was collected on whether the woman experienced any form of violence (physical, sexual or any other) during her last pregnancy. Findings in Table 4.6 showed that 11.2% of the women experienced violence during their last pregnancy. Although the study estimate is higher, it is comparable with the prevalence of domestic violence in the Central region (7.7%) (UBOS and ICF, 2012), where the study district is found.

4.4.6 Inter-pregnancy interval

World Health Organization recommends an interval of 24 months between pregnancies in order to allow the mother's body to recuperate and to reduce the risk of infant mortality through increased infant care and breastfeeding for the recommended duration of two years (WHO, 2005a). Research shows that both short (< 6 months) and long (> 59 months) inter pregnancy intervals are associated with occurrence of maternal near miss complications, maternal death and poor perinatal outcomes (Conde-Agudelo and Belizán, 2000). In this study, women who had

more than one pregnancy were asked about the interval between their last two pregnancies. The highest proportion of women (32%) had an interval of 36 months between their last two pregnancies while 13.7% of the respondents had a short inter-pregnancy interval of less than 18 months. Findings from this study also showed that the proportion of women who had a short inter-pregnancy interval also consisted of women whose last pregnancy was terminated and thus conceived within a short time thereafter.

4.4.7 Chronic diseases

Chronic diseases are known to be aggravated by pregnancy leading to ill health during pregnancy. The risk of maternal near miss complications is higher among women with chronic diseases including diabetes (Evers et al., 2004) and heart diseases (Smith et al., 2001). Women were asked about any chronic conditions they had. Only 4.3% of the study population reported having one or more of the following diseases or conditions: hypertension (46 respondents), diabetes (2), heart problems (9), liver problems (1) and asthma (14).

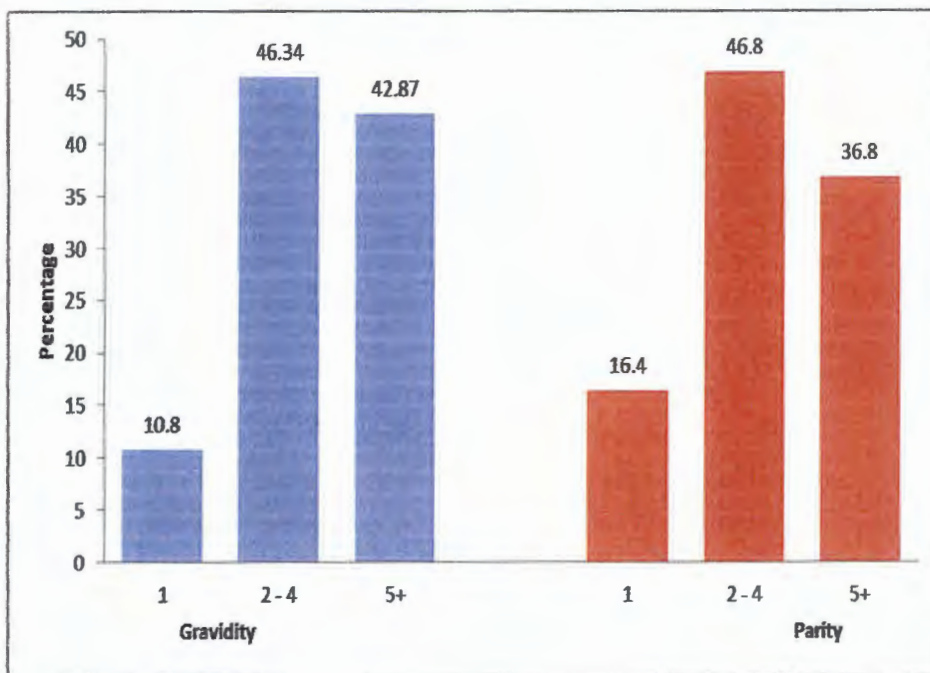
Similarly, women were also asked about other health conditions such as HIV/AIDS and malaria which are also known to indirectly cause maternal morbidity or death. Despite the sensitivity of one's HIV sero-status, 3.7% of the respondents revealed that they were HIV positive while 21.2% of the respondents reported as having suffered from malaria during their last pregnancy. Given that the HIV/AIDS status was self-reported, it is likely to be an under-estimate and may thus not be a reliable measure for further analysis.

4.4.8 Gravidity and parity

Figure 4.7 below shows the distribution of women by number of pregnancies (gravidity) and total number of children ever born (parity). Gravidity and parity affect maternal health through the first pregnancy or birth, and "too many" effect (Kaye et al., 2004a). First pregnancies are associated with anxiety, fear and lack of child birth experience while high gravidity or parity are

associated with reproductive stress following each additional pregnancy or birth (Bantebya-Kyomuhendo, 2004; Kaye et al., 2004a). Only 10.8% of the respondents had only one pregnancy and 42.9% had 5 or more pregnancies. Regarding the number of live births, 16.4% of the women had only one live birth and 46.8% had between 2-4 live births and 36.8% had 5 or more live births.

Figure 4. 7 Percentage Distribution of Gravidity and Parity of Respondents



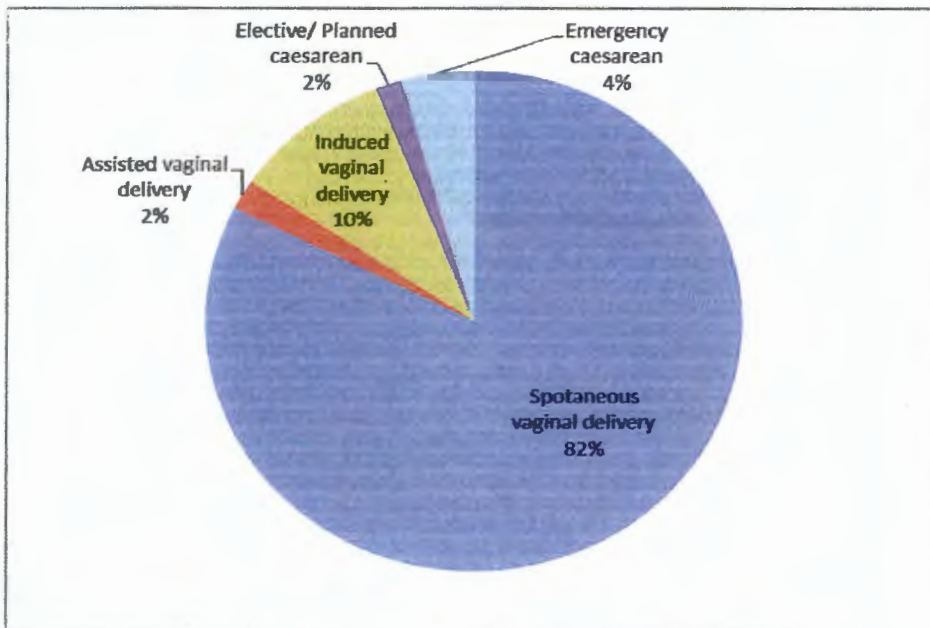
4.4.9 History of pregnancy complications

History of pregnancy complications is an indicator of a woman’s health in subsequent pregnancies (Camargo et al., 2011a). Thus, women who had more than one pregnancy were asked details about whether or not they experienced severe pregnancy complications. Out of 1,557 respondents, 15.6% had a history of severe pregnancy complications prior to this last pregnancy.

4.4.10 Mode of delivery

Women were also asked about the mode of delivery during their last pregnancy and whether they had any previous caesarean births. Mode of delivery is an indicator of the risk of maternal health problems during child birth. Figure 4.8 shows that the majority (82%) of the women had spontaneous vaginal delivery and 10% had an induced vaginal delivery. Only 6% of the women gave birth by caesarean section which is an indicator of maternal health problems especially in the study setting where culture highly upholds natural delivery. Only 5.6% of the women had ever given birth by caesarean prior to their last pregnancy. Caesarean births are often as a result of pregnancy complications and may thus account for possible recurrence of the same problems hence the need to explore this attribute in relation to occurrence of maternal near miss complications.

Figure 4. 8 Percentage Distribution of Mode of Delivery of Respondents



4.5 Summary

The majority of the respondents were aged between 20 – 29 years, were married, resided in the rural areas, had primary education and were mainly engaged in agricultural activities. Most of the respondents were Baganda and belonged to the Catholic religious affiliation. While almost half of the respondents' partners had primary education followed by secondary education and they were also equally engaged in both agricultural and non-agricultural activities. In addition, urban households had a higher socio-economic status compared to rural residents.

With regards to maternal health attributes, the median age at last birth was 26 years and there was low contraceptive usage coupled with high rate of unwanted pregnancies. The majority of women did not take alcohol during their last pregnancy and also did not experience violence during the same pregnancy. The highest proportion of women had an inter-pregnancy spacing of 36 months. Less than a quarter of the women had a history of pregnancy complications and caesarean births. Almost equal numbers of pregnancies and live births were evident despite a high proportion of pregnancies that were terminated. Finally, the spontaneous vaginal mode of delivery was the main mode of delivery in the study population.

With an insight into the characteristics of the study population and maternal health attributes, there is need to examine the maternal health care behaviour of these women. Examining the respondents' maternal health care seeking behaviour will help understand the relation between maternal health attributes, maternal health care seeking behaviour and possible occurrence of maternal near events. With information on the socio-demographic and maternal characteristics of the respondents, further analysis was undertaken at bivariate level to establish the relationship between these characteristics and occurrence of maternal near miss.

Chapter Five: Maternal Health Care Knowledge and Practices

5.1. Introduction

It is hypothesized in the conceptual framework guiding the study (Figure 2.1) that maternal health behaviour is among the immediate factors influencing occurrence of maternal near miss complications. The purpose of this chapter, therefore, is to describe the maternal health knowledge and behaviour of women in Rakai district. Maternal health knowledge included knowledge on pregnancy danger signs, and causes of maternal near miss complications while maternal health behaviour included attendance of antenatal care, place of delivery and postnatal care. In this regard, the patterns and differentials of utilization of maternal health services across socio-demographic characteristics and selected maternal attributes are described. Furthermore, the bivariate relationship between maternal health behaviour and occurrence of maternal near miss events is also presented.

5.2. Antenatal Care

Antenatal care attendance is one of the four pillars of safe motherhood programmes aimed at improving maternal outcomes. In this study, women were asked if they received any antenatal care during their last pregnancy and the number of antenatal care visits they had throughout their pregnancy. Information on the patterns of antenatal care attendance by women's socio-demographic and partner characteristics is important in understanding factors associated with attendance of antenatal care in the study area. Results in Table 5.1 show the differentials and unadjusted odds ratios of antenatal care attendance by women's socio-demographic characteristics. Overall, 60.3% of the respondents had the four recommended antenatal care visits which is higher than the national estimate (47.6%) of antenatal care attendance (UBOS and ICF, 2012).

Results in Table 5.1 showed that the proportion of women who attended antenatal care four or more times decreased as age increased. Adolescents had the highest proportion of four or more antenatal care visits (69.5%) while women aged 40 years and above had the lowest proportion (48.8%) of at least four antenatal care visits. The observed differentials between antenatal care attendance and woman's age were significant (p-value 0.002), thus antenatal care attendance and woman's age were dependent. The odds of women aged between 35 – 39 years and 40 years and above having four antenatal care visits were lower by 51% and 58% respectively compared to women who were aged 15 – 19 years.

There was a significant relationship between place of residence and attendance of antenatal care (p-value 0.004). Nearly two-thirds of women (65.2%) residing in urban areas attended antenatal care at least four times compared to 57.4% among women residing in the rural areas. The odds of having four antenatal care visits among women residing in rural areas were lower by 28% compared to women in urban areas.

With regards to educational attainment, women with secondary education and above reported the highest proportion (65.2%) of four or more antenatal care, while only 59.9% of uneducated women and 57.8% of women with primary education reported having had four or more antenatal care visits. The level of educational attainment was found to be significantly associated with antenatal care attendance (p-value 0.038). The odds of attending four or more antenatal care visits were lower by 27% among women with primary education compared to women with secondary education and above as shown in Table 5.1.

Table 5. 1 Differentials of antenatal care attendance and Unadjusted Odds Ratios of having 4+ antenatal care attendance by socio-demographic characteristics

Socio-demographic characteristics	< 4 ANC visits	4+ ANC visits	Total (n)	O.R	C.I
Age (p-value 0.002)					
15 - 19 (RC)	30.5	69.5	82	1.000	
20 - 24	33.7	66.4	416	0.865	[0.518 - 1.443]
25 - 29	40.9	59.1	408	0.633	[0.380 - 1.054]
30 - 34	41.9	58.1	296	0.608	[0.360 - 1.027]
35 - 39	47.2	52.8	199	0.490**	[0.284 - 0.846]
40+	51.2	48.8	82	0.418***	[0.220 - 0.792]
Location (p-value 0.004)					
Urban	34.8	65.2	514	1.000	
Rural	42.6	57.4	969	0.719***	[0.576 - 0.898]
Educational attainment (p-value 0.038)					
None	40.1	59.9	167	0.798	[0.552 - 1.154]
Primary	42.3	57.8	897	0.731**	[0.575 - 0.930]
Secondary+	34.8	65.2	419	1.000	
Occupation (p-value 0.021)					
Agricultural sector	42.7	57.3	914	1.000	
Non Agricultural sector	36.2	63.8	387	1.313*	[1.027 - 1.678]
Unemployed	34.1	65.9	182	1.441*	[1.032 - 2.011]
Total	39.9	60.1	1,483		
Marital status (p-value 0.584)					
Currently not in union	41.7	58.3	187	1.000	
Currently married	39.6	60.4	1,295	1.091	[0.799 - 1.489]
Total	39.9	60.1	1,482		
Religion (p-value 0.052)					
Catholics	36.8	63.3	585	1.000	
Anglicans	42.7	57.3	478	0.780*	[0.610 - 0.999]
Other Christians	45.3	54.7	234	0.702*	[0.516 - 0.954]
Muslims	36.4	63.6	184	1.015	[0.719 - 1.432]
Ethnicity (p-value 0.022)					
Muganda	36.6	63.4	703	1.000	
Munyakore	41.0	59.1	464	0.831	[0.653 - 1.057]
Others	45.5	54.5	314	0.689**	[0.526 - 0.903]
Total	39.8	60.2	1,481		
Wealth status (p-value 0.012)					
Richest	31.0	69.0	303	1.599**	[1.132 - 2.258]
Richer	42.2	57.8	296	0.984	[0.703 - 1.377]
Middle	40.2	59.8	306	1.070	[0.765 - 1.495]
Poorer	43.7	56.3	307	0.928	[0.665 - 1.295]
Poorest	41.8	58.2	263	1.000	
Total	39.7	60.3	1,475		

* p < 0.05, ** p < 0.01, *** p < 0.001

Results in Table 5.1 showed that women who were employed in the agricultural sector accounted for the lowest proportion (57.3%) of antenatal care attendance. However, unemployed women recorded the highest proportion (65.9%) of four antenatal care visits followed by women who were employed in the non-agricultural sector (63.8%). Women's occupation and attendance of antenatal care were dependent (p-value 0.021). Women employed in the non-agricultural sector were 1.3 times more likely to have four or more antenatal care visits compared to women employed in the agricultural sector. Similarly, unemployed women were 1.4 times more likely to have four or more antenatal care visits compared to women employed in the agricultural sector as shown in Table 5.1. Notably, there was no significant variation in antenatal care attendance and marital status (p-value 0.584).

The highest proportion of antenatal care attendance was recorded among Catholic and Muslim women. Almost equal proportions of Catholic and Muslim women (63%) had four or more antenatal care visits as shown in Table 5.1. The lowest proportion of antenatal care attendance was recorded among women belonging to other Christian denominations (54.7%). The relationship between religion and antenatal care attendance was marginal (p-value 0.052). The odds of attending four antenatal care visits among women belonging to the Anglican faith and other Christian denominations were lower by 22% and 30% respectively compared to Catholic women.

Additionally, attendance of antenatal care varied significantly by ethnicity (p-value 0.022). Results in Table 5.1 showed that attendance of four or more antenatal care visits was highest among the Baganda (63.4%) compared to Banyakore women (59.1%) and women belonging to other ethnic groups (54.5%). The odds of women belonging to other ethnic groups attending four antenatal care visits were lower by 31% compared to Baganda women. Furthermore, antenatal care attendance and wealth status varied significantly (p-value 0.012). Women belonging to the

richest (69%) wealth class reported a higher proportion of four or more antenatal care visits while the poorer women reported the lowest proportion (56.3%) of four or more antenatal care visits as shown in Table 5.1. The odds of attending four or more antenatal care visits were higher by 60% among women belonging to the richest wealth class compared to women belonging to the poorest wealth class.

Partner characteristics also play an important role in influencing attendance of antenatal care by women. Antenatal care attendance differed by level of educational attainment with increase in antenatal care attendance as level of education increased. Women whose partners had secondary education and above had the highest proportion (63.5%) of antenatal care attendance while those women with uneducated partners recorded the lowest proportion (50.5%) of antenatal care attendance as shown in Table 5.2. Women with uneducated partners were 0.6 times less likely to attend four or more antenatal care visits compared to women whose partners had secondary education and above.



Furthermore, there was variation in attendance of four or more antenatal care visits by partner's occupation. Women whose partners were employed in the non-agricultural sector recorded the highest proportion of attendance of four or more antenatal care visits (64.5%), while women whose partners were unemployed recorded the lowest proportion (50%) of attendance of four or more antenatal care visits in the study area as shown in Table 5.2. The observed differentials were statistically significant and therefore partner's occupation and antenatal care attendance were dependent (p-value 0.011). Women whose partners were employed in the non-agricultural sector were 1.4 times more likely to attend four or more antenatal care visits compared to women whose partners were employed in the agricultural sector.

Table 5. 2 Differentials of Antenatal care attendance and Unadjusted Odds Ratios of having 4+ Antenatal care attendance by Partner's Characteristics

Partner Characteristics	< 4 ANC visits	4+ ANC visits	Total (n)	O.R	C.I
Educational attainment (p-value 0.075)					
None	49.5	50.5	105	0.586**	[0.38 - 0.897]
Primary	39.7	60.4	628	0.875	[0.684 - 1.119]
Secondary+	36.5	63.5	474	1.000	
Don't Know	43.8	56.2	89	0.737	[0.466 - 1.166]
Total	39.6	60.4	1,296		
Occupation (p-value 0.011)					
Agricultural sector	43.6	56.4	656	1.000	
Non Agricultural sector	35.5	64.5	631	1.404**	[1.122 - 1.758]
Unemployed	50.0	50.0	6	0.773	[0.155 - 3.853]
Total	39.7	60.3	1,293		
Age (p-value 0.005)					
20 – 24	31.0	69.0	116	1.000	
25 – 29	35.3	64.7	232	0.823	[0.511 - 1.326]
30 – 34	37.1	62.9	264	0.762	[0.478 - 1.215]
35 – 39	37.5	62.5	240	0.750	[0.468 - 1.203]
40+	48.4	51.6	308	0.480***	[0.305 - 0.755]
Don't Know	41.7	58.3	132	0.630	[0.373 - 1.064]
Total	39.5	60.5	1,292		
Spousal Age Difference+ (p-value 0.334)					
Wife older	55.3	44.7	38	1.000	
Same Age	37.1	62.9	35	2.090	[0.819 - 5.339]
Spouse 1 - 4 years older	38.1	61.9	475	2.007*	[1.031 - 3.904]
Spouse 5 - 9 years older	38.6	61.5	358	1.969*	[1.004 - 3.864]
Spouse 10+ years older	40.2	59.8	254	1.841	[0.926 - 3.659]
Total	39.2	60.8	1,160		

* p < 0.05, ** p < 0.01, *** p < 0.001

+ Excludes women who did not know their partner's age.

Partner's age was significantly associated with attendance of antenatal care (p-value 0.005) while spousal age difference was not associated with attendance of antenatal care as shown in Table 5.2. Attendance of antenatal care increased as partner's age also increased. Women whose partners were aged between 20 – 24 years (69%) had the highest proportion of attendance of four

or more antenatal care visits while women whose partners were aged and 40 years and above (51.6%) had the lowest proportion of antenatal care attendance. The odds of having four or more antenatal care visits among women whose partners were aged 40 years and above were lower by 52% compared to women whose partners were aged 20 – 24 years. With regards to spousal age difference, women who were older than their spouses by 1 – 9 years were 2 times more likely to attend four antenatal care visits compared to women who were older than their spouses.

5.2.1 Quality of Antenatal Care

Carroli et al. (2001) explicitly explored the pathways through which antenatal care procedures provide opportunities for prevention, detection, and treatment of potentially life-threatening pregnancy complications. Antenatal care involves assessment of several components including weight measurements, blood pressure, HIV/AIDS testing, urine sample, tetanus injection, iron tablets, intestinal worms, and knowledge on pregnancy complications (UBOS and ICF, 2012). Information collected on blood pressure is key in detecting hypertensive disorders while information on height and weight offers information on women who may be at a high risk of obstructed or prolonged labour. Furthermore, antenatal care offers opportunities for sensitization of women on maternal health issues including detection of key pregnancy danger signs, safe and clean delivery, skilled deliveries, maternal and child nutrition, family planning among other issues or topics. Additionally, examination of urine tests in antenatal care aims to test proteinuria and oedema and can help predict or detect hypertensive disorders during pregnancy. While antimalarials drugs are aimed at protected women from malaria diseases. HIV/AIDS blood testing aims at eliminating mother to child HIV transmission.

Out of 1,482 respondents who attended antenatal care, majority of the respondents (90.6%) received the tetanus injection followed by respondents who took the iron tablets (82.9%) and anti malarials (76.9%). The lowest component of antenatal care was urine sample with only 15.5%

having heard their blood sample tested, while only a third of the respondents were told about pregnancy complications as shown in Table 5.3.

Table 5. 3 Percentage Distribution of Components of Antenatal Care

Components of ANC	Yes	No	Don't Know
Weight measurements	65.4	34.3	0.3
Blood pressure measurements	37.5	62.0	0.5
Blood sample	76.5	23.6	-
Urine sample	15.5	84.5	-
Tetanus injection	90.6	9.4	0.1
Took Iron tablets	82.9	16.7	0.3
Took intestinal worms	61.5	36.7	1.8
Took anti-malarials	76.9	22.0	1.1
Told about pregnancy complications	33.5	61.3	5.3

n = 1,482

The low attendance of antenatal care among the study respondents could be attributed to community perceptions about the importance of antenatal care. Several participants in focus group discussions discredited the importance of biomedical health system particularly antenatal care attendance in support of the traditional health system as illustrated in the excerpt below.

“But I also think that modern medicine does not help much a pregnant woman. Traditional medicine is better in this case. She has to get traditional herbs and use them. So thatwhen the time reaches, everything goes fine when the herbs are already digested in the body.” (Rural, Male FGD)

5.3. Place of delivery

The place of delivery has serious implications on a woman’s pregnancy outcome. In this study, women were asked where they delivered from. Information on the patterns of place of delivery by women’s socio-demographic and partner characteristics is important in understanding factors associated with choice of place of delivery in the study area. Results in Table 5.4 show the

differentials and unadjusted odds ratios in place of delivery by women's socio-demographic characteristics. Overall, 69% of the respondents delivered from a health facility. This is in comparison with national (57%) and Central region (62%) estimates of health facility deliveries (UBOS and ICF, 2012).

Results in Table 5.4 showed that the proportion of women who delivered from a health facility increased as age increased from 15 years up to 29 years and decreased thereafter. Health facility deliveries were lowest (48.3%) among older women (40 years and above) while highest (75.7%) among women aged 25 – 29 years followed by women (74.3%) aged 20 – 24 years. The observed differentials between place of delivery and woman's age were significant (p-value 0.000), thus place of delivery and woman's age were dependent. The odds of women aged between 35 – 39 years and 40 years and above delivering from a health facility were lower by 47% and 62% respectively, compared to women who were aged 15 – 19 years.

There was wide variation between place of residence and place of delivery. Almost all women (94.5%) residing in urban areas delivered from a health facility compared to women residing in the rural areas (55.5%) as shown in Table 5.4. The odds of delivering from a health facility among women residing in rural areas were lower by 93% compared to women in urban areas.

The choice of place of delivery significantly varied by education attainment in the study area (p-value 0.000). The proportion of women who delivered from a health facility increased as level of education increased. Majority of women with secondary education and above (91%) delivered from a health facility while 63.8% of women with primary education and 43.7% of uneducated women delivered from a health facility. Women with secondary education and above were 13 times more likely to deliver from a health facility, while those with primary education were 2.3 times more likely to delivery from a health facility compared to women with no education.

Table 5. 4 Differentials of Place of Delivery and Unadjusted Odds Ratios of health facility deliveries by Socio-Demographic Characteristics

Socio-demographic characteristics	Home	Health Facility	Total (n)	O.R	C.I
Age at birth (p-value 0.000)					
15 – 19	28.9	71.1	83	1.000	
20 – 24	25.7	74.3	409	1.178	[0.698 - 1.989]
25 – 29	24.3	75.7	407	1.266	[0.748 - 2.141]
30 – 34	33.56	66.4	298	0.805	[0.473 - 1.371]
35 – 39	43.6	56.4	204	0.526*	[0.303 - 0.910]
40+	51.7	48.3	87	0.380**	[0.201 - 0.716]
Location (p-value 0.000)					
Urban	5.3	94.7	511	1.000	
Rural	44.5	55.5	977	0.070***	[.046 - 0.104]
Educational attainment (p-value 0.000)					
None	56.3	43.7	174	1.000	
Primary	36.2	63.8	904	2.275***	[1.638 - 3.161]
Secondary+	9.0	91.0	410	12.999***	[8.276 - 20.418]
Occupation (p-value 0.000)					
Agricultural sector	43.7	56.3	915	1.000	
Non Agricultural sector	10.5	89.5	392	6.649***	[4.691 - 9.425]
Unemployed	11.6	88.4	181	5.918***	[3.686 - 9.499]
Total	31.1	69.0	1488		
Marital status (p-value 0.839)					
Currently not in union	30.4	69.6	191	1.000	
Currently married	31.1	68.9	1,296	0.966	[0.695 - 1.344]
Total	31.0	69.0	1,487		
Religion (p-value 0.000)					
Catholic	24.2	75.8	590	1.000	
Anglican	37.6	62.4	476	0.531***	[0.408 - 0.691]
Other Christian	42.6	57.5	235	0.432***	[0.314 - 0.595]
Muslim	21.6	78.4	185	1.160	[0.779 - 1.726]
Ethnicity (p-value 0.000)					
Muganda	17.0	83.0	705	1.000	
Munyakore	43.9	56.1	462	0.262***	[0.200 - 0.342]
Others	43.6	56.4	319	0.266***	[0.198 - 0.357]
Total	31.1	68.9	1,486		
Wealth Status (p-value 0.000)					
Richest	7.1	92.9	295	11.752***	[7.097 - 19.462]
Richer	19.2	80.8	302	3.789***	[2.608 - 5.505]
Middle	39.3	60.7	308	1.392*	[0.999 - 1.939]
Poorer	43.0	57.0	307	1.194	[0.859 - 1.660]
Poorest	47.4	52.6	268	1.000	
Total	31.0	69.0	1,480		

* p < 0.05, ** p < 0.01, *** p < 0.001

Results in Table 5.4 showed that women who were employed in the agricultural sector accounted for the lowest proportion (56.3%) of health facility deliveries. Similarly, women employed in the non-agricultural sector had the highest proportion (89.5%) of health facility deliveries followed by unemployed women (88.4%). Women employed in the non-agricultural sector were 6.6 times more likely to deliver from a health facility, while unemployed women were 5.9 times more likely to deliver from a health facility compared to women employed in the agricultural sector as shown in Table 5.4. Furthermore, there was no significant variation in choice of place of delivery by marital status (p-value 0.839).

Additionally, place of delivery significantly differed by religion in the study area (p-value 0.000). Muslims recorded the highest proportion (78.4%) of health facility deliveries followed by Catholics (75.8%), Anglicans (62.4%) and other Christians (57.5%) respectively. In comparison with Catholic women, the odds of delivering from a health facility among women belonging to the Anglican faith, or other Christian denominations were lower by 47% and 57% respectively. Similarly, ethnicity plays a significant role in choice of place of delivery. Results in Table 5.4 showed that health facility deliveries were highest among the Baganda (83%) compared to non-Baganda women (56%). The odds of non-Baganda women delivering at a health facility were lower by 74% among both Banyakore and other ethnicities compared to Baganda women.

The proportion of women who delivered from a health facility significantly decreased as wealth status decreased (p-value 0.000). Women belonging to the richest (92.9%) and richer (80.8%) wealth classes reported a higher proportion of health facility deliveries compared to the women in the poorer (57%) and poorest (52.6%) wealth classes. Women belonging to the richest wealth classes were 11.8 times more likely to deliver from a health facility compared to women belonging to the poorest wealth class. Likewise, women belonging to the richer and middle

wealth classes were 3.8 times and 1.4 times, respectively, more likely to deliver from a health facility compared to the poorest women as shown in Table 5.4.

With regards to partner characteristics, educational attainment, occupation and age were found to be associated with choice of place of delivery as shown in Table 5.5. The proportion of health facility deliveries increased as partner education also increased. Women whose partners had secondary education and above reported the highest (84.5%) proportion of health facility deliveries compared to women with uneducated partners (49.5%). The odds of delivering from a health facility among women with uneducated partners and partners with primary education were lower by 82% and 70% respectively, compared to women whose partners had secondary education and above. Notably, women who did not know their partner's highest level of educational attainment were also less likely by 71% to deliver from a health facility compared to women whose partners had secondary education and above.

Furthermore, majority of women whose partners were employed in the non-agricultural sector (83%) recorded a higher proportion of health facility deliveries compared women whose partners were employed in the non-agricultural sector (54.7%). The observed differentials were statistically significant and therefore partner's occupation and choice of place of delivery were dependent. Women whose partners were employed in the non-agricultural sector are 4.3 times more likely to deliver from a health facility compared to women whose partners were employed in the agricultural sector as shown in Table 5.5.

Table 5. 5 Differentials of Place of Delivery and Unadjusted Odds Ratios of health facility deliveries by Partner's Characteristics

Partner Characteristics	Home	Health Facility	Total (n)	O.R	C.I
Educational attainment (p-value 0.000)					
None	50.5	49.5	107	0.180***	[0.115 - 0.284]
Primary	38.4	61.6	628	0.295***	[0.219 - 0.397]
Secondary+	15.5	84.5	470	1.000	
Don't Know	39.1	60.9	92	0.286***	[0.176 - 0.466]
Total	31.2	68.9	1,297		
Occupation (p-value 0.000)					
Agricultural sector	45.3	54.7	660	1.000	
Non Agricultural sector	16.1	83.9	628	4.322***	[3.325 - 5.618]
Unemployed	50	50	6	0.828	[0.166 - 4.134]
Total	31.1	68.9	1,294		
Age (p-value 0.000)					
20 – 24	27.8	72.2	115	1.000	
25 – 29	23.0	77.0	230	1.288	[0.773 - 2.145]
30 – 34	28.7	71.3	265	0.959	[0.589 - 1.560]
35 – 39	27.9	72.1	240	0.996	[0.606 - 1.635]
40+	39.9	60.1	311	0.581*	[0.365 - 0.927]
Don't Know	38.6	61.4	132	0.612	[0.358 - 1.048]
Total	31.2	68.8	1,293		
Spousal Age difference + (p-value 0.964)					
Wife older	34.2	65.8	38	1.000	
Same Age	32.4	67.7	34	1.087	[0.407 - 2.904]
Spouse 1 - 4 years old	30.3	69.8	476	1.199	[0.596 - 2.410]
Spouse 5 - 9 years old	29.3	70.7	362	1.256	[0.619 - 2.548]
Spouse 10+ years older	31.1	68.9	251	1.153	[0.561 - 2.373]
Total	30.3	69.7	1,161		

* p < 0.05, ** p < 0.01, *** p < 0.001

+ Excludes women who did not know their partner's age.

Results in Table 5.5 showed that partner's age and choice of place of delivery were dependent (p-value 0.019) while spousal age difference and attendance of postnatal care were independent (p-value 0.964). Women whose partners were aged between 35 – 39 years (60.1%) and 40 years and above (61.4%) had the lowest proportion of health facility deliveries. While the highest

proportion (77%) of health facility deliveries were recorded among women whose partners were aged between 25 – 29 years. Women whose partners were aged 40 years and above were 0.6 times less likely to deliver from a health facility compared to women whose partners were aged between 20 – 24 years. With regards to spousal age difference, women who were older than their spouses had the lowest proportion (65.8%) of health facility deliveries while those whose spouses were older by 5 – 9 years had the highest proportion (70.7%) of health facility deliveries. However, no significant association was found to exist between spousal age difference and choice of place of delivery.

5.4 Postnatal care

Women are still prone to experiencing maternal near miss events or maternal deaths during the postpartum period. Therefore, postnatal care offers an opportunity for health workers to prevent or detect any complications that may occur which could lead to adverse pregnancy outcomes. Additionally, the postnatal care may act as a window of opportunity for contraceptive counselling and uptake especially for women who are at high-risk of experiencing maternal near miss complications. In this study, women were asked if they received postnatal care. Particularly, women who delivered in the communities were asked if they went to a health facility for a postnatal care within two days of delivery. Postnatal care was assessed by whether a health provider checked the woman's abdomen, eyes, and vaginal discharge before discharging the woman.

Results in Table 5.6 showed that only 31.8% of women received postnatal care. This is similar to the national and regional estimates where only a third of Ugandan women (33%) and 39.4% of women in Central Uganda receive postnatal care (UBOS and ICF, 2012). While women who delivered at a health facility were more likely to receive postnatal care, women who delivered in the communities were less likely to receive postnatal care.

Results from the focus group discussions showed that maternal seclusion is one of the cultural norms and practices associated with the postpartum period. Culturally, a newly delivered woman is not allowed to move out of the house or move past a road junction in the village for a period of 3 – 4 days after delivery. Therefore women who deliver in the communities may fail to receive postnatal care in the first two critical days after child birth. Such cultural beliefs may thus, have implications on occurrence of maternal near miss complications where existence of conditions such as haemorrhage or sepsis may deteriorate due to delays in seeking timely and appropriate care.

Knowledge on the patterns of postnatal care attendance by women's socio-demographic and partner characteristics is key in understanding factors associated with low postnatal care attendance. Results in Table 5.6 showed that postnatal care attendance increased as age increased from 15 years up to 29 years and decreased thereafter. Postnatal care attendance was lowest (23%) among older women (35 years and above) while it was highest (36.6%) among women aged 25 – 29 years followed by women (34%) aged 20 – 24 years. The observed differentials between postnatal care attendance and woman's age were significant (p-value 0.008), thus postnatal care and woman's age are dependent.



Postnatal care attendance in the urban areas was almost twice (46.8%) that of the rural areas (24%) as shown in Table 5.6. The odds of receiving postnatal care among women residing in rural areas were lower by 68% compared to women in urban areas (p-value 0.000). This can partly be attributed to the high proportion of home births in addition to limited access to health facilities in rural areas.

Postnatal care attendance increases as level of education increases (p-value 0.000). About 14.9% of women with no education received postnatal care compared to 29% among women with primary education and 45.1% among women with secondary education. The odds of receiving

postnatal care among women with no education are lower by 92% and 82% among women with primary education compared to women with secondary education. Women with secondary education are more likely to have health facility deliveries in addition to having knowledge on the importance of postnatal care compared to women with low or no education.

With regards to the socio-economic status of the women, marital status had no significant relationship with postnatal care attendance while occupation, religion, ethnicity, and wealth were significantly associated with postnatal care attendance. Women who were employed in the agricultural sector accounted for the lowest proportion (24%) of postnatal care attendance as shown in Table 5.6. The odds of unemployed women and women employed in the non-agricultural sector attending postnatal care were 2.5 times higher compared to women employed in the agricultural sector. While women employed in the non-agricultural sector may have had the finances to access postnatal care services, there is no clear explanation for the observed pattern of postnatal care attendance among unemployed women compared to women employed in the agricultural sector. Most women in the agricultural sector are engaged in subsistence farming and thus may have no disposable income to access postnatal care services.

Catholics recorded a higher proportion (37.1%) for postnatal care attendance followed by Anglicans (31.3%), while other Christians had the lowest proportion (21.7%) for postnatal care attendance. In comparison with Catholic women, the odds of attending postnatal care among women belonging to the Anglican faith, Muslim faith and other Christian denominations were lower by 23%, 32%, 53% respectively. The role of the Catholic church in the provision of health services in the area could have contributed to the increased utilization of health services among the Catholics. The Catholic religious leaders may have sensitized their congregation on the importance of utilization of maternal health services hence the increased postnatal care attendance. It is also possible that these women delivered from Catholic or mission based health

facilities in the area. Similarly, ethnicity plays a significant role in postnatal care attendance. Results in Table 5.6 showed that attendance of postnatal care was highest among the Baganda (38%) compared to Banyakore women (26%) and women belonging to other ethnicities (26%). The odds of non-Baganda women receiving postnatal care were lower by 42% compared to Baganda women as shown in Table 5.6.

Results in Table 5.6 showed that attendance of postnatal care significantly varied by wealth status care. Almost half (47.8%) of women belonging to the richest wealth class received postnatal care, while a quarter of women belong to the middle wealth class and 22.8% of poorer women received postnatal care. Women belonging to the richest wealth classes were 3 times more likely to attend postnatal care compared to women belong to the poorest wealth class, while richer women were also 2 times more likely to attend postnatal care compared to women belong to the poorest wealth class.

Table 5. 6 Differentials of Postnatal care attendance and Unadjusted Odds Ratios of Postnatal care attendance by Socio-Demographic Characteristics

Socio-demographic factors	Postnatal care attendance			O.R	C.I
	No	Yes	Total (n)		
Age of respondent (p-value 0.008)					
15 – 19	68.7	31.3	83	1.000	
20 – 24	66.0	34.0	409	1.129	[0.680 - 1.874]
25 – 29	63.4	36.6	407	1.266	[0.764 - 2.100]
30 – 34	69.1	30.9	298	0.979	[0.579 - 1.655]
35 – 39	77.0	23.0	204	0.656	[0.372 - 1.157]
40+	77.0	23.0	87	0.654	[0.331 - 1.294]
Location (p-value 0.000)					
Urban	53.2	46.8	511	1.000	
Rural	76.1	24.0	977	0.358***	[0.285 - 0.450]
Educational attainment (p-value 0.000)					
None	85.1	14.9	174	0.077***	[0.049 - 0.121]
Primary	71.0	29.0	904	0.175***	[0.122 - 0.252]
Secondary+	54.9	45.1	410	1.000	
Occupation (p-value 0.000)					
Agricultural sector	76.0	24.0	915	1.000	
Non Agricultural sector	56.1	43.9	392	2.470***	[1.922 - 3.173]
Unemployed	55.3	44.8	181	2.559***	[1.840 - 3.559]
Total	68.2	31.8	1,488		
Marital status (p-value 0.770)					
Currently not in union	69.1	30.9	191	1.000	
Currently married	68.1	31.9	1,296	1.050	[0.756 - 1.458]
Religion (p-value 0.000)					
Catholic	62.9	37.1	590	1.000	
Anglican	68.7	31.3	476	0.772*	[0.598 - 0.997]
Other Christian	78.3	21.7	235	0.470***	[0.330 - 0.668]
Muslim	71.4	28.6	185	0.680*	[0.475 - 0.975]
Ethnicity (p-value 0.000)					
Muganda	62.0	38.0	705	1.000	
Munyakore	73.8	26.2	462	0.579***	[0.447 - 0.748]
Others	74.0	26.0	319	0.573***	[0.428 - 0.768]
Total	68.2	31.8	1,486		
Wealth status (p-value 0.000)					
Richest	52.2	47.8	295	2.979***	[2.072 - 4.284]
Richer	60.3	39.7	302	2.145***	[1.490 - 3.089]
Middle	75.0	25.0	308	1.085	[0.740 - 1.590]
Poorer	77.2	22.8	307	0.961	[0.652 - 1.417]
Poorest	76.5	23.5	268	1.000	
Total	68.2	31.8	1,480		

* p < 0.05, ** p < 0.01, *** p < 0.001

Partner characteristics were also found to influence attendance of postnatal care among women in the study area. Attendance of postnatal care significantly varied by partner's educational attainment, occupation and age as shown in Table 5.7. Attendance of postnatal care increased as partner's educational attainment increased. Women whose partners had secondary education and above reported the highest (40%) attendance of postnatal care compared to 14% of women with uneducated partners. The odds of women with uneducated partners and partners with primary education attending postnatal care were lower by 75% and 38% respectively, compared to women whose partners had secondary education and above.

Furthermore, women whose partners were employed in the non-agricultural sector (40%) had a higher attendance of postnatal care compared to women whose partners were employed in the agricultural sector (24.4%). The observed differentials are statistically significant and therefore partner's occupation and attendance of postnatal care are dependent. Women whose partners were employed in the non-agricultural sector were 2 times more likely to attend postnatal care compared to women whose partners are employed in the agricultural sector as shown in Table 5.7.

Results in Table 5.7 show that partner's age and attendance of postnatal care were dependent (p-value 0.019) while spousal age difference and attendance of postnatal care were independent. No clear pattern was observed between attendance of postnatal care and spousal age difference, while attendance of postnatal care was highest among women whose partners were aged between 25 – 34 years (37%) followed by those whose partners were aged between 35 – 39 years (31.7%) and 20 – 24 years (29.6%) respectively.

Table 5. 7 Differentials of Postnatal care attendance and Unadjusted Odds Ratios of Postnatal care attendance by Partner's Characteristics

Partner Characteristics	Postnatal care attendance			O.R	C.I
	No	Yes	Total (n)		
Education attainment (p-value 0.000)					
None	86.0	14.0	107	0.245***	[0.137 - 0.435]
Primary	70.9	29.1	628	0.617***	[0.479 - 0.794]
Secondary+	60.0	40.0	470	1.000	
Don't Know	69.6	30.4	92	0.656	[0.406 - 1.062]
Total	68.1	31.9	1,297		
Occupation (p-value 0.000)					
Agricultural sector	75.6	24.4	660	1.000	
Non Agricultural Sector	60.0	40.0	628	2.064***	[1.625 - 2.620]
Unemployed	83.3	16.7	6	0.620	[0.072 - 5.345]
Total	68.1	31.9	1,294		
Age (p-value 0.019)					
20 – 24	70.4	29.6	115	1.000	
25 – 29	62.2	37.8	230	1.449	[0.896 - 2.345]
30 – 34	63.0	37.0	265	1.398	[0.872 - 2.241]
35 – 39	68.3	31.7	240	1.104	[0.680 - 1.792]
40+	73.0	27.0	311	0.882	[0.550 - 1.414]
Don't Know	75.0	25.0	132	0.794	[0.453 - 1.393]
Total	68.1	31.9	1,293		
Spousal Age difference + (p-value 0.518)					
Wife older	76.3	23.7	38	1.000	
Same Age	61.8	38.2	34	1.995	[0.720 - 5.524]
Spouse 1 - 4 years older	68.1	31.9	476	1.512	[0.698 - 3.272]
Spouse 5 - 9 years older	64.9	35.1	362	1.741	[0.800 - 3.793]
Spouse 10+ years older	68.9	31.1	251	1.453	[0.657 - 3.215]
Total	67.36	32.64	1,161		

* p < 0.05, ** p < 0.01, *** p < 0.001

+ Excludes women who did not know their partner's age.

5.5 Maternal Health Behaviour and Maternal Near Miss

Results in Table 5.8 showed that attendance of four or more antenatal care visits was higher among maternal near misses (27.7%). However, this variation was not statistically significant (p-value 0.384). Similarly, maternal near miss status was independent of place of delivery (p-value 0.393). With regards to attendance of postnatal care, maternal near misses recorded the highest proportion of attendance of postnatal care (38.3%). The variation between attendance of postnatal care was statistically significant (p-value 0.000), meaning postnatal care attendance and maternal near miss were dependent. This can possibly be attributed to maternal near misses who reach the health facilities in a critical condition or maternal near misses who are admitted during the postpartum period, and are able to receive postnatal care.

Table 5. 8 Differentials of Maternal Near Miss status by Maternal Health Behaviour

Maternal Health Behaviour	Not Maternal Near Miss	Maternal Near Miss	Total	p-value
Antenatal care attendance				0.384
< 4 visits	74.3	25.7	592	
4+ visits	72.3	27.7	891	
Total	73.1	26.9	1,483	
Place of Delivery				0.393
Home	75.1	24.9	462	
Health Facility	73.0	27.0	1026	
Postnatal care attendance				0.000
No	79.2	20.8	1,015	
Yes	61.7	38.3	473	
Total	73.66	26.34	1,488	

5.6 Chapter Summary

Utilization of maternal health services was described by three services including antenatal care attendance, place of delivery and postnatal care attendance. Women who were less likely to attend antenatal care were also less likely to deliver from a health facility, and consequently less likely to receive postnatal care. Utilization of maternal health services was lower among older

(35 years and above), poorest, and rural women in addition to women who were employed in the agricultural sector, had primary education, belonged to minority tribes in the study area and were non-Catholic women. Similarly, their partners were also employed in the agricultural sector, and were old (40 years and above) and not educated. The low utilization of maternal health services in the study area can partly be attributed to the over-reliance on traditional health systems in the rural areas, socio-cultural beliefs and low socio-economic status of the women.

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Chapter Six: Prevalence, Causes and Risk Factors of Maternal Near Miss

6.1 Introduction

This chapter presents the study definitions of maternal near miss complications or conditions. It addresses three of the objectives of the study including, estimation of the magnitude of maternal near miss, identification and description of the causes of maternal near miss and the risk factors of maternal near miss in Central Uganda. Furthermore, a detailed discussion and summary of the findings is presented in this chapter.

6.2 Study definitions or classification of maternal near miss

In order to estimate the magnitude or prevalence of maternal near miss in the study area, precise definitions of the life-threatening pregnancy complications is a prerequisite. Hence, this section describes the definitions of the different diseases or conditions that were used to classify women as maternal near misses. Given that the disease and management criteria were used to identify maternal near misses, the intervention procedures that were used to classify maternal near misses for each disease or condition are also discussed in this section. Furthermore, selected case narratives for each disease or condition are also presented.

6.2.1 Severe haemorrhage

Haemorrhage, generally known as blood loss, can either occur during pregnancy (antepartum haemorrhage) or during delivery or after child birth (postpartum haemorrhage). Antepartum haemorrhage refers to blood loss from the birth canal during the second half of the pregnancy but before child birth (Mukherjee and Bhide, 2008). Postpartum haemorrhage refers to blood loss in excess of 500 milliliters after child birth while severe postpartum haemorrhage refers to blood loss in excess of 1000 milliliters after child birth (MCHIP, 2011). In this study, severe haemorrhage, generally known as severe blood loss, was defined as excessive blood loss during

pregnancy (ante-partum), delivery (intra-partum) or after delivery (post-partum) during the first 48 hours leading to symptoms including severe weakness, dizziness, loss of consciousness; and treatment interventions such as uterine massage, intravenous infusion, administration of more than two blood control injections, extended hospitalization, removal of the uterus and blood transfusion.

In the absence of proper health facility record keeping and high proportion of home deliveries, other measurements and women's perception of severe blood loss were used to estimate severity of blood loss. Women's perception of excessive blood loss has previously been used in other studies or community program interventions on the use of misoprostol medication during home births as noted in an integrative review by Smith et al. (2013). Several techniques have also been used to gauge the amount of blood lost before classifying women as having haemorrhage in different community studies (Geller et al., 2006). According to WHO guidelines (WHO, 2006b), one of the indications of excessive bleeding during pregnancy or after delivery is a soaked pad or cloth in less than five minutes. Similarly, a Tanzanian study (Prata et al., 2005a) reported the use of a cotton fabric commonly known as *kanga* in estimating the amount of blood lost by a woman after a home delivery. This fabric was folded in four equal parts and placed beneath the woman's buttocks after delivery; a threshold of two soaked *kangas* was noted to be equivalent to 500mL while four soaked *kangas* were said to be equivalent to 1000mL. Another study in Bangladesh (Bell et al., 2014) estimated amount of blood loss in a community study using a "blood measurement tool" called a mat. While an Indian prospective community study (Bang et al., 2004) based on village health workers' information on the mother's temperature after delivery, number of pads used in a given day and observed amount of blood lost to categorize blood loss as normal or severe. Hence, it is possible for recently delivered women to gauge the amount of blood lost using the different techniques applicable to each local setting.

In this study, severe haemorrhage was probed by asking women their perception of the excessiveness of the blood they lost and their descriptions of excessive blood loss during the pregnancy period. These descriptions included continuous heavy blood outflow with or without haemorrhage medication (oxytocic injection or misoprostol tablets), frequent changing of pads or undergarments, blood flow covering the respondent's bedding and in some cases amount of blood (more than 2 cups) collected from the bed. In addition to the women's perceptions and descriptions of excessive blood loss, treatment procedures that were undertaken to manage severe haemorrhage were used to validate its occurrence among these women. Furthermore, referral to a health facility, if delivery was at home, or to a higher health facility was used to ascertain the severity of haemorrhagic complications.

Narratives from several women identified to have experienced severe haemorrhagic complications complied with the study definition of severe haemorrhage as shown below.

"I had gone for antenatal care in Mbarara hospital but I was admitted and told that I would deliver in three days. When one baby came out, the second one came out after two hours and the placenta came out fast. But I lost consciousness due to severe blood loss. I was put on two drips and one sachet of blood. I was discharged after one day." (Rural woman, aged 37 years with gravidity 6)

"After delivery at 4pm, there was severe blood loss so the midwife put three pads but they all got soiled. Blood was on the whole bed up to the neck as I lay on the bed. The people around me [caretakers] were all full of blood. I felt so weak and I could not talk. The midwife was fair enough and she called another midwife to come and help her. She had already given me three injections. I was shaking and shivering. Then I was kept warm; and the blood started reducing. I was admitted for two days. I was given mirinda fruity – the big bottle so that I gain blood."
(Urban woman, aged 23 years with gravidity 2)

The above examples, which are representative of the bulk of severe haemorrhage cases, illustrate some of the symptoms women who experienced severe postpartum haemorrhage had. Several

respondents' perception of severe blood loss was expressed through the frequent change of pads, overflow of blood on the bed, severe weakness and loss of consciousness. As part of the interventions to manage severe haemorrhage, these women either received more than two intravenous infusions and injections or blood transfusion. Notably, most women had extended hospitalization exceeding one day compared to their counterparts who are discharged within a few hours after a vaginal delivery. While the recommended health facility or hospital stay is one day for a vaginal delivery and two to three days for a caesarean section, most women in the study area were discharged within hours of delivery in case of no complications.

6.2.2 Retained placenta

In this study, the standard definition of retained placenta by WHO (2006b) was adopted, which is the failure of the placenta to be delivered within thirty minutes after delivery. In addition, management procedures such as abdominal massage, manual removal of the placenta, use of forceps and administration of oxytocic injections were at times used to validate occurrence of retained placenta complications among the women. Referral to a health facility in case of home deliveries or to a higher health facility was also used to ascertain severity of retained placenta complications.

Weeks (2008) argued that there is no consensus regarding the time frame of classifying a placenta as retained and management procedures such as manual removal of the placenta may be applied before or after the lapse of thirty minutes depending on whether a woman is experiencing postpartum haemorrhage or not. This is contrary to WHO's one hour time frame before such a procedure can be used. Similarly, grey literature notes that the time frame of thirty minutes applies to skilled birth attendance while unsupervised deliveries may have an allowance of more time before classifying a woman as having a retained placenta.

In this study, selected narratives from women who experienced retained placenta are presented below.

"I delivered the baby without any problem but the placenta got retained and it took more than forty minutes to be removed. My abdomen was hurting. The nurse massaged the stomach but it failed to come out. When it failed, the last option was to insert forceps into my cervix to pull it out." (Rural woman, aged 35 years with gravidity 4)

"After delivery, there was severe blood loss so I was given two injections to reduce the bleeding but it did not reduce because of the retained placenta. The health workers tried by massaging the abdomen and putting their hands to remove the placenta but they could not remove it. I was put on drip too but after one hour, we were referred to Rakai hospital, where it was removed within a short time. I was put on drip and given two more injections to stop the bleeding. Within something like forty minutes, the placenta was manually removed by pulling it out. The bleeding reduced but I was feeling so dizzy so I was admitted for two days." (Rural woman, aged 28 years with gravidity 4)

Analysis of the above cases validates occurrence of severe retained placenta complications lasting more than the standard thirty minutes as classified by WHO. The above cases, representative of other women with retained placenta complications, occurred as a result of postpartum haemorrhage. To ascertain the validity of the severity of retained placenta complications, assessment of the interventions undertaken was observed in each of these cases, which included uterine massage, and manual removal. Additionally, referral to a higher health facility in case of retained placenta also validated the severity of these complications.

6.2.3 Obstructed labour

Obstructed labour refers to the failure of a woman's fetus to descend through the pelvis or cervix because of either a mismatch between the size of the fetus and pelvis (big fetus, narrow pelvis),

or mal-presentations (transverse lie, shoulder, brow, breech presentations) and other abnormalities despite having strong labour pains or contractions (WHO and ICM, 2008a). In addition to adopting the standard definition of obstructed labour for the study, interventions such as emergency operative delivery (emergency caesarean section) were also used to verify occurrence of this complication. Furthermore, where applicable, referral to a higher health facility was also used to ascertain the severity of the complication.

The narratives of women who experienced obstructed labour are presented below. These narratives illustrate having a narrow pelvis as one of the causes that led to obstruction of labour among these women. Additionally, the narratives showed that emergency operative delivery (caesarean section) was the most common intervention undertaken to manage obstructed labour complications.

"I went to hospital on Tuesday but was retained because it was time to deliver. For two days, I was at the hospital but the cervix did not open and I was told that my pelvic bones were narrow. Therefore the doctor arranged for my operation because I was getting weaker. I was unconsciousness and thus can't remember what happened during the operation." (Urban woman, aged 18 years with gravidity 1)

"On going to the hospital at 9a.m, I was feeling pain and thought I had gone to deliver my baby. I was escorted by my sister. After six hours, the doctor was called in who checked on me and told me that my pelvic bones were narrow and that I could not handle the pushing of the baby. He later called my sister and told her that the best option was to give consent so that they take me for an operation. My sister came back and told me and I agreed if it was the best for both my baby and my survival. I was taken for an operation at 5 p.m. I accepted [to have operation] because even my first baby died while we were still in hospital because I had taken a lot of time in labour trying to push the baby and by the time the baby came out, it was tired and it was taken for oxygen supply but it passed on ten minutes later." (Urban woman, aged 24 years with gravidity 2)

6.2.4 Prolonged labour

The study definition for prolonged labour was adapted from WHO and ICM (2008a) as labour which exceeded twelve hours after the onset of regular painful contractions combined with slow progress of cervix dilation. While the management procedures for prolonged labour were considered in ascertaining occurrence of this complication, where applicable, referrals to higher health facilities for interventions such as caesarean section were also considered.

In this study, the narratives of women identified to comply with the definition of prolonged labour are reported below.

“I started getting labour pains at home and then went to my mother-in-law who told me to wait. So after like four hours, we went to the hospital and I stayed there for almost eight hours in pain and still nothing was done. Then I was put on drip to augment the labour pains and it took another five hours to deliver the baby.”
(Rural mother aged 21 years with gravidity 1)

“Having stayed in labour for over twenty four hours, the health worker decided to induce me with four bottles [presumably drips of oxytocin]. The labour pains were intensified and strong but the cervix could not expand. The final decision was an operation [emergency caesarean section].” (Rural woman, aged 22 years with gravidity 1)

The above narratives showed that women with prolonged labour spend more than twelve hours in labour after the onset of painful contractions. Additionally, they were either induced to augment the contractions or they were operated so as to save lives of both the mother and infant.

6.2.5 Ectopic Pregnancy

Ectopic pregnancy refers to a pregnancy where the fetus grows in the fallopian tubes or elsewhere, but not in the womb or uterus. A combination of the pregnancy gestation and management procedure was used to verify the occurrence of an ectopic pregnancy. A gestation period of less than three months and management of the complication by laparotomy (incision

through the abdomen) were key in ascertaining its occurrence. Only one woman in the study was classified as having suffered from an ectopic pregnancy and her narrative is presented below.

“While at home, I started hurting and I decided to go to Gyaviira clinic. I had a pregnancy test and I was told that I was pregnant yet I was using family planning (contraceptives). I denied and the doctor told me that it was true. At Gyaviira’s clinic; the medical personnel also told me that I had urinary tract infections and that is why I was hurting in the stomach. I was given some tablets and sent home. I swallowed the medicine for four days but the pain only got worse. It reached a time when I could not handle the pain. My husband decided to take me to Kalisizo hospital where I was taken into the scan and I was told that the pregnancy had grown in the fallopian tubes [ectopic] and that the only option was to terminate it. I was immediately scheduled for an operation and they performed an emergency operation [laparotomy]. I cannot use any family planning method anymore because I believe it is the family planning injection that caused this.” (Urban woman, aged 34 years, gestational period – 1 month & 3 weeks)

The above narrative conforms to the study definition and management procedures of an ectopic pregnancy. The respondent’s assertion of experiencing an ectopic pregnancy followed medical tests which showed that the fetus was growing in the fallopian tube and not the uterus. In addition, ectopic pregnancies are often identified early in pregnancy and are symptomized by sharp pains, which was also the case for this woman as she reported experiencing sharp pains and the pregnancy gestation period was less than two months.

6.2.6 Ruptured uterus

Ruptured uterus refers to the *“tearing of the uterine wall during pregnancy or delivery”* and can be diagnosed based on several indications including vaginal bleeding, unusual sharp or searing abdominal pains, discontinuation of labour contractions, reduced or absent fetal heart rate and signs of shock (Justus Hofmeyr et al., 2005). Rupturing of the uterus may either be incomplete with only part of the uterine wall torn, or complete with the whole uterine wall being torn (Gessesew and Melese, 2002). In addition, rupturing of the uterus may either be spontaneous

occurring without the use of uterotonic drugs for labour induction and augmentation; or traumatic occurring due to a scarred uterus, obstructed labour, obstetric procedures or misuse of uterotonic drugs (Aboyeji et al., 2001; Gessesew and Melese, 2002).

For this study, complications as a result of ruptured uterus were classified based on diagnosis and presentation of symptoms including unusual abdominal or labour pains followed by either vaginal bleeding during labour or the sudden stop of labour contractions and reduced or no fetal movement possibly leading to intra-uterine death, loss of unconsciousness, and shock during active labour. Occurrence of ruptured uterus complications was also ascertained based on the medical diagnosis given to the women while at the health facility. In addition, classification of a ruptured uterus was confirmed by the management of the complication such as laparotomy. It is important to note that further probing was done to differentiate between women who had previous caesarean scars and may have experienced dehiscence of the uterine scar and those with no previous caesarean scars.

Only one respondent, a 27 year urban woman, was classified as having suffered from a ruptured uterus complication in the study. The narrative below shows that prolonged labour, possible over-dosage of uterotonic drugs (three doses) and loss of consciousness during labour, reduced or absent fetal heart rate leading to fetal death all combined, were evident signs of a traumatic ruptured uterus complication.

"I went to hospital at 1.00pm and was checked and told that I would give birth. I was given a tablet for labour pains but the labour pains did not increase throughout the night. In the morning, I was put on drip to augment the labour pains further but also this was not of great help. I was added another drip but I became unconscious when the drip was almost half way. I was then rushed to the theatre for an emergency operation [laparotomy]. I had a tear on the left side of the uterus. Unfortunately the baby died in the process." (Urban woman, aged 27 years with gravidity 3)

Notably, the respondent was aware of the complication she had experienced which was evidenced by her unprompted mention of “tear on the left side of the uterus” which also ascertained the occurrence of this complication. Important to note that this respondent had no history of caesarean deliveries and thus could not have experienced scar dehiscence.

6.2.7 Puerperal sepsis

According to WHO and ICM (2008b), puerperal sepsis refers to bacterial infection of the female genital tract which occurs following delivery or a miscarriage, and is diagnosed based on several symptoms and signs including high fever (38° Celsius and above), foul vaginal discharge, severe abdominal pains, vaginal bleeding and, sometimes, shock. In addition, WHO and ICM (2008b) notes that being anaemic, obstructed labour, rupture of membranes, insertion of unhygienic instruments into the birth canal, operative deliveries, postpartum haemorrhage and retained placental components are all known risk factors of puerperal sepsis.

In this study, severe puerperal sepsis was defined as an infection characterized by a combination of high fever, severe abdominal pains and foul vaginal discharge experienced by a woman following delivery or an abortion. Similarly, the management procedures of puerperal sepsis including administration of antibiotics, removal of retained placenta components manually or by use of forceps (if applicable), and administration of plenty of oral or intravenous fluids (WHO and ICM, 2008b) were also taken into consideration before classifying a woman as having suffered from this complication. Below are two cases of women whose narratives conformed to the study definition of puerperal sepsis.

“After delivery, I was given an injection as part of the routine and then discharged. While at home, I started hurting in the stomach and had fever. The abdominal pain was severe that I reached a point whereby I could not stand and move by myself apart from crawling. I waited for my husband who rushed me to the clinic, where the midwife admitted me to the clinic again and she started

another method. The midwife asked me to lie on another bed like I was going to give birth. While wearing gloves, she inserted her hand into my vagina, opened the cervix and started scooping a lot of blood from my uterus, pouring it outside. The unwanted blood was a lot and smelly. After realizing that I was now safe, she prescribed a few tablets and this all relieved my pains.” (Rural woman, aged 37 years with gravidity 7)

“At nine months, I went for the last check up and everything seemed okay. While home, I experienced labour pains, got a motorcycle to rush me to the labour ward for delivery. Only to be told that the child I had delivered had died two to three days before time. After delivery, the placenta came out shortly but it was rotten and smelly. After the still birth, I had a fever, severe abdominal pains, swollen hands and bleeding complications. I also bled yellow smelly fluid which could be blown away by wind as it was ashy after drying. After cleaning me, the midwife came back with a medical letter referring me to Masaka referral hospital for further examination.” (Rural woman, aged 34 years with gravidity 7)

The above narratives, based on a combination of several symptoms and signs including foul discharge, fever, severe abdominal pains, can be classified as valid cases of sepsis. In the first narrative, it is evident that the cause of sepsis was as a result of retained placenta components which led to re-admission in hospital hence ascertaining the severity of the woman's condition. While in the second narrative, sepsis could have occurred as a result of intrauterine death and rotten placenta which led to referral of the woman to a higher health facility, which too explains the severity of the complication.

6.2.8 Abortion complications

Abortion refers to “*termination of a pregnancy before the fetus is capable of extra-uterine life*” (WHO, 1995). An abortion may either occur spontaneously, where the termination of the pregnancy is involuntary, or it may be induced, where there is deliberate or voluntary expulsion of the fetus (WHO, 1995). In Uganda, induced abortion is illegal except when the mother's life is

at risk or when the fetus is affected by congenital factors. An abortion may be safe, if carried out by skilled health personnel in the recommended medical setting. World Health Organization defines unsafe abortion as “*a procedure for terminating an unintended pregnancy carried out by persons lacking the necessary skills or in an environment that does not conform to minimum medical standards or both*” (Dragoman et al., 2014).

Every abortion that occurs puts the woman at risk of developing complications. However unsafe abortions aggravate the woman’s risk of developing life-threatening pregnancy complications including severe haemorrhage or infection, leading to severe maternal outcomes (Dragoman et al., 2014). Several interventions are done in the management of abortion related complications including uterine evacuation techniques (dilatation and curettage, and vacuum aspiration), antibiotic therapy, intravenous fluid infusion, use of oxytocins, blood transfusion, laparotomy and removal of the uterus (Dragoman et al., 2014; WHO, 1995).

In this study, abortion complications were defined as severe complications, including severe infection and haemorrhage, which arose as a result of an abortion before six months of the pregnancy. Furthermore, either referral to a higher health facility or admission at a health facility in addition to the interventions that were done to manage the abortion complications were taken into consideration while classifying a woman as having suffered from severe abortion complications. The narratives, representative of women who experienced abortion complications are reported below.

“After two days of bleeding, I decided to go to Kabayanda hospital, there, I was asked to take a pregnancy test and the doctor found out that I was still pregnant. They prescribed drugs and discharged me. I came back home but later realized that my condition was only worsening after taking the drugs for a week. I, therefore, decided to go to Lyantonde hospital where I was asked to get an ultra sound scan, but because I did not have the money needed, I left and went back

home. Two weeks later, I began hurting in the abdomen. I started feeling labour pains and the next thing was to see a lot of blood on my clothes. I cleaned myself and left for the clinic in Ndeeba where I was given an injection to stop blood loss. I came back home but after a few days, I bled again with clots and this tempted me to go to Lyantonde hospital where I was admitted. I received treatment and was also taken for an ultra sound scan. I was then told that my uterus had gotten contaminated and I had to be washed in the stomach [uterine evacuation]. However I did not have money to perform the procedure [uterine evacuation] and thus the hospital discharged me but I was given some medication.” (Rural woman, aged 27 years with gravidity 5, pregnancy gestation – 3 months)

“When I was three months’ pregnant, I started bleeding and after 4 days I went to a clinic. I was given drugs but they did not work. I had severe abdominal pains so we decided to go to Kisoro hospital where I was immediately admitted, put on drips and I was washed [uterine evacuation] in the stomach. To control the blood, I was given an injection and drugs. I spent seven days in the hospital as my condition was very bad. (Rural woman, aged 40 years with gravidity 11)

The diagnosis of severe abortion complications in women, like the two cases presented above, was ascertained based on a combination of several factors including gestation of the pregnancy, symptoms of an abortion patient, complications experienced and management of the condition. These women experienced spontaneous abortions during the first trimester of their pregnancies, evidenced by symptoms including strong abdominal pains, severe vaginal bleeding, and history of amenorrhea – which are known symptoms of an abortion patient as described by WHO (1994a). The complications mainly arose as a result of severe haemorrhage, and infection due to a “contaminated uterus.” Notably, the severity of the conditions prompted these women to seek treatment at higher health facilities (hospitals), which provide emergency abortion care. Due to the severity of the complications, these women were admitted to hospital and had an extended hospital stay. To manage the complications, uterine evacuation was the main recommended

procedure, although one of the cases presented above showed that due to lack of funds to pay for the procedure, the complication was managed conservatively by antibiotic therapy.

6.2.9 Pregnancy hypertensive disorders

AbouZahr (2003) defines pregnancy hypertensive disorders as a set of conditions associated with high blood pressure, amount of protein in urine (proteinuria) and convulsions in pregnancies. These pregnancy hypertensive disorders are mainly categorized into three groups including chronic hypertension; gestational hypertension; pre-eclampsia and eclampsia (WHO, 2011). According to Lindheimer et al. (2009), gestational hypertension refers to the development of high blood pressure after 20 weeks of pregnancy or during labour, or the postpartum period; and its severity is based on blood pressure levels of ≥ 160 mm Hg systolic and ≥ 110 mm Hg diastolic.

Whereas pre-eclampsia is a disease associated with the development of severe gestational hypertension and substantial protein levels in the urine after 20 weeks of pregnancy gestation or during delivery or the postpartum period (AbouZahr, 2003; WHO, 2011), its severity can be diagnosed based on either severe hypertension, high amount of protein in the urine or organ dysfunction (WHO, 2011). While eclampsia, which progresses from pre-eclampsia, is diagnosed by the occurrence of seizures and, or convulsions/ fits after ruling out the possibility of epilepsy during the pregnancy period (AbouZahr, 2003; WHO, 2011). Furthermore, Lindheimer et al. (2009) asserts that manifestation of signs and symptoms including headache, swelling of the legs (oedema), swelling of the face, dizziness, blurred vision, and abdominal pain can be used to diagnose a woman as a pre-eclamptic patient.

WHO (2011) recommends pregnancy termination or delivery of the fetus in management of severe pregnancy hypertensive disorders. In other cases, anti-hypertensive drugs are recommended in the management of severe gestational hypertension, while anti-convulsants

especially magnesium sulphate regimens are recommended in treatment of pre-eclampsia and eclampsia.

Chronic hypertension – pre-existing pregnancy hypertension or that which manifests before 20 weeks of pregnancy gestation, was excluded under the pregnancy life-threatening hypertensive disorders. This exclusion criterion was because severity could not be verified, in addition to possible under-reporting of this condition given the low use of health services by women for non-communicable diseases. Hence, this study only considered pre-eclampsia/ eclampsia and severe gestational hypertension as pregnancy hypertensive disorders that were life-threatening.

The operational definition for severe gestational hypertension was high blood pressure which developed after six months of pregnancy with blood pressure levels of 160 / 110 mm Hg and above (where readings were known), which required hospitalization or referral to a higher health facility. Pre-eclampsia was defined as the development of gestational hypertension after six months of pregnancy combined with several symptoms including loss of consciousness, swelling of the feet (oedema), dizziness or nausea, headache, abdominal pain and blurred vision. Eclampsia was diagnosed as progression from pre-eclampsia leading to seizures or convulsions or fits, after ruling out epilepsy.

Below are two narratives which illustrate the basis of diagnosis for pre-eclampsia and severe gestational hypertension in this study respectively.

“Severe labour pains started at 11.00 am but at around 6.00 pm, I had lost consciousness and woke up when the baby was out. Then I was padding myself when I fell and again lost consciousness and I don’t know what happened after. When I woke up, I was on my bed in the admission room at around 7.00pm. From the waist, the body was swollen. I was given vitaglobin syrup and took herbs. I spent 16 hours in the hospital after delivery.” (Urban woman, aged 24 years with gravidity 1 who suffered from pre-eclampsia)

“While at home, I received news that my mother was very sick and my blood pressure got high and increased to 180/140 mm Hg. I was rushed to hospital where I was taken to theatre for an emergency operation. While in theatre, I run short of oxygen and my blood pressure was very low and I was resuscitated.”
(Urban woman, aged 35 years, a nurse by profession with gravidity 5 who suffered from gestational hypertension)

The diagnosis of pre-eclampsia was based primarily on symptoms of a pre-eclamptic patient. The danger signs of pre-eclampsia as observed from the woman’s pregnancy history-taking are noteworthy. She experienced swelling of the legs (oedema), hands and face; paleness, nausea and dizziness, severe weakness, blurred vision and loss of consciousness during pregnancy, delivery and postpartum period. As a result of pre-eclampsia, she lost consciousness in the process of delivery which led her to have an assisted vaginal delivery. After regaining her consciousness briefly, she again became unconsciousness in less than 48 hours after delivery, which is characteristic of pre-eclampsia patients. The severity of her condition warranted hospitalization so that her condition could further be monitored by health personnel. Whereas, in the second narrative, classification of the condition as severe gestational hypertension was solely based on the high blood pressure measurements (180/140 mm Hg) as provided by the respondent – a nurse by profession. Her blood pressure levels exceeded the severe gestational hypertension threshold of 160/ 110 mm Hg which led to an emergency caesarean operation so as to save the life of both the mother and child.

6.2.10 Severe malaria

Based on the well-known premise that *“all fevers are not malaria”* (Anand et al., 2002), special attention was made in differentiating these two terms. However, there are still complexities as reported in several African studies (Adongo et al., 2005; Ahorlu et al., 1997; Kengeya-Kayondo et al., 1994; Launiala and Kulmala, 2006; Ndyomugenyi et al., 2007) where the local term for

fever and malaria is the same and thus used interchangeably at community level. In addition, the overlap of malaria symptoms and other parasitic illnesses (WHO et al., 2000) was also a challenge in identifying malaria cases.

Any woman who reported having suffered from an episode of malaria infection in addition to experiencing fever, anemia, convulsions, unconsciousness, vomiting, diarrhea, shivering or chills, nausea, joint or muscle pains and headache leading to hospitalization was categorized as a severe malaria case. These symptoms have either, been recommended, validated or used in both clinical diagnosis and identification of malaria cases in epidemiological studies (Barcus et al., 2007; Bojang et al., 2000; Chandramohan et al., 2002; Genton et al., 1994; Mayor et al., 2007; Ndyomugenyi et al., 2007; WHO, 2012a). Several studies (Adongo et al., 2005; Hlongwana et al., 2009; Launiala and Kulmala, 2006; Opiyo et al., 2007; Warsame et al., 2007; Williams and Jones, 2004) have shown that women are knowledgeable about these symptoms of malaria illness. In addition, these studies also showed that women were able to differentiate between uncomplicated and severe malaria which was often associated with severe anemia and convulsions and hence determined the type of health care sought.

For this study, hospital admission was essentially key in ascertaining the severity of malaria reported by the women. This compares relatively well with a study in Tanzania (De Savigny et al., 2004) which showed that terminal cases of malaria were more likely to be reported to health facilities rather than being managed at household or community level. Several women experienced severe malaria and below is a description of two selected narratives.

"I got malaria for three days and I was so weak. I was admitted in hospital for three days and given five drips. The baby was fine then but one week after coming back home from hospital, I could no longer feel the baby's movements. So I went back to the hospital and was told that the baby had died. I was given an injection which helped me to deliver the baby. I felt too weak when I had malaria

and I could not carry myself. At times my pressure was so low and I had to take glucose. I was given one injection, and drugs to stop the bleeding when the fetus came out. I spent another week in the hospital due to severe weakness and being anaemic. This time, I got eight drips. I took like one month when I was still weak and I could change pads every thirty minutes.” (Urban woman, aged 39 years with gravidity 6)

“When I got to Rakai hospital with severe malaria, I was immediately put on drip. I felt like I had labour pains which stopped immediately after being put on drip. After one week, I was discharged and when I got home I delivered after two days. I usually get severe headache during pregnancy and I take strong pain killers. I usually buy and keep at home, injections which stop the bleeding after delivery. My husband injected me as soon as I delivered because the blood was too much, but after that I was okay.” (Rural woman, aged 39 years with gravidity 11)

The above narratives clearly show that these two women experienced severe malaria. Diagnosis of malaria was based on reported symptoms including headache, severe weakness, anaemia among other symptoms. The severity of malaria led to health facility admission leading to extended hospitalization. Notably, both women received medication by intravenous infusion due to the severity of their condition. Although one of the women had a live birth, her counterpart had a still birth, which is a common outcome of severe malaria.

6.3 Knowledge and Perceptions about Maternal Near Miss Complications

Information gathered from the focus group discussions showed that both men and women had inadequate knowledge about the causes of maternal near miss complications or maternal deaths. Results showed that both men and women were knowledgeable about six causes of maternal near miss complications or maternal deaths. The most known causes of maternal near miss complications were retained placenta, severe postpartum haemorrhage, obstructed labour, and prolonged labour while ectopic pregnancy and ruptured uterus were hardly known causes of maternal near miss complications. In addition, the results showed that women and men alike had

variations in classifying these complications as severe. All respondents could easily relate with retained placenta as one of the complications that can lead to maternal near miss events. Below is an excerpt through which participants in a focus group discussion mentioned retained placenta as one of the maternal near miss complications.

"... .. she might deliver the baby but the placenta gets retained. So if the placenta gets retained for a long time, it can cause her to die." (Rural, Male FGD)

"I know of a woman whom I saw being taken to hospital and also her, it was because of a retained placenta. They were taking her to Rakai hospital. She had given birth from this side of Byezitire village and they even brought her on a bicycle while holding her. When they reached here [Mudaala village], they put her in a car and took her to Rakai hospital. I am not even sure if she died or survived. I don't even know. I saw when they had dressed her in several clothes and they were holding her on the bicycle and she was crying and saying 'she is going to die'." (Rural, Male FGD)

Although retained placenta could easily be identified as a maternal near miss complication, there were variations in the duration of the placenta retention that was considered as severe or problematic. While World Health Organization recommends a period of thirty minutes for a retained placenta to be considered as a problem, the participants believed that for retained placenta conditions to be taken as severe or life-threatening, it should be retained for at least three hours. This has implications on the health seeking behaviour of women, where women may delay to seek emergency obstetric care due to lack of knowledge on the severity of retained placenta condition in causing maternal near miss events or maternal deaths. Below is an excerpt from a male respondent in a focus group discussion on determining the severity of a retained placenta condition.

".... I can say for a retained placenta to cause her problems, it can take like three hours before being expelled. At that point I think that's when it starts causing her problems. That's my view!!" (Rural, Male FGD)

Ideally, the participants had a perception that during the first hour of placenta retention, it was not a problem and during that time, efforts are being made to manage the complication as evidenced in the narrative below.

"No, in one hour, it's not a problem. By that time, they are still trying to think or get solutions. Then, you are still investigating and wondering why. You can get traditional medicine especially if she has given birth from home." (Rural, Male FGD)

The cultural belief or community perception on the cause of retained placenta is failure to take traditional medicines during pregnancy as illustrated in the excerpt below.

"...because when a woman gets pregnant, they tell you that she should ensure that she takes traditional medicines." (Rural Male, FGD)

To manage or treat retained placenta complications, all male focus group discussion participants unanimously agreed that it can be managed in the communities through use of traditional medicines. In addition, there is a cultural belief that if after use of traditional medicines, the placenta has not been expelled, the woman's husband can use his shoe and hit the woman on the forehead and thereafter the placenta would get expelled; and failure for it to get expelled, they resign to fate to take control.

Another commonly identified complication was severe postpartum haemorrhage. Several statements from the participants showed that the participants were conversant with severe blood

loss or postpartum haemorrhage as one of the causes of maternal near miss complications as shown in the excerpt below.

"She can give birth and a lot of blood is released or lost, to the extent of being excessive." (Rural, Male FGD)

Similarly, like in the case of retained placenta, there were variations in what is classified as severe. Although all participants agreed that excessive loss could lead to near death experiences or even death, the amount of blood considered to be excessive varied among participants.

"But it [amount] does make three basins. No, it may not make three basins. It may be like one small basin, or half a basin." (Rural, Male FGD)

While participants agreed that severe postpartum haemorrhage could be treated with traditional medicines, they felt it was better to rush such a woman to the health facility. This means that postpartum haemorrhage was considered a more severe complication compared to a woman having a retained placenta which they believed could be managed in the community.

Both prolonged and obstructed labour were considered, interchangeably, as maternal near miss complications in the study population. These complications were commonly described by failure of the woman to push or deliver the baby due to severe weakness or the baby being big or the woman having a narrow pelvis.

The known ways of managing these complications were caesarean section and a vaginal incision done by either the health personnel or traditional birth attendant. However, some participants believed that immediate resumption of sexual intercourse after delivery healed the women in case of vaginal delivery where an incision had been done during delivery as illustrated in the excerpt below.

“But the important thing is that you the man after having sex with the woman, the incisions heal so it is you the man who now has to have sex with her before she heals so that she hurts as she is healing.” (Rural, Male FGD)

This may have implications on the postnatal care attendance or acquisition of other infections such as sepsis occurring before the woman fully recovers.

6.4 Prevalence of maternal near miss

The prevalence rate of Maternal Near Miss (MNM) in the study population was 278.7 per 1,000 pregnancies. This was obtained by dividing the total number of maternal near miss cases by the population at risk, expressed per 1,000 pregnancies. Maternal near miss cases included all women who experienced any life-threatening complication presented in section 6.2 while the population at risk was the total number of women, whose last pregnancy including abortions and ectopic pregnancies, occurred in the last three years in the study area. For every 1,000 pregnancies in the study population, 278 women were maternal near misses.

$$\text{Prevalence of MNM} = \frac{\text{No. of maternal near miss cases}}{\text{Total no. of pregnancies}} * 1000$$

$$\text{Prevalence of MNM} = \frac{434}{1557} * 1000$$

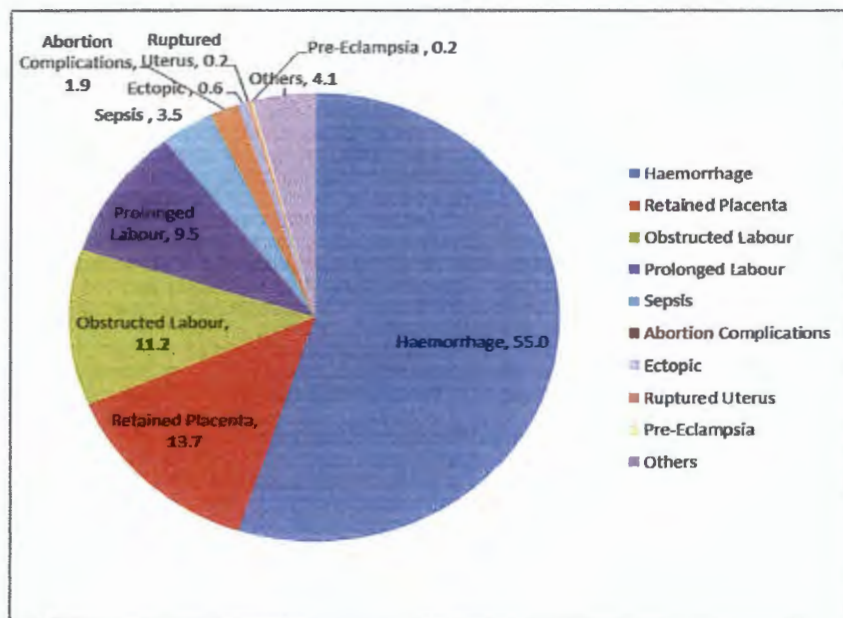
$$\text{MNM Rate} = 278.7 / 1,000 \text{ pregnancies}$$

6.5 Causes of maternal near miss

Figure 6.1 shows the causes of maternal near miss events in Central Uganda. The most common cause of maternal near miss in Central Uganda is haemorrhage which accounts for more than half (55%) of the burden of maternal near miss events. This is followed by retained placenta (13.7%), obstructed labour (11.2%), prolonged labour (9.5%), sepsis (3.5%) and abortion complications (1.9%). Less than 1% of the maternal near miss events were caused by pre-

eclampsia (0.6%). Ruptured uterus and ectopic pregnancies accounted for 0.2% of the maternal near miss events each. Other causes of maternal near miss included severe malaria and severe gestational hypertension.

Figure 6. 1 Percentage contribution of the causes of Maternal Near Miss



6.6 Prevalence rate of specific maternal near miss conditions

Table 6.1 shows the prevalence rate of specific maternal near miss conditions in the study population. The disease specific prevalence of haemorrhage was 170.2 per 1,000 pregnancies while that of retained placenta was 42.4 per 1,000 pregnancies. Obstructed labour had a prevalence of 34.7 maternal near miss cases per 1,000 pregnancies followed by prolonged labour with a prevalence of 29.5 maternal near miss cases per 1,000 pregnancies. Maternal near miss cases due to sepsis was 10.9 for every 1,000 pregnancies; abortion complications (5.8 / 1,000 pregnancies), ectopic pregnancies (1.9 / 1,000 pregnancies), ruptured uterus and pre-eclampsia (0.6 / 1,000 pregnancies) together accounted for less than 10 per 1,000 pregnancies.

Table 6. 1 Differentials of Postnatal care attendance and Unadjusted Odds Ratios of Postnatal care attendance by Partner's Characteristics

Cause of Maternal Near Miss	Frequency	Disease Specific Prevalence Rate (per 1000 pregnancies)
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Haemorrhage (Severe Blood Loss)	265	170.2
postpartum haemorrhage		
Retained Placenta	66	42.4
Obstructed Labour	54	34.7
Prolonged Labour	46	29.5
Severe Sepsis / Infection	17	10.9
Abortion Complications	09	5.8
Ectopic Pregnancy	01	0.6
Ruptured Uterus	01	0.6
Hypertensive Disorders		
- Pre-Eclampsia / Eclampsia	02	1.9
- Gestational Hypertension	05	3.2
-Severe Malaria	15	9.6
Total	482*	

* Some women experienced more than one life-threatening complication

6.7 Socio-economic and demographic differentials of maternal near miss status

To explore the risk factors of maternal near miss, it is important to first examine the patterns and differentials of maternal near miss across socio-demographic and maternal health characteristics. This section presents differentials or bivariate results of maternal near miss status by the socio-economic and demographic characteristics of the women.



6.7.1 Educational attainment and maternal near miss

Results in Table 6.2 showed that women who had secondary education and above had the least percentage (24.6%) of maternal near misses as compared to women with primary education (29.2%) and those with no education (29%). Notably, the proportions of maternal near misses that had primary education and those with no education were the same. Maternal near misses were highest among women with primary or no education, whose prevalence (29%) was higher than the overall study prevalence (27.9%). Despite the observed patterns between educational attainment and maternal near miss status, the differences between education categories were not statistically significant ($p > 0.203$). Therefore, educational attainment was independent of maternal near miss status in this study sample.

From the observed patterns, the prevalence of maternal near miss does not differ among women with primary education and no education. It is also evident that occurrence of maternal near miss events reduces with attainment of secondary education. Secondary education may influence various aspects that might prevent occurrence of maternal near miss events including knowledge of pregnancy complications, benefits of family planning, need for supervised deliveries, reduced reliance on traditional health systems, and averting delays at household level and in accessing health facilities. Additionally, higher education may be associated with increased levels of employment and higher incomes, which would increase accessibility and affordability of health services or obstetric care. This distribution of maternal near misses by educational attainment is similar to another study done in Uganda (Kaye et al., 2004a). Notably, the lack of association between educational attainment and maternal near miss occurrence in this study could have been affected by the differences between observed and expected responses in each category.

6.7.2 Marital status and maternal near miss

In Table 6.2, the results of the distribution of women by marital status and maternal near miss are presented. The table shows that the highest proportion (28.8%) of maternal near misses was among the currently married women compared to those who were not currently in union (21.4%) who were either single, divorced, separated or widowed. In addition, the results showed a significant association between marital status and maternal near miss status ($p < 0.029$) suggesting that maternal near miss and marital status were associated.

While the observed patterns are contrary to the expected norm, the higher occurrence of maternal near miss events among women in union is possibly three-fold. First, these women may have experienced intimate partner violence, which is associated with unwanted pregnancies, abortions or miscarriages, leading to occurrence of maternal near miss events. Secondly, these women may have had higher stress levels during their pregnancy, possibly resulting from partners' extra-

marital affairs or child birth competition with co-wives in case of polygamous unions. Thirdly, the heavy work load resulting from these women having to fulfill both their marital obligations and traditional roles in a household, without any partner support, could also have contributed to their experience of maternal near miss events. All these reasons coupled together, could have hindered utilization of health services, possibly influencing occurrence of maternal near miss events.

Table 6. 2 Differentials of maternal near miss status by socio-demographic characteristics and maternal near miss status

Background Characteristics	Maternal Near miss status % (n)			Significance (p-value)
	Not Maternal Near Miss	Maternal Near Miss	Total	
Educational attainment				0.203
None	71.0 (130)	29.0 (53)	100 (183)	
Primary	70.8 (668)	29.2 (275)	100 (943)	
Secondary+	75.4 (325)	24.6 (106)	100 (431)	
Marital Status				0.029
Currently not in union	78.6 (158)	21.4 (43)	100 (201)	
Currently married	71.2 (965)	28.8 (390)	100 (1355)	
Location				0.000
Urban	80.5 (434)	19.5 (105)	100 (539)	
Rural	67.7 (689)	32.3 (329)	100 (1018)	
Occupation				0.012
Agricultural sector	69.6 (661)	30.4 (289)	100 (950)	
Non Agricultural sector	77.3 (317)	22.7 (93)	100 (410)	
Unemployed	73.6 (145)	26.4 (52)	100 (197)	
Religion				0.024
Catholics	75.4 (467)	24.6 (152)	100 (619)	
Anglicans	71.6 (356)	28.4 (141)	100 (497)	
Other Christian	65.2 (161)	34.8 (86)	100 (247)	
Muslim	72.4 (139)	27.6 (53)	100 (192)	
Ethnicity				0.001
Baganda	76.6 (568)	23.4 (174)	100 (742)	
Banyakore	67.4 (325)	32.6 (157)	100 (482)	
Others	68.9 (228)	31.1 (103)	100 (331)	
Wealth Status				0.029
Richest	74.7 (233)	25.3 (79)	100 (312)	
Richer	76.9 (240)	23.1(72)	100 (312)	
Middle	66.4 (215)	33.6 (109)	100 (324)	
Poorer	72.6 (233)	27.4(88)	100(321)	
Poorest	69.6 (195)	30.4 (85)	100 (280)	
Total	72.1 (1123)	27.9 (434)	100 (1557)	

6.7.3 Place of residence and maternal near miss

In this study, it was found out that rural women experienced a higher occurrence of maternal near miss events compared to women residing in urban areas. Almost a third (32.3%) of the women residing in rural areas experienced maternal near miss events compared to 19.5% who resided in urban areas as shown in Table 6.2. Overall, maternal near miss status and place of residence were significantly associated ($p < 0.001$).

In the study context, physical attributes, low level of health care facilities, lack of electricity and over-reliance on traditional health systems can largely account for the higher occurrence of maternal near miss events in the rural area (Lwamaggwa sub-county). As earlier noted in Chapter 3 (study setting), the terrain of most of the rural areas was hilly coupled with a poor transport road network. This contributed to delays in accessing health services especially when the need for emergency obstetric care arose. Additionally, the highest level of health care facility was a Health Centre III – which offered only basic obstetric care, unlike some facilities in the urban areas which offered comprehensive obstetric care. Similarly, lack of electricity could also have contributed to low skilled deliveries during the night. Furthermore, the over-reliance on traditional health systems, not only hindered modern maternal health utilization but also put the women at a higher risk of experiencing maternal near miss events. Therefore, interplay of all these factors could have contributed to limited access to obstetric care in the rural areas.

6.7.4 Occupation and maternal near miss

Maternal near misses were higher among women employed in the agricultural sector and the unemployed women. About a third of the women (30.4%) employed in the agricultural sector and 26.4% of the unemployed women were maternal near misses. The lowest proportion of maternal near miss events (22.7%) occurred among women employed in the non-agricultural sector as shown in Table 6.2. In addition, the data showed that there exists a significant

association between occupation and maternal near miss status ($p < 0.012$) indicating that maternal near miss status and occupation are dependent.

Majority of the women who were employed in the agricultural sector were mainly subsistence farmers. With subsistence farming, these women received little or no cash earnings as compared to women employed in the non-agricultural sector. Similar to unemployed women, women with little or no cash earnings may not have been able to access health services especially emergency obstetric care. Additionally, women without cash earnings have low autonomy and are less likely to participate in decision-making processes regarding utilization of health care services (Furuta and Salway, 2006). This could have contributed to delays at both household level and in accessing transport means to the health facilities, hence the high occurrence of maternal near miss events among women employed in the agricultural sector and those who are unemployed. Furthermore, women in agricultural sector may have been engaged in the more labourious farm work which could have contributed to their experience of maternal near miss events.

6.7.5 Religion and maternal near miss

Table 6.2 presents differentials in maternal near miss by religion. The table shows that more than one third of the women belonging to other Christian affiliations including Pentecostals and Seventh Day Adventists (34.8%) were maternal near misses compared to a quarter of Catholic women (24.6%). Equal proportions of women belonging to the Muslim and Anglican religions (28%) experienced maternal near miss complications. The differentials between various religious affiliations by maternal near miss were found to be statistically significant ($p < 0.024$), indicating that religion and maternal near miss are dependent.

The observed high occurrence of maternal near miss events among women belonging to other Christian religious sects largely resulted from rigidity in beliefs and over-reliance on divine or spiritual healing with disregard to biomedical health services. The low occurrence of maternal

near miss events among Catholics could partly be attributed to the role of Catholic church in provision of health services in the area. In line with the high number of Catholics in the study area, the church leaders played a role in sensitizing their congregation to utilize health services. This could have led to more Catholics utilizing maternal health services especially seeking care from Catholic mission health facilities.

6.7.6 Ethnicity and maternal near miss

Results in Table 6.2 show that occurrence of maternal near miss events significantly varied by ethnicity ($p < 0.001$). The lowest proportion of maternal near misses belonged to Baganda ethnic group (23.4%), while the highest proportion of maternal near miss belonged to Banyakore ethnic group (32.6%) followed by maternal near misses belonging to other ethnic groups (31.1%).

The different cultural norms and practices surrounding pregnancy, child birth and pregnancy complications can possibly explain the variation in the prevalence of maternal near miss by ethnicity. Despite over-reliance on traditional or indigenous health systems among all ethnic groups, cultural practices of non-Baganda women may have hindered utilization of biomedical health services and accounted for the occurrence of maternal near miss events. Additionally, some women attributed occurrence of maternal near miss events to witchcraft, which hindered utilization of emergency obstetric care services. Notably, Baganda women are the indigenous ethnic grouping in the study area and thus women belonging to other ethnic groupings may have found challenges such as language barrier or unfamiliar traditional medicines, which could have contributed to delays in utilization of maternal health services.

6.7.7 Wealth status and maternal near miss

The prevalence of maternal near miss events is evidently lower among women belonging to either the richer or richer wealth class. Table 6.2 shows that the highest percentage of maternal near misses belonged to the middle wealth class (33.6%) followed by the poorest (30.4%) and

poorer (27.4%) women respectively. Results in Table 6.2 also show that wealth status and maternal near miss status are dependent ($p < 0.029$). Affordability of obstetric care services and reduced delays in accessing health services could be the main reasons for the lower prevalence of maternal near miss events among rich women compared to their counterparts.

6.7.8 Husband's occupation and maternal near miss

Table 6.3 presents differentials in maternal near miss by husband's occupation. The table shows that women whose husbands were employed in the non-agricultural sector had the least proportion (25.6%) of maternal near misses compared to women whose husbands were engaged in the agricultural sector (31.8%). Conversely, women with unemployed husbands recorded the highest proportion (33.3%) of maternal near misses in the study population. Maternal near miss status and husband's occupation were found to be significantly associated at $p < 0.039$.

The study patterns on maternal near miss by husband's occupation are similar to those earlier observed by women's occupation. As explained earlier, the majority of people in the agricultural sector are subsistence farmers and thus earn little or no money. Therefore both unemployed husbands and husbands employed in the agricultural sector may lack finances to enable their wives to access both basic and emergency obstetric care.

Table 6. 3 Differentials of Maternal Near Miss Status by Partner's socio-demographic characteristics

Background Characteristics	Maternal near miss status % (n)			Significance (p-value)
	Not Maternal Near Misses	Maternal Near Misses	Total	
Occupation				0.039
Agricultural sector	68.2 (465)	31.8 (217)	100 (682)	
Non Agricultural sector	74.4 (495)	25.6 (170)	100 (665)	
Unemployed	66.7 (4)	33.3 (2)	100 (6)	
Education attainment				0.001
None	69.6 (78)	30.4 (34)	100 (112)	
Primary	66.7 (437)	33.3 (218)	100 (655)	
Secondary+	75.9 (375)	24.1 (119)	100 (494)	
Don't Know	80.0 (76)	20.0 (19)	100 (95)	
Total	71.2 (966)	28.8 (390)	100 (1356)	
Spousal Age difference*				0.471
Wife older	76.9 (30)	23.1 (9)	100 (39)	
Same Age	62.9 (22)	37.1 (13)	100 (35)	
Spouse 1 – 4 years older	70.0 (343)	30.0 (147)	100 (490)	
Spouse 5 – 9 years older	73.4 (282)	26.6 (102)	100 (384)	
Spouse 10+ years older	69.2 (182)	30.8 (81)	100 (263)	
Total	70.9 (859)	29.1 (352)	100 (1211)*	

* Excludes women who did not know their partner's age.

6.7.9 Husband's educational attainment and maternal near miss

Women whose husbands attained secondary education had the lowest prevalence of maternal near miss events (24.1%) as shown in Table 6.3. Maternal near miss events were highest among women whose husbands had primary education or were not educated. Notably, this distribution on spousal educational attainment and occurrence of maternal near miss is affected by the proportion of women who did not know their partner's education attainment. Overall, the association between husband's educational attainment and maternal near miss status was found to be statistically significant ($p < 0.001$). Partner's secondary education can be associated with increased knowledge and higher income enabling women's utilization of health services.

Similarly, this distribution pattern has previously been observed in another study in Uganda (Kaye et al., 2004a).

6.7.10 Spousal age differences and maternal near miss

Data presented in Table 6.3 shows that maternal near miss events were highest among women with no spousal age differences and those in cross generational unions (10+ years older). Maternal near miss was lowest among women who were older than their spouses (23.1%) as shown in Table 6.3. In addition, the proportion of maternal near miss decreased as the spousal age difference increased up to 5 – 9 years. Overall, no clear pattern was identified between prevalence of maternal near miss and spousal age difference. Similarly, maternal near miss and spousal age differences were found to be independent ($p < 0.471$). Notably, these findings are affected by the exclusion of women who did not know their partner's age.

6.8 Maternal health attributes and maternal near miss

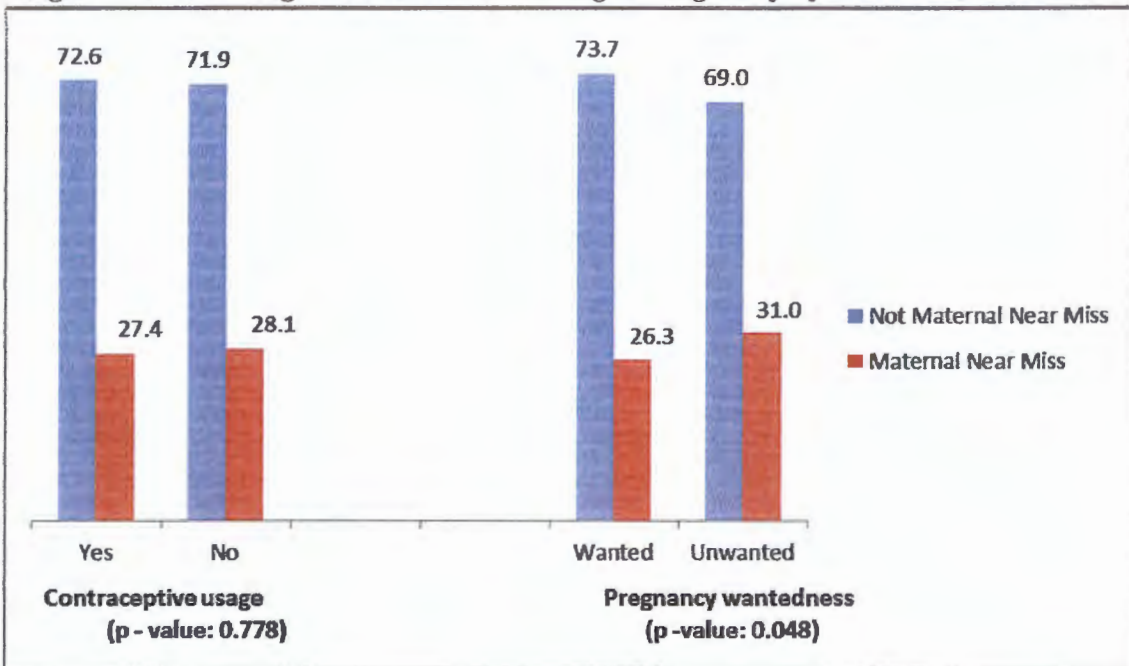


In this section, the mechanisms through which maternal health attributes influence occurrence of complications leading to maternal near miss are presented. Additionally, it presents differentials of maternal near miss status by maternal health attributes including age at birth, timing of pregnancy, alcohol intake, violence during pregnancy, pregnancy termination, birth order, parity, gravidity, inter-pregnancy interval, pregnancy danger signs and history of pregnancy complications. The distributions of selected maternal health conditions (malaria, HIV/AIDS, chronic conditions) by maternal near miss status are also described herein. Furthermore, results assessing the bivariate relationship between the maternal health attributes and maternal near miss status are also presented in this section.

6.8.1 Timing of pregnancy and maternal near miss

With the basic premise that unwantedness of a pregnancy has negative repercussions on maternal health, this study sought to examine the differentials and relationship between maternal near miss and timing of pregnancy. Figure 6.2 shows that women with unwanted pregnancies (31%) reported a higher occurrence of maternal near miss events compared to their counterparts (26.3%). In addition, maternal near miss was found to have a marginal significant association with timing of pregnancy ($p < 0.048$). The observed pattern among women with unwanted pregnancies could be as a result of no antenatal care, unskilled deliveries and unsafe abortions.

Figure 6. 2 Percentage Distribution of Timing of Pregnancy by maternal near miss status



6.8.2 Age at birth and maternal near miss

Information on the differentials of maternal near miss by women's age at last birth or pregnancy is presented in Table 6.4. The proportion of maternal near misses increased as age increased. Adolescents recorded the lowest proportion of maternal near misses (26%) followed by women

in the middle age group (20 – 34 years) with 27.3% and 31.7% among older women aged 35 years and above.

The likely explanation for a higher occurrence of maternal near miss events among older women could be a greater reliance on traditional health systems, hence inadequate prenatal care or unskilled deliveries. In addition, these women's pregnancies may have been unwanted due to their high parity. Similarly, the high parity among these women is associated with continued reproductive stress which increases the risk of experiencing complications in each subsequent pregnancy. Despite this observed pattern, age at last birth was found to be independent of maternal near miss status ($p > 0.330$).

6.8.3 Alcohol intake and maternal near miss

Table 6.4 shows that there was no clear observed pattern between maternal near miss status and alcohol intake during the last pregnancy. Women who often drank alcohol (28.6%) and those who never drank alcohol (29.2%) similarly experienced maternal near miss. Conversely, only 22.7% of the women who rarely drank alcohol during pregnancy experienced maternal near miss complications. However, alcohol intake during pregnancy and maternal near miss status were not statistically dependent ($p > 0.072$).

6.8.4 Pregnancy termination and maternal near miss

This study examined the relationship between pregnancy termination and maternal near miss status. The result shows that maternal near misses were higher among women who have ever had a pregnancy terminated (37.2%) compared to women who did not experience pregnancy termination (Table 7.3). Maternal near miss was found to be significantly associated with pregnancy termination at $p < 0.0001$.

Table 6. 4 Differentials of Maternal Near Miss Status by Maternal Health Attributes

Maternal Health Attributes	Maternal Near Miss Status (MNM) % (n)			Significance (p-value)
	Not MNM	MNM	Total	
Age at birth				0.330
15 – 19	74.0 (128)	26.0 (45)	100 (173)	
20 – 34	72.7 (829)	27.3 (312)	100 (1141)	
35+	68.3 (166)	31.7 (77)	100 (243)	
Alcohol intake				0.072
Never	70.8 (816)	29.2 (337)	100 (1153)	
Rarely	77.3 (242)	22.7 (71)	100 (313)	
Often	71.4 (65)	28.6 (26)	100 (91)	
Violence				0.740
Yes	71.1 (123)	28.9 (50)	100 (173)	
No	72.3 (997)	27.7 (382)	100 (1379)	
Pregnancy termination				0.000
Yes	62.8 (230)	37.2 (136)	100 (366)	
No	75.0 (890)	25.0 (296)	100 (1186)	
Birth Order				0.045
First	72.1 (150)	27.9 (58)	100 (208)	
Second – Fourth	75.1 (531)	24.9 (176)	100 (707)	
Fifth	68.8 (441)	31.2 (200)	100 (641)	
History of complications				0.000
Yes	51.0 (124)	49.0 (119)	100 (243)	
No	76.0 (999)	24.0 (315)	100 (1314)	
Parity				0.129
1	68.6 (175)	31.4 (80)	100 (255)	
2 – 4	74.4 (542)	25.6 (186)	100 (728)	
5+	70.7 (405)	29.3 (168)	100 (573)	
Gravidity				0.064
Primigravida	72.6 (122)	27.4 (46)	100 (168)	
2 – 4 pregnancies	74.8 (539)	25.2 (182)	100 (721)	
5+ pregnancies	69.1 (461)	30.9 (206)	100 (667)	
Pregnancy danger signs				0.000
No	81.5 (246)	18.5 (56)	100(302)	
Yes	69.9 (877)	30.1 (378)	100(1255)	
Total	72.1 (1123)	27.9 (434)	100(1557)	

6.8.5 Violence in pregnancy and maternal near miss

In this study, women were asked if they had experienced any form of violence (physical or sexual) during their last pregnancy. The result presented in Table 6.4 shows that there was no major variation in maternal near misses among women who experienced violence and those who did not. Women who reported to have experienced physical or sexual violence during pregnancy had a slightly higher proportion (28.9%) of maternal near misses as compared to 27.7% among women who never experienced any form of violence. Violence and maternal near miss status were found to be independent ($p > 0.740$).

6.8.6 Birth order and maternal near miss

Results presented in Table 6.4 shows that maternal near misses were highest (31.2%) among women with a high birth order (5+) followed by women of first birth order (27.9%). Women of birth order 2nd – 4th had the least cases of maternal near misses (24.9%). Birth order was found to be significantly associated with maternal near miss at $p < 0.036$.

6.8.7 History of pregnancy complications and maternal near miss

This study also examined the relationship between maternal near miss status and history of pregnancy complications. The results in Table 6.4 shows that the proportion of women with a history of pregnancy complications who experienced maternal near miss complications was more than twice (49%) that of women with no history of pregnancy complications (24%). Additionally, there was a significant relationship between maternal near miss status and history of pregnancy complications at $p < 0.0001$.

6.8.8 Parity and maternal near miss

In this study, data was collected on the birth history of every woman including information on the total number of live births (parity) a woman had in her reproductive lifetime. To examine the

effect of parity on maternal near miss, the result in Table 6.4 shows that the highest percentage of maternal near misses was recorded among women with one live birth (31.4%) followed by women with a high parity of 5+ (29.3%). Women with parity of 2 – 4 recorded the least percentage (25.6%) of maternal near misses. Notable is that the women of parity 1 and 5+ recorded a higher proportion of maternal near misses compared to the overall proportion (27.9%) of maternal near misses in the study population. The result also shows that there was a significant relationship between maternal near miss status and parity ($p < 0.029$).

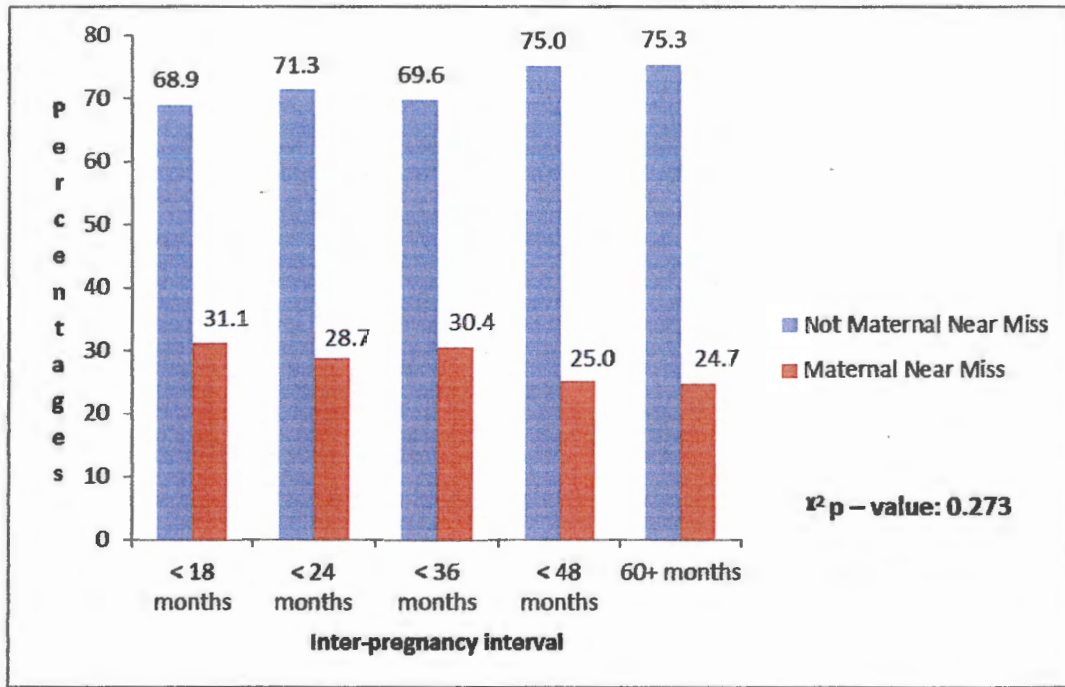
6.8.9 Gravidity and maternal near miss

Women were asked about their gravidity and the result in Table 6.4 shows that although the majority of women were of gravida (number of pregnancies) 2 – 4, women with gravida 5+ had the highest proportion of maternal near misses (30.9%) followed by primigravida (first pregnancy) (27.4%). A quarter of women with gravida 2 – 4 (25.2%) were maternal near misses. The result in Table 6.4 shows that gravidity and maternal near miss status were independent ($p > 0.064$).

6.8.10 Pregnancy danger signs and maternal near miss

Women were asked whether they had experienced any of the pregnancy danger signs including: swelling of the face, swelling of legs, blurred vision, fits, paleness, difficulty in breathing, weight loss, fever, bleeding, cough, night blindness, severe headache, convulsions, unconsciousness, severe weakness, severe abdominal pains, accelerated or reduced fetal movement, water breaking without labour, excessive vomiting and malaria. Results presented in Table 6.4 showed that women who experienced at least one of the above pregnancy danger signs had a higher proportion of maternal near misses (30.1%) compared to women who never experienced any danger signs (18.5%). In addition, there was a significant relationship between maternal near miss status and experience of pregnancy danger signs ($p < 0.0001$).

Figure 6. 3 Percentage distribution of inter-pregnancy interval by maternal near miss status



6.8.11 Inter-pregnancy interval and maternal near miss

Inter-pregnancy interval is known to have an effect on maternal and child health. Information was collected on the inter-pregnancy interval between the woman’s last two pregnancies. Figure 6.3 shows that there was no clear differential in maternal near miss status by inter-pregnancy interval. Women with an inter-pregnancy interval of less than 18 months had the highest proportion (31.1%) of maternal near misses followed by women with a pregnancy interval of less than 36 months (30.4%). Maternal near misses were lowest (25%) among women with an inter-pregnancy interval of 48 months and 60+ months. The inter-pregnancy interval was found to be independent of the maternal near miss status ($p > 0.273$).

6.8.12 Chronic conditions and maternal near miss

Chronic conditions including diabetes, hypertension, cardiovascular and kidney diseases aggravate ill-health during pregnancy leading to maternal near miss complications. Previous research (Goffman et al., 2007) shows that the presence of a chronic health condition during pregnancy is a risk factor for the occurrence of complications leading to maternal near miss. In this study, data was collected on any chronic health conditions a woman might have had. Results in Table 6.5 showed that maternal near misses were higher among women who had chronic conditions (35.8%) as compared to those with no history of chronic conditions (27.5%). However, maternal near miss status was found to be independent of a woman having any chronic condition ($p > 0.138$).

6.8.13 Malaria and maternal near miss

Malaria in pregnancy is one of the known pregnancy danger signs. If untreated, it progresses into severe malaria which is associated with fatal maternal and fetal outcomes. In highly endemic malaria countries, such as Uganda, every pregnant woman is at risk of malaria infection. Malaria infection in pregnancy is associated with spontaneous abortions (miscarriages), still births, retarded inter uterine growth or deaths, among other negative maternal and child health outcomes.

Results in Table 6.5 show that more than a third (36.5%) of the women who suffered from malaria were maternal near misses as compared to a quarter (25.6%) of maternal near misses among women who did not suffer from malaria. There was also a significant relationship between malaria and maternal near miss status ($p < 0.0001$).

Table 6. 5 Percentage Distribution of Health conditions by Maternal Near Miss Status

Health conditions	Maternal Near Miss Status		Total	Significance (p-value)
	Not Maternal Near Miss	Maternal Near Miss		
Chronic conditions				0.138
No	72.5 (1080)	27.5 (410)	100 (1490)	
Yes	64.2 (43)	35.8 (24)	100 (67)	
Malaria				0.000
Yes	63.5 (209)	36.5 (120)	100 (329)	
No	74.4 (912)	25.6 (314)	100 (1226)	
HIV/AIDS status				0.223
Positive	64.8 (35)	35.2 (19)	100 (54)	
Negative	72.4 (1088)	27.6 (415)	100 (1503)	
Total	72.1 (1123)	27.9 (434)	100 (1557)	

6.8.14 HIV/AIDS and maternal near miss

In this study, HIV/AIDS was self-reported among the terminal or chronic illnesses women had. Overall, maternal near misses were higher among HIV infected women compared to HIV negative women. Results in Table 6.5 showed that out of 54 women who reported to be HIV/AIDS positive, 35.2% experienced complications leading to maternal near miss compared to 27.6% among HIV negative women. Despite this observed pattern, no significant relationship was found to exist between HIV status and maternal near miss ($p > 0.223$).

However, the result on HIV status needs to be interpreted with caution as HIV/AIDS status was self-reported and may not be representative of the true magnitude of HIV prevalence in the study population as no blood samples were tested during field work, HIV stigmatization and inability to establish the timing of HIV infection, hence causality cannot be inferred regarding these results.

6.9 Risk Factors of Maternal Near Miss in Central Uganda

This section presents two best-fit models showing the proximate risk factors of maternal near miss in Central Uganda taking into account only women's characteristics (Model A) and both women's and their partners' characteristics (Model B) respectively. Particularly, it seeks to achieve objective III of the study (to examine the socio-demographic and proximate risk factors influencing occurrence of maternal near miss). Several hypotheses are tested in the model as shown below. It also involves information on the model diagnostics or goodness of fit of the model.

6.9.1 Timing of pregnancy

Ha₁: Women with unwanted pregnancies are more likely to experience maternal near miss complications compared to women with wanted pregnancies.

Results in Table 6.6 show that wantedness of pregnancy was significantly associated with occurrence of maternal near miss complications. Thus, the null hypothesis was rejected and the stated alternative hypothesis was accepted. Model A shows that the odds of women with unwanted pregnancies experiencing maternal near miss events are 24% higher ($p < 0.1$) compared to women with wanted pregnancies, taking into account the demographic characteristics of the women. However, the odds of women with unwanted pregnancies experiencing maternal near miss events increase by 37% compared to those with wanted pregnancies when partners' characteristics, specifically partner's education is taken into account. This shows that partner's education has a strong effect on women with unwanted pregnancies experiencing maternal near miss events. These findings are supported by the qualitative study findings which also showed that women with unwanted pregnancies were more likely to experience maternal near miss events. Below are excerpts from women who had unwanted pregnancies and experienced maternal near miss complications.

"I started feeling serious abdominal pains. I felt like I was in labour and could push. Blood started coming out in pieces. I told my husband and he told me to go to Mrs Mutebi's drug shop. I went there but did not think I was pregnant. When I told her what was happening, she told me that I was pregnant. Actually, I went to Mr. Mutebi's wife just to know why my bleeding was heavy yet in the previous months, I was not getting such serious periods. I told her that I did not want the pregnancy. I asked her to give me tablets to stop the pain but not to save the pregnancy which she did. The pain stopped but the bleeding continued and I was still very weak and dizzy. After five days, something came out (heavy clot of blood) but the bleeding continued. It stopped after a week.... I did not want the pregnancy because my baby was still twelve months. I did not even tell my husband that I was pregnant. I told him after that I had lost the pregnancy and he was not happy about it but for me, I was not ready." (19 year old rural mother with 2 pregnancies)

"I started getting abdominal pain at night. I told my husband but he didn't care as we had fought a week back. He had kicked me and tried to strangle me. So when I started bleeding, I told him about the pain and the bleeding, he did not care. He just told me to carry my things which I was using in my bar to bring them home as he had stopped me from working. So I went and started carrying them. The pains got stronger and the bleeding continued. The bleeding had not decreased by the following day and the pain persisted. The bleeding still continued and at about 7 p.m, I was walking out to check on the children and I realized that I was bleeding seriously. I tried to get a basin to bathe so that I can go to hospital but I felt big clots coming out and very smelly and later some funny thing came out and it was also very smelly. I had become very weak by then. I called my neighbor and asked her to call my sister who stays near. She came and cleaned me and took me to a clinic. The health worker worked on me and put a cannula on my hand. But I told him not to put me on drip because I had no money, which he did. He just injected me and admitted me for six hours and later came home. I got a serious fever and the following morning, I went back to the clinic. I was injected and given five injections for the whole treatment. When I called my husband, he came home for a few minutes and told me he had taken his

wife to hospital because she had a miscarriage. He did not even ask if I had gone to hospital. He did not care at all. When I started bleeding, I told my husband but he did not mind. So I also decided to let the pregnancy go after all, the man didn't care." (27 year old rural mother with 5 pregnancies)

The narratives above show that these women had unwanted pregnancies which could partly account for their experience of maternal near miss events. In both excerpts, it is evident that partners played a role in the unwantedness of women's pregnancy due to lack of support or care. In both cases, which are representative of the majority of cases of women with unwanted pregnancies, these women had abortions leading to severe complications including severe haemorrhage and puerperal sepsis.



6.9.2 History of previous life-threatening pregnancy complications

Ha₁: Women with a history of severe or life-threatening pregnancy complications are more likely to experience maternal near miss complications.

There is a significant relationship between history of severe or life-threatening pregnancy complications and occurrence of maternal near miss complications as shown in Table 6.6. Hence the researcher accepted the alternative hypothesis and rejected the null hypothesis. The findings show that the odds of women with a history of severe pregnancy complications experiencing maternal near miss complications in subsequent pregnancies are 68% and 70% higher compared to women without a history of severe pregnancy complications, while controlling for women's (Model A) and partners' (Model B) demographic characteristics respectively. Analysis of the qualitative findings supports the above findings that women with a history of severe pregnancy complications experienced the severe pregnancy complications in a subsequent (reference) pregnancy. Below are narratives from some of the women who experienced severe complications in previous pregnancies and also in their last pregnancy.

“After the delivery of the baby, the doctor waited for the placenta to come out but it was trapped inside. He massaged my stomach for quite some time but to no avail. After an hour, she instructed an attendant at the clinic to go to the village Traditional Birth Attendant (TBA). The TBA gave them some herbs which I was instructed to take. With continuous massaging of the stomach, the placenta came out. Ever since I started giving birth, I always experience this problem although this time, it took longer than usual.” (25 year old rural mother with 4 pregnancies)

“After giving birth, the placenta took more than an hour to come out. The TBA decided to administer local herbs which I took orally. After some time with her help with massaging my stomach, the placenta came out. For the last three pregnancies, I have had my placenta come out after thirty minutes though this time it took longer than an hour to come out.” (47 year old rural mother with 10 pregnancies)

“I was aware that the placenta would get retained and only the TBA would be able to get me herbs to remove it. The TBA is experienced and trained. The health facility had no health provider present at the time so everyone in the village then used a TBA.” (38 year old rural mother with 12 pregnancies)

“After six hours, the doctor was called in who checked on me and told me that my pelvic bones were narrow and that I could not handle the pushing of the baby... ..I accepted [to have operation] because even my first baby died while we were still in hospital because I had taken a lot of time in labour trying to push the baby and by the time the baby came out, it was tired and it was taken for oxygen supply but it passed on ten minutes later.” (Urban woman, aged 24 years with gravidity 2)

The above findings show that women who experienced maternal near miss complications in their last pregnancy had experienced severe pregnancy complications in previous pregnancies. In addition, these women were likely to experience the same complication as they had experienced in their previous pregnancies as noted by one of the participants who experienced retained

Table 6. 6 Logistic regression model showing the risk factors of maternal near miss

Maternal Near Miss	Model A		Model B	
	Women's characteristics		Women & Partner characteristics	
	O.R	C.I	O.R	C.I
Timing of pregnancy				
Wanted (RC)	1.000		1.000	
Unwanted	1.237	[0.961 – 1.593]	1.379*	[1.063 – 1.837]
Violence in pregnancy				
Yes (RC)	1.000		1.000	
No	1.015	[0.702 – 1.468]	0.967	[0.646 – 1.446]
Alcohol intake during pregnancy				
Never	1.087	[0.649 – 1.820]	1.177	[0.670 – 2.065]
Rarely	0.841	[0.481 – 1.472]	0.826	[0.447 – 1.526]
Often (RC)	1.000		1.000	
Pregnancy danger signs				
Yes	1.771***	[1.272 – 2.465]	1.725**	[1.207 – 2.464]
No (RC)	1.000		1.000	
History of pregnancy complications				
Yes (RC)	1.000		1.000	
No	0.322***	[0.240 – 0.432]	0.295***	[0.215 – 0.405]
Parity				
1	1.632**	[1.169 – 2.279]	1.827**	[1.264 – 2.640]
2 – 4 (RC)	1.000		1.000	
5+	1.005	[0.765 – 1.319]	0.871	[0.647 – 1.172]
Chronic diseases				
Yes	1.275	[0.733 – 2.219]	1.142	[0.632 – 2.063]
No (RC)	1.000		1.000	
Marital status				
Currently not in union (RC)	1.000			
Currently in union	1.386	[0.946 – 2.032]		
Type of occupation				
Agricultural sector (RC)	1.000		1.000	
Non Agricultural sector	0.806	[0.578 – 1.124]	0.856	[0.582 – 1.258]
Unemployed	0.954	[0.637 – 1.427]	1.03	[0.655 – 1.620]
Religion				
Catholics (RC)	1.000		1.000	
Anglicans	1.023	[0.761 – 1.374]	1.028	[0.747 – 1.413]
other Christians	1.159	[0.804 – 1.671]	1.08	[0.729 – 1.600]
Moslems	1.063	[0.718 – 1.575]	1.127	[0.742 – 1.711]
Ethnicity				
Baganda (RC)	1.000		1.000	
Banyakore	1.359*	[1.005 – 1.836]	1.318	[0.953 – 1.824]
Others	1.214	[0.874 – 1.686]	1.283	[0.900 – 1.830]

Table 6.6: Continued

Maternal Near Miss	Model A		Model B	
	Women's characteristics		Women & Partner characteristics	
	O.R	C.I	O.R	C.I
Wealth status				
Richest	1.011	[0.655 – 1.560]	1.206	[0.733 – 1.983]
Richer	0.782	[0.524 – 1.167]	0.879	[0.563 – 1.373]
Middle	1.266	[0.881 – 1.821]	1.316	[0.880 – 1.966]
Poorer	0.93	[0.640 – 1.350]	0.95	[0.634 – 1.424]
Poorest (RC)	1.000		1.000	
Partner's education				
None			1.194	[0.702 – 2.031]
Primary			1.426*	[1.029 – 1.975]
Secondary+			1.000	
Don't Know			0.763	[0.426 – 1.367]
Partner's occupation				
Agricultural sector (RC)			1.000	
Non Agricultural sector			0.862	[0.633 – 1.173]
Unemployed			0.935	[0.149 – 5.845]
Constant	0.327**	[0.143 – 0.746]	0.401*	[0.165 – 0.972]
Model summary				
n	1543		1340	
Goodness of fit				
1. Prob > chi2	0.126		0.282	
2. hat	0.000		0.000	
Hatsquare	0.561		0.080	

O.R – Odds ratios; C.I – 95% confidence intervals in brackets; R.C – Reference category

* p<.05, ** p<.01, *** p<.001

placenta complications in all her pregnancies. The excerpts also show that the most common maternal near miss complications to re-occur in subsequent pregnancies were postpartum haemorrhage, retained placenta, abortion complications and obstructed labour.

6.9.3 Parity

Ha1: Women of birth order 1 are more likely to experience maternal near miss complications as compared to those with 2 – 4 children.

Ha2: Women with high parity (5+) are more likely to experience maternal near miss complications as compared to those with 2 – 4 children.

The above hypotheses were tested and the results are shown in Table 6.6. The results show that there was a significant relationship between occurrence of maternal near miss complications and having the first birth. The odds of women of birth order one experiencing maternal near miss complications are 63% higher compared to women with 2 – 4 children, while controlled for women's demographic characteristics (Model A). The odds of experiencing maternal near miss complications among women with first birth order one compared to women with 2 – 4 children greatly increase when controlling for partner's characteristics as shown in Table 6.6. The results show that women of first birth order are almost two times more likely to experience maternal near miss complications compared to their counterparts with 2 – 4 children (Model B).

"I went to hospital on Tuesday but was retained because it was time to deliver. For two days, I was at the hospital but the cervix did not open and I was told that my pelvic bones were narrow. Therefore the doctor arranged for my operation because I was getting weaker. I was unconsciousness and thus can't remember what happened during the operation." (Urban woman, aged 18 years with gravidity 1)

"I started getting labour pains at home and then went to my mother-in-law who told me to wait. So after like four hours, we went to the hospital and I stayed there for almost eight hours in pain and still nothing was done. Then I was put on drip to augment the labour pains and it took another five hours to deliver the baby." (Rural mother aged 21 years with gravidity 1)

"Having stayed in labour for over twenty four hours, the health worker decided to induce me with four bottles [presumably drips of oxytocin]. The labour pains were intensified and strong but the cervix could not expand. The final decision was an operation [emergency caesarean section]." (Rural woman, aged 22 years with gravidity 1)

However, the results show that there was no significant relationship between having a high number of children and occurrence of maternal near miss complications in comparison to women

with 2 – 4 children. While quantitative findings show that high birth order has no significant relationship with occurrence of maternal near miss complications, qualitative findings support the notion or stated hypothesis that women with high birth order are more likely to become maternal near misses as shown in the excerpt below.

“The doctor checked her and said she had to be operated because the arm had come out. I was counselled on child bearing and the operation. The doctor told me to buy certain things that are needed for the operation.....I was worried about her condition because all her other births were okay. I went to town to buy a big sheet which I took to a tailor to trim well because I knew that anyone who is operated either comes out alive or dead. I stopped child bearing and before the operation, I was counselled about sterilization and I accepted my wife to be sterilized. She also accepted to be sterilized. I, then, signed the forms.” (IDI – Male partner aged 40 years with a wife of gravidity 8 who experienced obstructed labour)

6.9.4 Experience of pregnancy danger signs

Ha₁: Women who experienced pregnancy danger signs were more likely to experience maternal near miss complications as compared to women who did not experience any pregnancy danger signs.

Women who experienced at least one of the common pregnancy danger signs had a higher likelihood of 77% (Model A) and 73% (Model B) of experiencing maternal near miss complications compared to their counterparts who had not experienced any of the pregnancy danger signs, while controlling for women and partner characteristics. The odds of experiencing maternal near miss complications slightly reduce when partners' characteristics are taken into account.

6.9.5 Socio-demographic characteristics

All socio-demographic characteristics except ethnicity and partner's education had no significant relationship with occurrence of maternal near miss complications. Regarding ethnicity,

Banyakore women are more likely to experience maternal near miss complications by 36% compared to the Baganda women. Women whose partners had primary education were more likely to experience maternal near miss complications by 43% compared to women whose partners had secondary education and above as shown in Table 6.6.

6.10 Discussion

This section discusses the study results in light of previous research findings and the implications on maternal health and obstetric health care system in Uganda.

The study findings estimated a prevalence rate of 278.7 maternal near miss cases per 1,000 pregnancies (27.8%). This estimate falls within the range of the magnitude of maternal near miss (1.1% - 33.4%) in sub-Saharan Africa (Kaye et al., 2011a). Particularly, the study results are comparable to previous studies done in Uganda which reported a maternal near miss rate of 11% (Kaye et al., 2004a) and 33.4% (Okong et al., 2006). However, the latter estimate needs to be interpreted with caution as the authors did not set forth to establish the magnitude of maternal near miss in their study (Okong et al., 2006). However compared to Kaye et al. (2004a), this study estimated a higher prevalence rate of maternal near miss. The reasons for the variation in the estimates are three-fold. The first and perhaps the most important is the difference in study approaches. Whereas this study used a community based approach, Kaye et al. (2004a) was a one health facility based study. The second difference lies in the use of different selection criteria, that is organ dysfunction and management criteria versus disease based criteria, of identifying maternal near misses while the third difference relates to variation in the population at risk. While this study considered all pregnancies, that of Kaye et al. (2004a) considered only pregnancies that resulted in live births.

Although the hospital based approach coupled with the organ dysfunction criteria is the gold standard recommended by World Health Organization, this approach has major limitations. It

may lead to under-estimation of the magnitude of maternal near misses especially in settings such as Uganda, where many women (43%) (UBOS and ICF, 2012), and almost one-third (31%) of the women in the study area give birth at home. Additionally, inadequate diagnostic facilities or inconsistent measurement of the maternal near miss biomarkers could also explain the difference (Kaye et al., 2004a). Thus, the use of a population or community approach in identifying maternal near misses gives a better representation of the prevalence of maternal near miss as it is more encompassing, catering for the inclusion of maternal near misses who give birth at home and survive by luck. In addition, the organ dysfunction and management criteria may also omit women who experience life-threatening complications which either do not result in any organ dysfunction or are managed differently due to inadequate emergency obstetric care facilities and services. Furthermore, consideration of total pregnancies as opposed to total live births allows for inclusion of women who experience life-threatening complications resulting from ectopic pregnancies and severe abortion complications, which several studies omit.

The high prevalence of maternal near miss elucidates the ill-health or poor health status of mothers, and act as a pointer to poor new born and infant health and survival. In addition, this estimate reflects two critical health care issues including access to and quality of emergency obstetric care. With such a high prevalence of maternal near miss, there is need to investigate the major causes of maternal near miss in the study population.

Therefore, there is need for the use of population-based surveys in estimating the prevalence of maternal near miss as in the case of maternal mortality which is widely estimated through demographic health surveys in developing countries rather than through health facility audits. The hospital based approach is more applicable in developed countries where almost all births occur at health facilities with high quality obstetric care diagnostic facilities. To the best of the researcher's knowledge, this is the first study in Uganda which has estimated the prevalence of

maternal near miss through a population based survey using the disease specific criteria. In addition, while the study findings are comparable and compliment previous studies on maternal near miss in Uganda, they also justify the possible use of population or community based surveys in estimating the magnitude of maternal near miss in developing countries. Furthermore, this study can be replicated in other regions or other low developing countries. However, while these results may be representative of the Central region, they may not be representative of the other regions in the country and thus there is need for nationally representative maternal near miss studies to estimate the national prevalence rate. In addition, given that the situation in Central Uganda is better than elsewhere in the country, a population-based approach could estimate a much higher maternal near miss rate in the whole country.

Knowledge of the major causes of maternal near miss in Uganda is vital to effectively address and manage life-threatening pregnancy complications. This study has identified postpartum haemorrhage as a major cause of maternal near miss. This finding corroborates previous research in Uganda (Okong et al., 2006) and elsewhere in low developing countries (Adeoye et al., 2013). However another study in Uganda (Mbonye et al., 2007) showed that obstructed labour was the leading cause of maternal near miss morbidity followed by haemorrhage. The variation could be attributed to the women who give birth in the communities and experience postpartum haemorrhage but survive by luck or rely on traditional remedies to manage the severe blood loss which is highly unlikely in the case of obstructed labour complications. Another reason for this variation could be that this study was a self-reported study while that of Mbonye et al. (2007) was based on clinical records. Nonetheless Mbonye et al. (2007) reported haemorrhage as the main cause of maternal mortality in Uganda.

Other causes of maternal near miss complications are retained placenta, obstructed labour, prolonged labour, sepsis, abortion complications, ectopic pregnancies, pre-eclampsia or pregnancy induced hypertension, ruptured uterus and malaria respectively. These findings are consistent with those of previous studies elsewhere (AbouZahr, 2003; Kaye et al., 2011a; Khan et al., 2006; Ronsmans and Graham, 2006; Waterstone et al., 2001). These studies continue to validate the use of maternal near miss studies in investigating the bigger problem of maternal mortality.

Furthermore, these findings have implications on the risk of maternal mortality. Empirical evidence shows that different causes of maternal near miss are associated with different severity which may have inferences on the risk of maternal mortality. A Brazilian study by Moraes et al. (2011) asserted that hypertension was associated with less severity compared to haemorrhage. These findings suggest that women who experience haemorrhagic complications are at a greater risk of maternal death than those who experience hypertension. This study found that haemorrhage is the main cause of maternal near miss complications while a previous study (Mbonye et al., 2007) also found haemorrhage as one of the leading causes of maternal mortality in Uganda. In conclusion, with the knowledge of the prevalent causes of maternal near miss, there is need to establish the risk factors associated with its occurrence.

Women with a history of life-threatening pregnancy complications are more likely to have a recurrence of these complications in subsequent pregnancies. This finding is consistent with another study (Camargo et al., 2011a) in Brazil which reported a five-fold increased risk of maternal near miss events in subsequent pregnancies among women who had previously experienced maternal near miss events. The majority of the maternal near misses reported to have experienced the same type of life-threatening pregnancy complications as in the previous pregnancies. This is similar to other findings where women who experienced retained placenta

(Endler et al., 2012; Kominiarek and Kilpatrick, 2007; Nikolajsen et al., 2013), antepartum haemorrhage (Kaye et al., 2011b), postpartum haemorrhage (Ford et al., 2007; Fullerton et al., 2013; Kominiarek and Kilpatrick, 2007; Oberg et al., 2014; Waterstone et al., 2001), ectopic pregnancy (Bantebya-Kyomuhendo, 2004) and hypertensive disorders including pre-eclampsia (Hjartardottir et al., 2006; Klungsøyr et al., 2012; Nakimuli et al., 2013; Waterstone et al., 2001), and gestational diabetes (Getahun et al., 2010) in previous pregnancies reported to have experienced the same type of life-threatening complications in subsequent pregnancies.

However, no extensive amount of literature has been found to explicitly account for the probable causes or risk factors of recurrence of these life-threatening pregnancy complications in an effort to avert maternal near miss events and maternal deaths in subsequent pregnancies. Studies (Ford et al., 2007; Kominiarek and Kilpatrick, 2007; Nakimuli et al., 2013; Oberg et al., 2014) which have attempted to investigate the plausible explanations for the recurrence of severe pregnancy complications in subsequent pregnancies have attributed them to possible recurring risk factors including fibroids, genes, family history, causes and the method used in the management of these complications in previous pregnancies. However, the majority of the studies that have examined recurrence incidence and its risk factors have been undertaken in developed countries and have been limited to postpartum haemorrhage, hypertensive disorders and retained placenta complications. Hence the explanation for recurrence of these complications in the study area has to be interpreted with caution and there is need for further research regarding risk factors for recurrence of severe pregnancy complications at country level.

In light of these findings, history of previous severe pregnancy complications is a key determinant in identifying high risk mothers during antenatal care and delivery time. Therefore, screening of women during antenatal care should involve a detailed and complete history of women's pregnancy complications. Deliberate efforts should be made to ensure that women with

a history of life-threatening pregnancy complications deliver at appropriate emergency obstetric care services with all the necessary pre-arrangements made towards management of such complications during delivery in case they re-occur.

Women with unwanted pregnancies have a higher risk of experiencing maternal near miss events than women with wanted pregnancies. Similarly, studies in Uganda (Kaye et al., 2004a) and elsewhere (Waterstone et al., 2001) reported a higher occurrence of maternal near misses among women with unwanted pregnancies. However, these findings are contrary to a Nigerian study by Adeoye et al. (2013). Unwantedness of the pregnancy in this study population could have resulted from domestic violence, lack of partner support, short birth interval in addition to contraceptive failure either as a result of inconsistent or incorrect usage of contraceptive methods. Important to note is that women with unwanted pregnancies were significantly associated with older age (35 years and above) in addition to having a high parity (5+ children) which could also explain unwantedness of the pregnancy among these women. Other reasons for unwantedness of pregnancy in Uganda have previously been explored (Kaye et al., 2005; Singh et al., 2006).



In this study, women with unwanted pregnancies tended to have poor maternal health seeking behaviours associated with low utilization of maternal health services compared to women who had planned pregnancies. Wantedness of the pregnancy was significantly associated with the timing and frequency of antenatal care visits, in addition to the place of delivery. Women with unwanted pregnancies had a higher proportion of their first antenatal care visit in the second and third trimesters of the pregnancy; had less than the four recommended antenatal care visits, and delivered at home compared to women with planned pregnancies. These findings in relation to maternal health behaviour are consistent with several other studies (Alderliesten et al., 2007; Arslan Özkan and Mete, 2010; Delgado-Rodríguez et al., 1997; Kost et al., 1998; Magadi et al.,

2000; Marston and Cleland, 2003; Oxaal and Baden, 1996; Pagnini and Reichman, 2000; Singh et al., 2012; Singh et al., 2013b; Sunil et al., 2010).

The poor maternal health behaviour exhibited by these women presumably impacted on their experience of maternal near miss events. Late attendance of antenatal care and fewer antenatal care visits could have led to missed opportunities in terms of the services and quality of prenatal care they received; reduced chances for early identification of high risk mothers and possible referral during this period to deliver at an appropriate health facility. Furthermore, the failure by these women to deliver at health facilities could also explain their ordeal. With home births, these women were unable to receive the appropriate obstetric care needed in the management of these life-threatening complications.

Notably, a higher proportion of women with unwanted pregnancies experienced severe haemorrhage and this was possibly as a result of abortion complications. Abortion is illegal in Uganda except in cases where the life of the mother is in danger, thus most women with unwanted pregnancies resort to crude or unsafe abortion methods leading to abortion complications such as haemorrhage and sepsis. Several studies have also documented unwanted pregnancies as the root cause of abortions and its implications on maternal morbidity and mortality (Grimes et al., 2006; Haddad and Nour, 2009; Oxaal and Baden, 1996; Shah and Ahman, 2009; Singh et al., 2010).

In conclusion, the findings depict the urgent need to prevent unwanted pregnancies in an effort to prevent maternal near miss and maternal mortality events. This shows there is still a high unmet need for contraceptives in this region. Hence, policy makers and programmers need to ensure that all women of reproductive age have access to information and affordable contraceptive commodities if maternal near miss events are to be avoided or prevented in future. Furthermore, community health programmes and routine antenatal care procedures should include counselling

women on pregnancy wantedness so as to improve the maternal health seeking behaviours of women who end up with unwanted pregnancies.

Pregnancy danger signs exacerbate occurrence of maternal near miss events. Similarly, Chortatos et al. (2015) reported a higher occurrence of hypertensive disorders (maternal near miss complications) among women who experienced selected pregnancy danger signs. The study finding can be attributed to failure in seeking timely obstetric care, possibly due to inadequate knowledge of danger signs, social norms and beliefs in super natural powers – witchcraft. Previous research showed that inadequate knowledge of danger signs coupled with less perceived risk; and cultural norms, which expected women to be brave during pregnancy, contributed to women's delay in seeking obstetric care (Green, 2004). Mpembeni et al. (2007) found that Tanzanian women who experienced pregnancy complications did not use health facilities because they believed the complications were caused by super natural powers; and thus, consulted traditional healers.

Parity of a woman has been evidenced to influence the occurrence of maternal near miss. First order and higher order births (four and above) increase risks of reproductive complications (Lule et al., 2005; Kaye et al., 2003, Oxaal et al., 1996) These researchers attributed complications among first birth order to fear, anxiety, lack of knowledge and experience with child birth. On the other hand, higher birth orders and number of children may lead to reproductive complications such as haemorrhage, obstructed labour and retained placenta due to reproductive stress that come with each additional birth (Kyomuhendo, 2004; Storeng et al., 2010).

Ethnicity contributes to the occurrence of maternal near miss events in Uganda. The study findings are consistent with other studies in Uganda (Bantebya-Kyomuhendo, 2004) and elsewhere (Goffman et al., 2007; Knight et al., 2009). These studies attributed ethnic differences in prevalence of severe maternal morbidity to genetic and environmental factors, cultural

practices, and barriers in accessing health care among minority ethnic groups. In the study context, the findings can largely be attributed to differences in cultural norms, beliefs and practices regarding pregnancy and child birth. Notably, the Banyakore in the study area were migrants from South Western Uganda. With the over-reliance on traditional health systems in Uganda (Bantebya-Kyomuhendo, 2004), these women too may have had to conform to their cultural practices during pregnancy. Thus, women may have made strenuous arrangements to acquire indigenous medicines (local herbs), access traditional birth attendants and seek social support from their places of origin. This could have led to missed opportunities in identifying high-risk women through timely or adequate antenatal care and supervised deliveries. Secondly, the majority of these women could have faced language barriers in a predominantly *Luganda* (local language for Baganda) speaking area hence their limited utilization of health facilities. Thirdly, as migrants, Banyakore settled in the rural and hilly areas of the district. These areas were largely undeveloped with a low level health care, poor transport network and no access to electricity. This could also have limited their access to emergency obstetric care.

Partner characteristics play an important role in occurrence of maternal near miss events. The level of partner's education influences occurrence of maternal near miss events. Women whose partners had secondary education were at a lower risk of experiencing maternal near miss events, which findings are consistent with a descriptive study in Uganda (Kaye et al., 2004a). Evidence shows that male involvement in maternal health is crucial in reducing adverse maternal outcomes (Kinanee and Ezekiel-Hart, 2009). Partners with secondary education may have averted delays in seeking health care through: timely decision-making at household level, access to financial resources for obstetric care, and access to transport means.

6.11 Summary

In summary, maternal near miss was higher among the rural residents, married, non Baganda, other Christians, poor or middle class women and women with no spousal age difference. It was also common among the uneducated or women with primary education and among women employed in the agricultural sector. Similarly, women whose husbands were uneducated or had primary education and were either unemployed or employed in the agricultural sector had the highest proportion of maternal near misses in the study population. Maternal near miss was found to be associated with all women's socio-demographic characteristics (residence, ethnicity, marital status, religion, wealth status, type of occupation, husband's educational attainment and occupation) except educational attainment and spousal age difference.

In addition, maternal near miss was prevalent among women with unwanted pregnancies, non-contraceptive usage, older women (35+ years), high birth order, high gravidity, low parity and among women who experienced violence; pregnancy danger signs, previous pregnancy complications; and women who had a history of pregnancy termination. Similarly, maternal near miss was predominant among women with chronic conditions, malaria and HIV/AIDS. No clear pattern was observed between alcohol intake, inter-pregnancy interval and maternal near miss status. Furthermore, maternal near miss was found to be significantly associated with birth order, pregnancy termination, parity, pregnancy wantedness, history of pregnancy complications, malaria and experience of pregnancy danger signs, while age at birth, alcohol intake, violence, gravidity, inter-pregnancy interval, chronic conditions, inter-pregnancy interval and maternal near miss status were independent.

Women with unwanted pregnancies, first birth order, history of previous severe pregnancy complications, and those who experienced pregnancy danger signs were more likely to experience maternal near miss events as compared to their counterparts. In addition, ethnicity

and partner's education were the only socio-demographic characteristics that were associated with occurrence of maternal near miss complications, after controlling for other factors.

Chapter Seven: Effects of Maternal Near Miss Complications on Birth

Outcomes

7.1 Introduction

Previous chapters have extensively examined the dynamics of maternal near miss events. Understanding the dynamics of maternal morbidity, near miss complications and mortality is key in achieving improved perinatal and infant outcomes. In order to reduce poor infant outcomes, infant morbidity and mortality, there is a need to examine the linkage between adverse pregnancy complications and birth outcomes. Therefore, the main objective of this chapter is to examine the relationship between maternal near miss complications and birth outcomes. In this chapter, a description of birth outcomes, and examination of differentials of birth outcomes by maternal near miss status is presented.

7.2 Pregnancy outcomes of Maternal Near Misses

Data in Table 7.1 shows that 95% of all pregnancies resulted in live births and 5% in either still births or early pregnancy losses. The majority of maternal near misses experienced still births (3.9%) and early pregnancy losses (9%) compared to the non-maternal near misses.

Table 7.1 Percentage and frequency (n) distribution of pregnancy outcomes by maternal near miss status

Pregnancy outcomes	Not Maternal Near Miss	Maternal Near Miss	Total
Early pregnancy loss	1.6 (18)	9.0 (39)	3.7 (57)
Still birth	0.5 (6)	3.9 (17)	1.5 (23)
Live birth	97.9 (1098)	87.1 (378)	94.9 (1476)
Total	100 (1122)	100 (434)	100 (1556)

7.3 Infant Deaths

Out of the 1,476 live births, 2% of the infants (29) died before their 5th birthday. Table 7.2 shows the distribution of timing of infant deaths. Almost half (48.3%) of the infants died within the first week of life (early neonatal deaths); nearly 7% died after the first week, but before the end of the first month; and almost 90% of deaths occurred in the first year of life.

Table 7.2 Distribution and Timing of Infant deaths

Timing of death	Frequency	Percent
First 7 days	14	48.3
After 7 days but before 30 days	2	6.9
Before 1 year	10	34.5
After 1 year	3	10.3
Total	29	100

7.4 Fetal and Infant Death Rates by Maternal Near Miss Status

Table 7.3 shows the perinatal and infant death rates in the study population by maternal near miss status. Abortion rate refers to the total number of spontaneous and induced abortions out of the total number of pregnancies in a given period. The abortion rate among maternal near misses is calculated as the total number of abortions among maternal near misses out of the total pregnancies that occurred in the study period. It is expressed per 1,000 pregnancies.

Abortion rate among maternal near misses =

$$\left(\frac{\text{Total number of abortions among maternal near misses}}{\text{Total pregnancies}} \right) * 1000$$
$$= (57 / 1556) * 1000$$
$$= 0.0251 * 1000$$
$$= \mathbf{25.1 \text{ abortions per 1,000 pregnancies}}$$

Results in Table 7.3 show that the total abortion rate in the study population was 36.6 per 1,000 pregnancies with the majority of the cases (25.1 per 1,000 pregnancies) occurring among maternal near misses.

Perinatal death rate refers to the total number of still births occurring after seven months of gestation and deaths that occur in the first seven days of life (early neonatal deaths) (UBOS and ICF, 2012). It is computed by dividing the total number of still births and early neonatal deaths by the total number of pregnancies with a minimum gestation period of seven months (UBOS and ICF, 2012).

Perinatal death rate =

$$\begin{aligned} & \left(\frac{\text{Total number of still births and early neonatal deaths}}{\text{Total pregnancies with gestation of 7 months and above}} \right) * 1000 \\ & = (37/1499) * 1000 \\ & = 0.02468 * 1000 \\ & = \mathbf{24.7 \text{ deaths per 1,000 pregnancies}} \end{aligned}$$

The perinatal death rate in the study population was 24.7 per 1,000 pregnancies as shown in Table 7.3. In addition, maternal near misses recorded a higher perinatal death rate of 14 per 1,000 pregnancies compared to non-maternal near misses with a perinatal death rate of 10.7 per 1,000 pregnancies. The overall study shows that perinatal death rate is lower than both national (40 per 1,000 pregnancies) and Central region's (47 per 1,000 pregnancies) estimates (UBOS and ICF, 2012). It is probable that the study district is one of the districts in the region or country with lower perinatal deaths. Overall, it can be noted that both abortion and perinatal death rates were highest among maternal near misses.

Table 7. 3 Fetal and Infant death rates by maternal near miss status

Death Rates	MNM (n)	Not MNM (n)	Total (n)	95% Confidence Interval ⁺
Abortion rate ¹	25.1 (39)	11.6 (18)	36.6 (57)	[27.122 – 46.142]
Perinatal death rate	14.0 (21)	10.7 (16)	24.7 (37)	[16.730 – 32.637]
Neonatal death rate	2.7 (4)	8.1 (12)	10.8 (16)	[5.528 – 16.152]
Post neonatal death rate	2.0 (3)	4.8 (7)	6.8 (10)	[2.576 – 10.974]
Infant death rate	4.7 (7)	12.9 (19)	17.6 (26)	[10.844 – 24.386]

¹ includes both induced and spontaneous abortions.

⁺ range of confidence intervals is too big due to small number of cases.

Neonatal death rate refers to the *probability of dying within the first month of life* (UBOS and ICF, 2012). It is expressed per 1,000 live birth births.

Neonatal death rate for non-maternal near misses =

$$\begin{aligned}
 & \left(\frac{\text{Deaths that occurred in 1st month of life among non maternal near miss}}{\text{Total live births}} \right) * 1000 \\
 & = (14/1476) * 1000 \\
 & = 0.0081 * 1000 \\
 & = \mathbf{8.1 \text{ deaths per 1,000 live births}}
 \end{aligned}$$

Table 7.3 shows that the overall neonatal death rate was 10.8 deaths per 1,000 live births. This study estimate is lower than the national estimate (27 deaths per 1,000 live births) by 2.5 times. It is also four times lower than that of the Central region (44 deaths per 1,000 live births), where the study district belongs and which recorded the highest neonatal mortality among all regions in Uganda (UBOS and ICF, 2012). Contrary to the abortion and perinatal death rates, the neonatal death rate is three times higher among non-maternal near misses (8.1 deaths per 1,000 live births) compared to maternal near misses (2.7 deaths per 1,000 live births as shown in Table 7.3.

Infant death rate refers to the probability of dying before the first birthday (UBOS and ICF, 2012). Table 7.3 shows the overall infant death rates for the total population, among maternal near misses and non-maternal near misses. The infant death rate among maternal near misses was 4.7 deaths per 1,000 live births while that of non-maternal near misses was 12.9 deaths per 1,000 live births). The infant death rate in the study population was 17.6 deaths per 1,000 live births. In comparison with national and regional estimates, the infant mortality rate for Uganda and Central region is 54 deaths per 1,000 live and 75 deaths per 1,000 live births respectively (UBOS and ICF, 2012).

Infant death rate =

$$\begin{aligned} & \left(\frac{\text{Total number of deaths occurring before 1st birthday}}{\text{Total live births}} \right) * 1000 \\ & = (26 / 1476) * 1000 \\ & = 0.0176 * 1000 \\ & = \mathbf{17.6 \text{ deaths per 1,000 live births}} \end{aligned}$$

Post neonatal death rate refers to the arithmetic difference between infant and neonatal death rates (UBOS and ICF, 2012). The post neonatal death rate in the study population was 6.8 deaths per 1,000 live births, with 4.8 deaths per 1,000 live births occurring among non-maternal near misses and 2 deaths per 1,000 live births occurring among maternal near misses as presented in Table 7.3. The study's post neonatal death rate is lower than the national (27 deaths per 1,000 live births) and the Central region (31 deaths per 1,000 live births) estimates (UBOS and ICF, 2012).

$$\begin{aligned} \text{Post Neonatal Death Rate} & = \text{Infant death rate} - \text{Neonatal death rate} \\ & = 17.6 - 10.8 \\ & = \mathbf{6.8 \text{ deaths per 1,000 live births}} \end{aligned}$$

In summary, abortions and perinatal deaths are high and the greatest contributor to negative pregnancy outcomes. Additionally, the high abortion and perinatal death rates among maternal near misses show that the majority of pregnancy losses occur during pregnancy and soon after birth, and are possibly closely linked to maternal near miss complications. Furthermore, the lower neonatal and infant deaths among maternal near misses are possibly because most losses occur in the pregnancy and perinatal period and not after the early neonatal period. In comparison to the national and regional estimates, the lower study estimates could possibly be as a result of few cases to allow comparability or it can be possibly attributed to lower death rates in the study region compared to other districts in the Central region or in the country.

7.5 Description of birth outcomes

This section presents the description of the birth outcomes and their importance to infant health. The infant outcomes described in this section include birth weight, birth size, new-born care practices and infant birth complications. Table 7.4 shows the percentage distribution of the birth outcomes.

7.5.1 Birth weight

Birth weight is often categorized into three categories: low, normal and high birth weight. WHO (2004) classifies low birth weight as weight less than 2,500grams (g) and an infant with 4,500 grams as a very big baby. However, there is no consensus on the cut-off points for high birth weight and thus, weight of either 4,000g, 4,500g or 5,000g has commonly been used as an indicator for high birth weight (Boulet et al., 2003; Zhang et al., 2008). Thus, in this study, low birth weight was categorized as weight less than 2,500g, normal weight 2,500g – 4,499g, and high birth weight greater than 4,500g.

Knowledge of foetus or infant birth weight is important in understanding maternal and child health outcomes. It can act as an indicator of maternal nutritional status or illness influencing

pregnancy outcomes, in addition to infant survival outcomes. Both extremes of birth weights are associated with negative maternal, fetal and infant outcomes. Low birth weight (Eichenwald and Stark, 2008) and high birth weight (Boulet et al., 2003; Koyanagi et al., 2013; Oral et al., 2001; Zhang et al., 2008) are associated with increased occurrence of perinatal mortality, infant morbidity and mortality. Furthermore, these weights are also associated with long term consequences including underweight risk, obesity (Schellong et al., 2012), non-communicable diseases (Eichenwald and Stark, 2008; Wallace and McEwan, 2007; Wei et al., 2003) and childhood leukaemia (Caughey and Michels, 2009).

In this study, women were asked if their infants had been weighed at birth. Women whose infants had been weighed were asked about the infant's birth weight. Results in Table 7.4 showed that only 882 women, who had live births, had an immunization card or could recall their infants' birth weight. The majority of the women (78.3%) reported to have delivered babies with normal weight. The least proportion of women (8.2%) delivered low weight babies. This finding is consistent with national estimates of birth weight where 10.2% of the infants weighed less than 2,500g and 89.8% weighed above 2,500g (UBOS and ICF, 2012). Similarly, the Central region, where Rakai district is found, had comparable estimates of 14.4% and 85.6% infants weighing below 2,500g and above 2,500g respectively (UBOS and ICF, 2012).

Table 7. 4 Table showing percentage distribution of birth outcomes

Infant outcomes	Frequency	Percent
Birth weight		
Low birth weight (1000g - 2499g)	72	8.2
Normal weight (2500g - 4499g)	691	78.3
Big / High birth weight (> 4500g)	119	13.5
Total	882	100
Birth size		
Very big	148	10.0
Bigger than average	364	24.7
Average	720	48.8
Smaller than average	189	12.8
Very small	55	3.7
Total	1,476	100
New-born care practices		
Breastfeeding within 1st hour		
Yes	753	51.5
No	709	48.5
Total	1,462	100
Dry and wrap		
Yes	1,237	83.81
No	239	16.19
Eye care		
Yes	273	18.5
No	1,203	81.5
Dry cord care		
Yes	494	33.47
No	982	66.53
Kangaroo mother care		
Yes	389	26.36
No	1,087	73.64
Infant birth complications		
Yes	528	35.8
No	948	64.2
Total	1,476	100

7.5.2 Birth size

The importance of birth size in maternal and child health studies is similar to that of birth weight. Information on birth size is an ideal proxy for birth weight in community studies. This is because of the limited information on birth weight resulting from infants delivered in the communities and not weighed at birth (UBOS and ICF, 2012). Additionally, mother's non recall of infant's birth weight may also account for the limited information on birth weight.

During the study, women were asked to estimate their infant's birth size. Almost half of the women (48.8%) reported to have delivered new-borns of an average size. This group was followed by a quarter of women (24.7%) who reported to have delivered new-borns who were bigger than average. Only 3.7% of women reported to have delivered very small new-borns. These results are comparable with national and Central region's estimates on birth size. An equal proportion (5.4%) of women in Uganda and Central region reported to have delivered very small babies (UBOS and ICF, 2012). While 15.3% (national estimate) and 16.5% (Central region) of women reported to have delivered smaller than average babies (UBOS and ICF, 2012).

7.5.3 New-born care practices

The first month of life (neonatal period) poses serious health risks to an infant. Neonatal mortality (27 deaths/1,000 live births) accounts for half of the infant deaths (54 deaths/1,000 live births) that occur in Uganda (UBOS and ICF, 2012). World Health Organization recommends a set of new-born care practices that if implemented can reduce both neonatal and infant morbidity and mortality (WHO, 1994b; WHO, 1996). These practices include but are not limited to initiation of breastfeeding within the first hour, exclusive breastfeeding, dry and wrap of infants after child birth, dry cord care, eye care, kangaroo mother care (skin-to-skin contact), immunization, vitamin supplementation, and postnatal care. Implementation of most of these new-born care practices may depend mainly on the mother's knowledge about these practices or

her health condition after birth. In this study, women who had a live birth were asked about new-born care practices. Table 7.4 shows the percentage distribution of selected new-born care practices in the study population.

7.5.3.1 Initiation of breastfeeding in the first hour of birth

World Health Organization recommends early initiation of breastfeeding in the first hour of birth (WHO, 1996) because it has been noted to have several benefits including reduced risk of neonatal morbidity and mortality (Debes et al., 2013; Mullany et al., 2008). Similarly, Edmond et al. (2006) found that 22% of neonatal deaths in rural Ghana could be averted if breastfeeding was initiated in the first hour of life.

Out of 1,462 women who breastfed their infants, more than half (51.5%) initiated breastfeeding in the first hour after child birth. This is very similar to the national estimates which show that 52.5% (UBOS and ICF, 2012) of infants in Uganda are breastfed within the first hour of birth. However, in Central region, less than half (46.7%) (UBOS and ICF, 2012) of the infants were breastfed in the first hour of birth.

7.5.3.2 Dry and Wrap of New-born

Thermal protection is vital in achieving optimal new-born care, in addition to prevention of neonatal morbidity and mortality. WHO (1996) recommends the use of simple thermal protection techniques to prevent loss of infant warmth. Thermal protection techniques include use of delivery rooms at room temperature, drying and wrapping new-borns immediately after birth, and skin-to-skin contact of new-borns with their mothers. Failure to prevent heat loss among the new-borns results in hypothermia, which is associated with new-born complications that can result in severe neonatal morbidity or death. Women were asked if their infants were dried and wrapped immediately at birth. The majority of the women (83.8%) reported that their

infants had been dried and wrapped soon after childbirth. Notably, dry and wrap of infants was the most commonly practiced or applied technique among all new-born care practices.

7.5.3.3 Eye care

World Health Organization (WHO, 1996) recommends new-born eye care treatment or prophylaxis soon after birth in order to prevent or manage severe eye infections that may have resulted from mothers having sexually transmitted diseases such as gonorrhoea or chlamydia. These eye infections, if present and left untreated in a new-born, can lead to blindness. In Uganda, the Ministry of Health recommends immediate wiping of a new-born's eyes followed by applying of an eye ointment within the first hour of birth (Uganda Newborn Study, 2010). Although eye care prophylaxis is one of the recommended new-born practices in Uganda, the majority of the infants (81.5%) in the study population did not have any eye care measures undertaken after birth. Overall, eye care was the least practiced new-born care technique.

7.5.3.4 Dry Cord Care

Cleanliness in cutting of the umbilical cord and dry care of the cord is one of the new-born care practices recommended by World Health Organization (WHO, 1996). Failure to care for the cord by not applying any substances may result in neonatal sepsis or tetanus, leading to neonatal death (WHO, 1994b). As part of understanding new-born care practices among maternal near misses, all women were asked if they had observed the dry cord care. Only a third (33.5%) of the women reported to have put nothing on the cord. While very few women cleaned the cord with warm or saline or salty water, several women reported to have applied different substances including ashes, powder, herbs, and saliva on the cord until it healed. Applying of various substances on the cord to enable its fast healing is a common practice in Uganda as evidenced in another study (Waiswa et al., 2008). However, some of these substances may be harmful to the new-born and may cause infections.

7.5.3.5 Kangaroo mother care (skin-to-skin contact)

Kangaroo mother care refers to the act of placing an infant on the mother's abdomen or chest with skin-to skin contact, immediately after child birth for a given duration (Moore and Anderson, 2007). This simple technique is associated with several benefits leading to improved or better infant outcomes. Dabrowski (2007) reviewed the benefits of kangaroo mother care to include: earliest opportunity for mother-infant interaction, thermoregulation of new-borns, enhancement of early initiation of breastfeeding and increased breastfeeding duration, among other benefits. In this study, only 26.4% of women had skin-to-skin contact with their new-borns immediately after child birth.

7.5.4 Infant birth complications

Complications that occur in labour or during delivery are often linked to complications experienced by new-borns. These complications, if not treated or managed within the first critical hours of birth may result in neonatal deaths. In this study, women were asked about the various birth complications their infants experienced. Table 7.4 presents the distribution of women whose infants experienced at least one infant complication while Table 7.5 presents the distribution by type of complication.

More than a third (35.8%) of women reported their infants to have experienced at least a complication. The highest proportion of complications reported were skin lesions or blisters (10.4%), yellow skin or eye colour (jaundice), (9.9%), very small baby (7.8%) and difficult or fast breathing (7.7%) respectively, while lethargy was the least (1%) reported infant complication as shown in Table 7.5.

Table 7.5 Table showing distribution of infant birth complications

Infant birth complications*	Frequency	Percent
Difficult or fast breathing	114	7.7
Yellow skin/ eye colour (jaundice)	146	9.9
Poor sucking or feeding	46	3.1
Discharge from umbilical cord	46	3.1
Very small baby	115	7.8
Skin lesions / blisters	153	10.4
Convulsions / Rigidity	58	3.9
Lethargy / Unconsciousness	15	1.0
Red / swollen eyes with pus	80	5.4
Others	54	3.7

* Multiple responses

7.6 Differentials of infant outcomes by maternal near miss status

This section entails a description of the relationship between maternal near miss and infant outcomes. In addition, a description of the differentials of infant outcomes by maternal near miss status is also presented herein. Furthermore, results ascertaining whether the differentials were statistically significant are also presented in Figure 7.1 and Table 7.6.

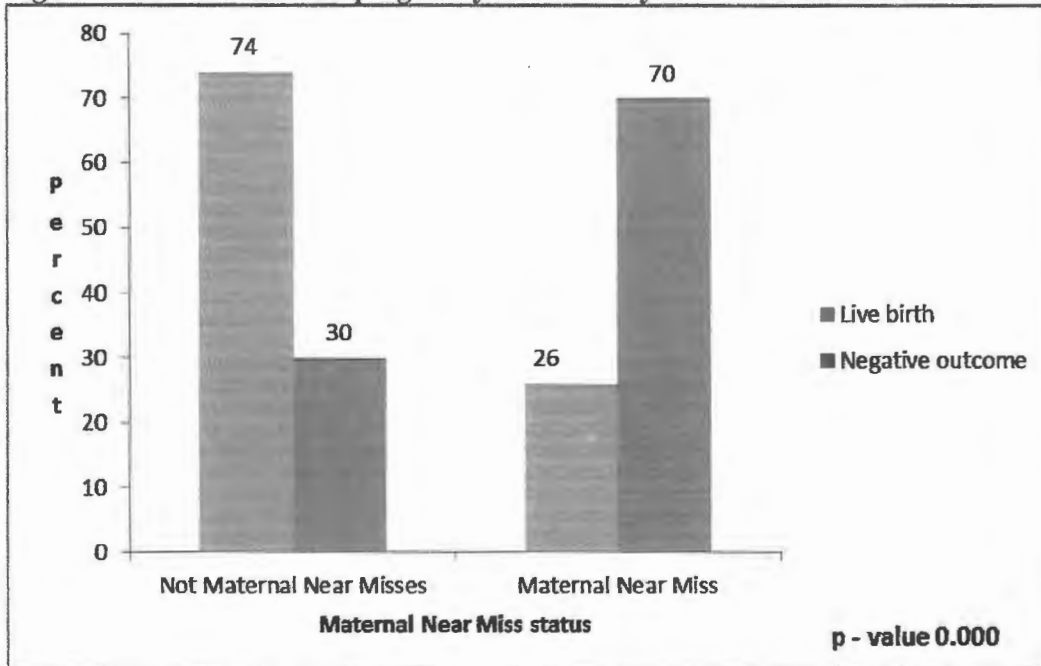
7.6.1 Pregnancy outcomes and maternal near miss

Maternal near miss complications are likely to result in negative pregnancy outcomes such as still births, or pregnancy losses. Maternal near miss complications including obstructed labour, prolonged labour, hypertension, pre-eclampsia, sepsis, have been found to increase the occurrence of still births (Cham et al., 2009; Lawn et al., 2009; Olagbuji et al., 2012). These complications may lead to birth trauma or fetal distress among other complications, hence resulting in intra-partum or fetal deaths.

Figure 7.1 showed that 70% of negative birth outcomes occurred among near misses compared to 30% among non-maternal near misses. Similarly, almost three-quarters (74%) of live births occurred among non-maternal near miss compared to only 26% of live births among maternal near misses. The relationship between maternal near miss status and pregnancy outcome was

tested and founded to be significant ($p < 0.001$). Therefore, maternal near miss and pregnancy outcomes are dependent.

Figure 7.1: Differentials in pregnancy outcomes by maternal near miss status



7.6.2 Birth weight and maternal near miss

There is a two-way causal relationship between maternal near miss and birth weight. A woman’s fetal weight can be a cause of maternal near miss complications or these complications can influence birth weight outcomes. Different birth weight outcomes are associated with different maternal and child health outcomes. Most research on maternal near miss complications and birth weight has largely focussed on low birth weight. However, there is an adequate breadth of literature supporting a strong relationship between maternal near miss complications and high birth weight.

High birth weight has been found to be associated with maternal near miss complications such as prolonged labour, obstructed labour, sepsis, and postpartum haemorrhage (Boulet et al., 2003; Jolly et al., 2003; Koyanagi et al., 2013; Oral et al., 2001; Stotland et al., 2004; Wallace and

McEwan, 2007). Similarly, delivery of low birth weight infants has been linked with occurrence of maternal near miss complications including severe malaria, prolonged or obstructed labour (Adeoye et al., 2013; Coutinho et al., 2009; Guyatt and Snow, 2004; Konje and Ladipo, 2000; Shulman et al., 2001; Souza et al., 2010; Tiono et al., 2009). Furthermore in his review, Valero de Bernabé et al. (2004) noted that pre-eclampsia, antepartum haemorrhage, pregnancy induced hypertension (maternal near miss complications) were contributory factors to the delivery of low birth weight infants. Consequently, with the delivery of low birth or high birth weight infants comes an increased risk of poor infant outcomes including perinatal mortality, neonatal morbidity, and infant mortality.

Table 7.6 presents the differentials of birth weight by maternal near miss status. The highest proportion of maternal near misses had high birth weight infants. A third (32.8%) of the high birth weight infants belonged to maternal near misses, while a majority of non-maternal near misses had low birth weight and normal weight infants. Over three-quarters of low birth weight (79.2%) and normal weight (76%) infants were among non-maternal near misses. However, no significant relationship ($p > 0.05$) was found to exist between birth weight and maternal near miss status, suggesting that birth weight was independent of maternal near miss status.

7.6.3 Birth size and maternal near miss



Similar to birth weight, the highest proportion of maternal near misses had very big infants. More than a third (36.5%) of the maternal near misses had very big infants compared to 23.6% of maternal near misses who had average sized infants and very small infants. An equal proportion of non-maternal near misses (74.6%) had averagely sized and very small infants. The lowest proportion of non-maternal near misses had very big infants (63.5%). In addition, the results showed a significant association between maternal near miss status and infant birth size ($p < 0.05$).

7.6.4 New-born care practices and maternal near miss

The importance of new-born care practices has earlier been described in section 7.5.3. Maternal near misses may be unable to implement the recommended new-born care practices especially initiation of breastfeeding in the first hour of birth, kangaroo mother care, dry and wrap of infant and eye care. Maternal near misses who deliver by caesarean section may be unable to undertake new-born practices including skin-to-skin contact (kangaroo mother care) as shown in previous studies (Dabrowski, 2007; Rowe-Murray and Fisher, 2002).

This study examined the bivariate relationship between new-born care practices and maternal near miss status as shown in Table 7.6. Almost a third (31.2%) of maternal near misses did not initiate breastfeeding in the first hour of birth compared to only 20.6% of maternal near misses who started breastfeeding within the first hour of birth. Similarly, 31.8% of maternal near misses did not dry and wrap their infants soon after birth compared to less than a quarter (24.4%) who did dry and wrap their infants. Contrary to other new-born practices including breastfeeding in the first hour, dry and wrap, and kangaroo mother care, a higher proportion of maternal near misses followed the recommended eye care practices for infants. While a quarter (24.9%) of maternal near misses did not follow the eye care practices, 28.6% of maternal near misses did follow the recommended eye care practices.

Table 7. 6 Table showing differentials of birth outcomes by maternal near miss status

Birth outcomes	Not Maternal Near Misses (n)	Maternal Near Miss (n)	Total (n)	Significance (p-value)
Birth weight				0.088
Low birth weight	79.2 (57)	20.8 (15)	72	
Normal weight	76.0 (525)	24.0 (166)	691	
Big / High birth weight	67.2 (80)	32.8 (39)	119	
Total	75.1 (662)	24.9 (220)	882^a	
Birth size				0.028
Very big	63.5 (94)	36.5 (54)	148	
Bigger than average	74.7 (272)	25.3 (92)	364	
Average	76.4 (550)	23.6 (170)	720	
Smaller than average	74.1 (140)	25.9 (49)	189	
Very small	76.4 (42)	23.6 (13)	55	
Total	75.4 (1098)	25.6 (378)	1476	
New born Care Practices				
Breastfeeding in 1st hour of birth				0.000
Yes	79.4 (598)	20.6 (155)	753	
No	68.8 (488)	31.2 (221)	1709	
Total	74.3 (1086)	25.7 (376)	1462^b	
Dry and wrap				0.017
Yes	75.6 (935)	24.4 (302)	1237	
No	68.2 (163)	31.8 (76)	239	
Eye care				0.214
Yes	71.4 (195)	28.6 (78)	273	
No	75.1 (903)	24.9 (300)	1203	
Dry cord care				0.951
Yes	74.3 (367)	25.7 (127)	494	
No	74.4 (731)	25.6 (251)	982	
Kangaroo mother care (skin-to-skin)				0.116
Yes	77.4 (301)	22.6 (88)	389	
No	73.3 (797)	26.7 (290)	1087	
Infant birth complications				0.729
No	74.7 (708)	25.3 (389)	948	
Yes	73.9 (390)	26.1 (138)	528	
Total	75.4 (1098)	25.6 (378)	100 (1476)	

^a includes only women whose infants were weighed and mother had birth cards or could recall the weights. ^b includes only women who ever breastfed.

With regards to dry cord care, there was no variation in its practice or non practice among both maternal near misses and non-maternal near misses. About 26% of maternal near misses applied

the dry cord care practices while another 26% of maternal near misses acted contrarily. Furthermore, 26.7% of maternal near misses did not apply the kangaroo mother care technique after child birth. Similarly, 77.4% of non-maternal near misses used the kangaroo mother care technique compared to only 22.6% of maternal near misses.

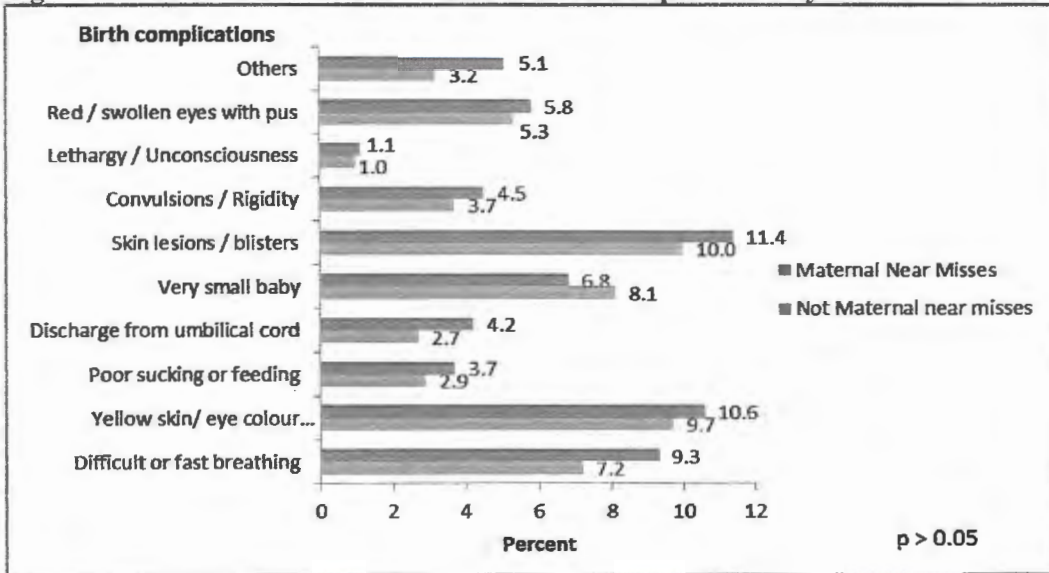
Generally, there was low uptake of new-born care practices, except for eye care and dry cord care, among maternal near misses. Despite the remarkable differentials across several new-born care practices, only initiation of breastfeeding within the first hour ($p < 0.001$) and dry and wrap ($p < 0.05$) practices were found to be significantly associated with maternal near miss status.

7.6.5 Infant complications and maternal near miss

The distribution of infant complications by maternal near miss status is presented in Table 7.6. Among women whose infants did not experience any infant complications, three quarters (74.7%) were non maternal misses while 25.3% were maternal near misses. This was in comparison with 26.1% of maternal near misses whose infants experienced complications. However, no significant relationship was found to exist between maternal near miss status and birth complications ($p > 0.05$).

Furthermore, the bivariate association between maternal near miss and each of the birth complications was examined. In comparison with non-maternal near misses, maternal near misses reported a higher proportion of each complication except having a very small baby as shown in Figure 7.2. Infant complications that accounted for the highest proportion among maternal near misses included skin lesions or blisters (11.4%), yellow skin or eye colour (jaundice) (10.6%), and difficult or fast breathing (9.3%). A similar trend of infant complications was observed among non-maternal near misses. None of the infant complications was found to be significantly associated with maternal near miss status ($p > 0.05$).

Figure 7.2: Percent distribution of infant birth complications by maternal near miss status



7.7 Birth outcomes of Maternal Near Miss

This section presents the best – fit model, based on the linktest and estat gof tests, showing the infant outcomes of maternal near misses compared to non-maternal near misses. Information on the different hypotheses tested for each infant outcome is entailed. Also, a description of the results shown in the model (Table 7.7) is presented in this section.

7.7.1 Infant outcome: Pregnancy outcomes

Ha₁: Maternal near misses are more likely to be associated with negative birth outcomes compared to non maternal near misses.

Results in Table 7.7 show that maternal near miss status and pregnancy outcomes are significantly associated ($p < 0.001$). Thus, the null hypothesis was rejected and the alternative hypothesis, as stated above, was accepted. Maternal near misses were less likely to have a live birth as compared to women who were not maternal near misses. The odds of having a live birth among maternal near misses were lower by 85% compared to having a negative birth outcome.

Therefore, maternal near misses were at a higher risk of experiencing negative birth outcomes including either a still birth or early pregnancy loss.

"I was given a tablet for labour pains but the labour pains did not increase throughout the night. In the morning, I was put on drip to augment the labour pains further but also this was not of great help. I was added another drip but I became unconscious when the drip was almost half way. I was then rushed to the theatre for an emergency operation [laparotomy]. I had a tear on the left side of the uterus. Unfortunately the baby died in the process." (Urban woman, aged 27 years with gravidity 3)

"I got malaria for three days and I was so weak. I was admitted in hospital for three days and given five drips. The baby was fine then but one week after coming back home from hospital, I could no longer feel the baby's movements. So I went back to the hospital and was told that the baby had died. I was given an injection which helped me to deliver the baby. I felt too weak when I had malaria and I could not carry myself. At times my pressure was so low and I had to take glucose. I was given one injection, and drugs to stop the bleeding when the fetus came out. I spent another week in the hospital due to severe weakness and being anaemic. This time, I got eight drips. I took like one month when I was still weak and I could change pads every thirty minutes." (Urban woman, aged 39 years with gravidity 6)

7.7.2 Infant outcome: Birth weight



Ha₁: Maternal near misses are less likely to deliver infants with a normal weight.

The study results showed that maternal near miss status and infant weight were significantly associated ($p < 0.05$). Although maternal near miss status was not associated with low birth weight infants, it was associated with high birth weight as shown in Table 7.7. The odds of maternal near misses having a big or high birth weight infants ($> 4,500\text{g}$) compared to normal weight infants ($2,500\text{g} - 3,500\text{g}$) were higher by 54%.

7.7.3 Infant outcome: Birth size

Ha₁: Maternal near misses are less likely to deliver infants of average size.

The relationship between infant birth size and maternal near miss status was tested. It was hypothesized that maternal near misses are less likely to deliver infants of average size. Results in Table 7.7 showed that birth size and maternal near miss status were strongly associated ($p < 0.001$), thus accepting the alternative hypothesis. Notably, delivering very big infants was found to be strongly associated with maternal near miss status. Maternal near misses were almost two times (odds ratio: 1.8) more likely to deliver very big infants than average sized infants. However, on controlling for other infant outcomes of maternal near misses, these odds slightly reduced to 1.7 times. These findings are in conformity with the qualitative findings. Narratives of several women who experienced maternal near miss complications mainly obstructed or prolonged labour partly attributed their misfortune to having big infants. These women often experienced prolonged labour and obstructed labour due to cephalopelvic disproportion of the fetus which led to emergency caesarean section. The narratives below highlight experiences of maternal near misses that delivered very big babies.

"I was admitted at the hospital when I was hurting. But I over stayed at the hospital. After 4 days of pain, I was taken to an ultra-sound, only to discover that the baby was so big and it is lie was dangerous [transverse position] for it to get out. So the doctor decided that I should have an operation so that they can save

the baby and me, because during that time I had become very weak.” (22 year old rural mother)

*“I went to hospital with labour pains. When I got there, I was examined and they [health workers] discovered I couldn’t have a vaginal delivery, because **the baby was big**. So, the doctor suggested an operation [caesarean section] instead of vaginal delivery saying that if I insisted, I would either lose the baby or I would die. So I was rushed to the theatre.” (22 year old rural mother)*

Management of prolonged or obstructed labour complications often leads to emergency caesarean section or assisted deliveries, which procedures may also increase risk of sepsis complications.

7.7.4 Infant outcome: Infant birth complications

H_{a1}: Infants born to maternal near misses are more likely to experience birth complications.

While it was hypothesized that infants born to maternal near misses were more likely to experience birth complications, this was not evident in the study population. Findings presented in Table 7.7 showed that there was no significant relationship between maternal near miss status and experience of birth complications by the infants. Therefore, the above alternative hypothesis was rejected in favour of the null hypothesis that, no significant relationship existed between maternal near miss status and infant birth complications.

Table 7. 7 Table showing odds ratios of birth outcomes of maternal near miss

Birth outcomes of maternal near misses	Unadjusted Odds Ratio	95% Confidence Interval (CI)	Adjusted Odds Ratio^b	95% CI
Pregnancy outcome^a				
Live birth	0.148***	[0.090 0.241]		
Negative outcome (RC)	1.000			
Birth weight				
Low birth weight (1000g - 2499g)	0.832	[0.459 1.509]		
Normal weight (2500g - 4499g)	1.000			
Big / High birth weight (> 4500g)	1.542*	[1.012 2.348]		
Birth size				
Very big	1.824***	[1.250 2.662]	1.653**	[1.119 2.440]
Bigger than average	1.094	[0.817 1.466]	1.042	[0.771 1.410]
Average (RC)	1.000		1.000	
Smaller than average	1.132	[0.783 1.636]	1.046	[0.711 1.537]
Very small	1.001	[0.525 1.909]	0.947	[0.486 1.842]
Infant birth complications				
Yes	1.044	[0.819 1.331]	1.053	[0.813 1.364]
No (RC)	1.000		1.000	
New-born care practices				
Breastfeeding within 1st hour of birth				
Yes (RC)	1.000		1.000	
No	1.747***	[1.377 2.216]	1.769***	[1.388 2.254]
Dry and wrap				
Yes (RC)	1.000		1.000	
No	1.444**	[1.068 1.952]	1.412*	[1.025 1.946]
Eye care				
Yes	1.204	[0.898 1.614]	1.562**	[1.082 2.256]
No (RC)	1.000		1.000	
Dry cord care				
Yes (RC)	1.000		1.000	
No	0.992	[0.775 1.271]	1.225	[0.899 1.667]
Kangaroo mother care (skin-to-skin)				
Yes (RC)	1.000		1.000	
No	1.245	[0.947 1.635]	1.144	[0.853 1.534]

a: n = 1556, b: n = 1462 and overall p - value 0.000; *** p < .001, ** p < .01, * p < .05

7.7.5 Infant outcome: New-born care practices

Ha1: Maternal near misses are associated with low uptake of new-born care practices.

This study hypothesized that maternal near misses were associated with low uptake of each new-born care practice. Among the essential new-born care practices, breastfeeding in the first hour of birth ($p < 0.001$), dry and wrap ($p < 0.05$), and eye care ($p < 0.01$) were the only practices significantly associated with maternal near miss status as shown in Table 7.7.

Maternal near misses were 1.7 times more likely not to initiate breastfeeding in the first hour of birth compared to their counterparts. These odds were increased to 1.8 times when other infant outcomes were controlled for. Additionally, maternal near misses were 1.4 times more likely not to dry and wrap their infants compared to their counterparts. However, as shown in Table 7.7, these odds marginally reduced when other infant outcomes were taken into account. Although eye care was initially not found to be associated with maternal near miss status, it was found to be statistically significant when other infant outcomes were taken into account. Notably, the odds of infant eye care practice among maternal near misses were 1.6 times higher than their counterparts. Other recommended new-born care practices including dry cord care and kangaroo mother care (skin-to-skin bonding) were not significantly associated with maternal near miss status.

7.8 Discussion

The study findings showed high rate of abortions, perinatal deaths, neonatal deaths and infant deaths in the study population. Additionally, maternal near miss status was significantly associated with poor infant outcomes including negative birth outcomes, high birth weight or very big infants, and poor new-born care practices including late initiation of breastfeeding, and failure to dry and wrap the infants after child birth.

The study results showed that maternal near misses are a greater risk of having negative pregnancy outcomes including early pregnancy loss or still birth. This finding is supported by study findings which showed a high prevalence of abortions, stillbirths, and perinatal deaths among maternal near misses as compared to non-maternal near misses. This is in conformity with previous studies which reported high occurrence of still births among maternal near misses (Adeoye et al., 2013; Cham et al., 2009; Olagbuji et al., 2012; Souza et al., 2010). In their systematic review, Di Mario et al. (2007) reported maternal near miss complications such as obstructed labour, pre-eclampsia, and chronic diseases as significant risk factors for the occurrence of still births in developing countries. Similarly, the study findings on high prevalence of perinatal deaths among maternal near misses conform to other studies in Uganda (Nakimuli et al., 2015) and elsewhere (Kusiako et al., 2000; Tachiweyika et al., 2011; Weiner et al., 2003). Weiner et al. (2003) found that maternal near misses in Kenya were nine times more likely to have a perinatal death as compared to their counterparts. Another study in Uganda reported that maternal near miss complications such as obstructed labour, prolonged labour, severe malaria, preeclampsia, and antepartum haemorrhage increased the odds of occurrence of perinatal deaths by 10.6 (Nankabirwa et al., 2011).

Therefore, maternal near miss complications are a significant contributor to the high prevalence and occurrence of negative pregnancy outcomes in the study population. The explanation for the high occurrence of negative pregnancy outcomes among maternal near misses could be three-fold. First, maternal near miss complications are associated with several infant complications including increased fetal distress, birth trauma, respiratory distress, reduced blood and nutrient supply among other complications, which conditions increase the risk of perinatal deaths (Musooko et al., 2014; Tachiweyika et al., 2011). Secondly, maternal near misses are likely to experience delays either at household, accessing transport means or while at health facilities

when accessing emergency obstetric care. Thirdly, it could largely be a reflection of the limited access to emergency obstetric care or poor management of maternal near miss complications during the delivery process.

In this study, maternal near misses were more likely to deliver very big or high birth weight infants. This is consistent with several studies which reported high birth weight to be associated with maternal near miss complications (Boulet et al., 2003; Jolly et al., 2003; Koyanagi et al., 2013; Oral et al., 2001; Stotland et al., 2004). Stotland et al. (2004) reported a five-fold increased risk of high birth weight infants being associated with maternal near miss complications. In the context of the study findings, delivery of high birth weight infants was common among women who experienced prolonged or obstructed labour. In addition, postpartum haemorrhage could have been another complication common among women with a high birth weight child. These women may have experienced postpartum haemorrhage following either a spontaneous delivery or caesarean delivery which is common in prolonged or obstructed complications. However, the study finding is contrary to several other studies which, instead reported a high occurrence of low birth weight infants among maternal near misses (Adeoye et al., 2013; Souza et al., 2010).

Initiation of breastfeeding within the first hour of birth was significantly low among maternal near misses. This can be partly attributed to a high proportion of women who delivered by emergency caesarean section, hence a substantial time of separation with their new-borns. Maternal near miss events may lead to birth trauma, emotional stress, birth injuries, severe weakness or unconsciousness, which conditions may delay secretion of breast milk or may require women to have some time to recuperate before initiating breastfeeding. The study findings can be compared to another study (Orun et al., 2010) which noted pregnancy illness as a risk factor for late initiation of breastfeeding of infants in the first hour. Similarly, Thompson et al. (2010) explained reasons for delayed initiation of breastfeeding in the first hour among

women who experienced postpartum haemorrhage, while other studies also affirmed late initiation of breastfeeding within the first hour among women who delivered by caesarean section (Awi and Alikor, 2007; Chien and Tai, 2007; Orun et al., 2010; Rowe-Murray and Fisher, 2002; Vieira et al., 2010).

The new-born care technique of drying and wrapping the infant immediately after birth was less likely to be done among maternal near misses. No literature has been found to explain the link between maternal near miss complications and dry and wrap of infants. In the study context, four perspectives can possibly be used to explain this situation.

First, it is plausible that with the occurrence of maternal near miss complications, health workers may have been busy with saving or monitoring the mothers than effecting the dry and wrap technique, despite its benefits. This can be supported by the low proportion of maternal near misses that had skin-to-skin contact – which technique follows the dry and wrap technique. Another perspective may be from the mother's condition. Maternal near misses may have been in an unhealthy condition, or may have experienced infections, which conditions may not have enabled them to have skin-to-skin contact in case the baby had already been dried and wrapped. While from the infant's side, infants born to maternal near misses may have experienced birth complications and thus may have had to be taken into a nursery or intensive care unit, hence were unable to partake in this technique. Lastly, maternal near misses who delivered in the communities, in the absence of skilled health providers, may not have applied this technique, as it may not have been mandatory, compared to births that occurred in health facilities. In conclusion, there is need to investigate why maternal near misses are less likely to apply the dry and wrap technique.

Contrary to other new-born care practices, maternal near misses were more likely to have had eye care prophylaxis. Although eye care prophylaxis is the recommended norm in Uganda, this

may not have been the practice in the study setting. Anecdotal information shows that women are encouraged to purchase an eye ointment to use at birth in case of any new-born eye infections. Thus, only women whose new-borns exhibit signs of eye infections are treated at birth as compared to all new-borns. Therefore, this study finding can partly be attributed to the possibility of maternal near misses having given birth to new-borns with eye infections, and thus needed eye care treatment.

New-borns of maternal near misses may have been at a higher risk of eye infections possibly due to two main reasons. First, maternal near misses may have had sexually transmitted diseases which may have been responsible for occurrence of both pregnancy complications and eye infections. A study showed that women with sexually transmitted diseases during pregnancy experienced pregnancy complications including premature rupture of membranes and also delivered babies with eye infections (Mullick et al., 2005). Secondly, maternal near misses complications resulting from prolonged labour may also have contributed to occurrence of eye infections leading to eye care treatment at birth. Mundia et al. (2008) reported that infants born to women who experienced prolonged labour experienced eye infections – conjunctivitis, following several vaginal examinations that could have led to transmission of bacteria to the new-borns at the time of birth. While another study showed that sexually transmitted diseases, premature rupture of membranes and sepsis were maternal risk factors associated with eye infections in new-borns in Malawi (Ranjit et al., 2014).

7.9 Chapter Summary

In conclusion, the study findings emphasize the negative effects of maternal near miss complications on infant outcomes. Based on these findings, it can be concluded that maternal near miss complications are a significant contributor to the poor infant outcomes and continued high perinatal and infant morbidity and mortality in the country.

Chapter Eight: Male involvement in women's utilization of emergency obstetric care and averting of maternal deaths in Central Uganda

8.1 Introduction

The need for male involvement in reproductive health was brought to the forefront during the International Conference on Population and Development (UNFPA, 1994b) in Cairo. Since then, maternal health policies and programmes in low and middle income countries have advocated for male involvement in maternal and child health. The importance of male involvement in maternal health is two-fold. First, men are partners or husbands of the women (UNFPA, 2007) and are affected by maternal outcomes. Secondly, men's importance in maternal health arises from a socio-economic and cultural dimension. These dimensions are informed by the recognition of the patriarchal system, societal gender and power dynamics, which dynamics emphasize the central role played by men as household heads and decision makers in all household spheres including health care utilization in sub-Saharan Africa (Nwokocha, 2008; Roth and Mbizvo, 2001).

Male involvement in maternal health is associated with several benefits including increased family planning uptake, couple testing for HIV/AIDS and utilization of maternal health services (Ditekemena et al., 2012; Kinanee and Ezekiel-Hart, 2009; Mullany et al., 2007; Nwakwuo and Oshonwoh, 2013; Okechukwu et al., 2007; Roth and Mbizvo, 2001; Shahjahan et al., 2013). In addition, documented evidence (Barua et al., 2004; Dudgeon and Inhorn, 2004; Kinanee and Ezekiel-Hart, 2009) shows that male involvement in maternal health is generally crucial in reducing maternal mortality. However, little is known about men's role in women's access to and utilization of EmOC, yet access to EmOC is the overriding factor in averting maternal deaths in Uganda (Mbonye et al., 2007) and elsewhere (Paxton et al., 2005), especially in areas with a high proportion of home births (McCord et al., 2001). With Uganda's maternal mortality ratio stalling at a high level of 438 / 100,000 live births and a high proportion of home births (43%)

(UBOS and ICF, 2012), understanding men's role in access to EmOC with the aim of developing appropriate strategies on male involvement in women's utilization of EmOC to reducing maternal mortality is necessary.

Previous studies on birth preparedness and complication readiness (Iliyasu et al., 2010; Kakaire et al., 2011) have assessed couples' plans and readiness in the event that women experience severe pregnancy complications. Studies in Nigeria (Odimegwu et al., 2005; Odimegwu, 2002) and Uganda (Kaye et al., 2014) have examined the roles played by men during their wives' emergency obstetric conditions. These studies found that men were involved in roles such as decision-making about when and where to access EmOC; offered financial support enabling access to EmOC; in addition to playing supportive roles such as escorting their wives to health facilities after the onset of severe pregnancy complications. However, Nigerian studies (Odimegwu et al., 2005; Odimegwu, 2002) considered a limited set of obstetric conditions and largely focussed on key pregnancy danger signs rather than all life-threatening pregnancy conditions or complications, The Ugandan study (Kaye et al., 2014) considered only partners of maternal near misses admitted to the national referral hospital, which is not representative of the bulk of partners of maternal near misses who deliver from home, reside in rural areas, and experience numerous challenges in accessing EmOC. Therefore, this study, by including a wide range of life-threatening obstetric complications and taking into consideration place of residence, and place of delivery, extended the existing research by examining the roles played by men in the utilization of EmOC and averting maternal deaths after the onset of maternal near miss events.

With regard to the *Three Delays* model, focus is placed on the three types of delay that often manifest after onset of obstetric complications which may hinder access or utilization of EmOC (Thaddeus and Maine, 1994). Based on the premise of the *Three Delays* model, men may play a

role in addressing the delays at household level and in accessing EmOC hence influencing women's utilization of EmOC.

The sample for this qualitative study was drawn from the quantitative sample. Qualitative data was collected through narratives and in-depth interviews (IDIs). A total of 40 maternal near misses and 10 partners formed the study population. Each woman who reported experiencing complications leading to maternal near miss was asked to narrate her ordeal and circumstances surrounding the complications. Purposive sampling was used to select maternal near misses based on the unprompted mention of partner's positive involvement in their near-miss accounts or narratives. In addition, in-depth interviews were administered to randomly selected partners of these maternal near misses. Only partners of maternal near misses were selected for analysis. This selection was based on the assumption that husbands are more likely to be concerned and responsible about their wives' pregnancy state as compared to other male relations (Barua et al., 2004).

8.2 Male involvement in women's utilization of emergency obstetric care

Male involvement was analysed in the context of positive male involvement in women utilization of obstetric care. Results from the study generated six broad themes of male involvement in access to emergency obstetric care and averting maternal deaths. The emerging themes included uptake of permanent or long term contraceptive methods; management of obstetric complications; provision of financial support to access emergency obstetric care; decision-making; transport arrangements; and social support.

8.2.1 Uptake of permanent or long term contraceptive methods

Postpartum uptake of contraceptives was one of the key roles played by the men. The results showed that men consented to their wives' uptake of permanent or long-term contraceptive methods after the maternal near miss events occurred. Below is an excerpt in which a male

partner of a woman who experienced obstructed labour consented to sterilization as a family planning method.

“The doctor checked her and said she had to be operated because the arm had come out. I was counselled on child bearing and the operation. I stopped child bearing and before the operation, I was counselled about sterilization and I accepted my wife to be sterilized. She also accepted to be sterilized. I, then, signed the forms.”(IDI – Male partner aged 40 years with a wife who experienced obstructed labour)

In other cases, men advised their wives to use long-term family planning methods after the devastating occurrence of maternal near miss events. This scenario was best illustrated by an HIV positive woman who experienced multiple complications resulting from a spontaneous abortion including severe haemorrhage and a retained placenta. The husband, who had not disclosed his HIV status for three years, later advised the wife to use a long-term family planning method. With additional counselling from the village health team, the woman was given an injection protecting her from pregnancy for five years.

8.2.2 Management of obstetric complications at household level

The data showed that at household level, men were involved in managing life-threatening pregnancy complications such as postpartum haemorrhage and retained placenta. Management of these complications was done in three main ways: administering of intramuscular haemorrhage medication (presumed to be oxytocin), provision of haemorrhage oral medication (presumed to be misoprostol) and abdominal or fundal massage in case of retained placenta.

Overwhelming evidence emerged from the study which showed that husbands administered essential obstetric medication used in the management of haemorrhage complications. Men were reported to have administered both intramuscular injectable and oral medication to wives who

experienced postpartum haemorrhage. By doing this, men ensured that their wives had access to essential obstetric medicines used in the management of postpartum haemorrhage. Several women who had home births and experienced postpartum haemorrhage reported that their husbands had injected them with postpartum haemorrhage medication (presumably oxytocin injectable) while a few women reported to have received oral medication (presumably misoprostol tablets) from their husbands. Below are some of the excerpts from the narratives of maternal near misses who were treated by their partners.

“I gave birth from my house by myself. After two hours, bleeding became severe and my husband went somewhere at a drug shop in the trading centre and brought some medicine and injected me. Then the bleeding reduced.” (Narrative: Rural respondent, aged 31 years)

Men also administered injections to their wives while at home following insufficient management of postpartum haemorrhage conditions at health facilities as illustrated below.

“After giving birth, I was taken back to the ward. ...The bleeding was too much. I called the nurse and she gave me an injection. I was discharged but when I got home, the bleeding was too much. My husband went back to Lwamaggwa health center and the midwife gave him an injection which he brought and injected me. After, the bleeding reduced.” (Narrative: Rural respondent, aged 39 years)

In addition to managing postpartum haemorrhage complications, men were also involved in managing retained placenta complications during home births. The excerpt below shows attempts by a husband to expel a retained placenta from the wife’s uterus.

“Labour started and within 2 hours, the baby had been born but the placenta did not come out within the first 30 minutes. I decided to take a concoction of local herbs as my husband kept on massaging my stomach until it came out. It came out after 3 hours.” (Narrative: Rural respondent, aged 23 years)

8.2.3 Decision-making

Decision-making was another role exhibited by men regarding their wives' access to EmOC. Although several women made the decision to seek urgent medical care after onset of life-threatening complications, a considerable proportion of women relied on their husband's decision to seek emergency medical attention. In many instances, the men made the decisions regarding when and where their wives sought EmOC, especially in situations where complications started from home or during home births. Men made decisions on a wide spectrum of issues which determined their wives' utilization of EmOC including: place sought for emergency care (health facility or traditional birth attendant); type of health facility visited (hospital or lower level health facility, government or private); whether the woman was referred to a health facility or a health worker was brought home; and the timing of seeking EmOC especially if complications started at night, among other decisions. Notably, in most situations where men decided the type of health facility to be visited, they opted for a hospital compared to when the women made the decision to seek EmOC as demonstrated by a 34 year urban respondent who suffered from an ectopic pregnancy.

“While at home, I started hurting and I decided to go to Gyaviira clinic. I had a pregnancy test and I was told that I was pregnant yet I was using family planning. It reached a time when I could not handle the situation. My husband decided to take me to Kalisizo hospital where I was taken into the scan and I was told that the pregnancy was ectopic.”

In some situations where husbands were absent, all efforts were made to contact and inform them, who in turn decided the course of action taken. This scenario was best illustrated by a rural respondent who experienced severe malaria leading to abortion complications and postpartum haemorrhage who exclaimed as follows:

“So that very night at around 11.00pm, the abdominal pains were very serious and by 1.00am, the bleeding had become serious. My neighbour called my husband that night and he came and took me to the government health centre.”

8.2.4 Financial support

Provision of financial support was another emerging theme observed from the data. Both maternal near misses and their partners highlighted the pivotal financial role played by men in ensuring their wives’ utilization of EmOC after onset of maternal near miss events. Results from the in depth-interviews showed that men believed that they had a financial obligation to enable their wives’ access to emergency medical services, such that even in cases where men lacked money, they made every effort either to borrow money or to sell some of their assets so that they could enable their wives to urgently access medical attention as shown below.

“The doctor told me to buy certain things that are needed for the operation. The cost was 70,000 Uganda shillings and I did not have the full amount as I had only 20,000 Uganda shillings. So I decided to borrow from a friend.” (IDI – male partner)

Finances were mainly required to buy essential obstetric drugs, pay for transport and emergency obstetric care services such as caesarean section operations. Notably, the financial role was intertwined in almost all forms of male involvement in women’s utilization of EmOC and averting of maternal deaths. Overall, men’s involvement through contraceptive uptake, management of obstetric conditions, making transport arrangements, and decision-making had financial implications. This assertion is best illustrated by extracts from women’s narratives such as:

“My husband was not at home. He works in Sudan but he sent me money.” (Rural woman – IDI)

“My husband rushed and brought tablets”; and “After a day, he sold his shamba of coffee and someone advised us to go to Lwamaggwa health centre.” (Rural woman – IDI)

8.2.5 Social support

From the data, it emerged that men were instrumental in providing social support to their wives through several ways. Social support was illustrated by men accompanying their wives to health facilities, offering emotional support to their wives, and caring for the sick mothers. The majority of the women acknowledged and were grateful for the social support shown by their husbands during the maternal near miss events which they believed was also key in their recovery process. One rural woman was quoted as saying:

“I lost the pregnancy. My husband was supportive but he just did not have money to take me to hospital. But he really wanted to take me, that is why we finally went to the government health centre leaving the Lwamaggwa German private health facility because we had no money. Although we are two women, he cares about me”; while another woman asserted that *“My husband and mother took care of me. I stayed in hospital for a week.”*

In other cases, men offered social support by acting as the linkage between the health system and their wives during emergencies. Rather than men taking their wives to the health facilities when complications arose, they either went to the health facilities and returned home with a health worker to treat their wives or they went to the health facilities and drug outlets in the communities and bought drugs which they administered to their wives. In doing this, men still ensured that their wives utilized skilled medical personnel or accessed essential obstetric drugs to manage the complications.

8.2.6 Transport arrangements to access EmOC

Results showed that men were involved in making transport arrangements after onset of maternal near miss events, thus enabling their wives to access EmOC. This role was mainly evident when women needed to be urgently referred to a health facility and also during referrals from one health facility to another. Excerpts from women's narratives affirm men's role in making transport arrangements.

"At around 6:00 am, I got three contractions and with the third contraction, the baby came out. However, the placenta refused to move out and I started bleeding heavily and I lost consciousness. So my husband hurried and went to call his brother who had a car to take us to the hospital. On reaching the hospital, luckily and even though we got immediate attention and they removed the placenta, I was still put on drip and was also injected to stop the bleeding." (Narrative: Rural respondent, aged 40 years)

8.3 Discussion

Male involvement comprised roles that addressed the proximate causes of maternal deaths through uptake of postpartum permanent or long term contraceptives and management of obstetric complications at community level. Other roles addressed the underlying causes of maternal deaths and included decision-making, social support, financial support and making transport arrangements. All roles enabled the maternal near misses to utilize emergency obstetric care and averted maternal deaths.



Pregnancy is the key risk factor for the occurrence of maternal near miss events and maternal mortality, for without which, adverse maternal outcomes cannot occur. In their model, McCarthy and Maine (1992) stated that prevention of pregnancy is paramount in prevention of severe maternal morbidity and mortality. Overwhelming scientific evidence exists on the role of contraceptive usage in averting maternal mortality in low income countries through reducing the

risk of pregnancies (Ahmed et al., 2012; Campbell and Graham, 2006; Cleland et al., 2012). Men's role in the uptake of permanent or long term contraceptive methods plays an important role in the prevention of maternal deaths. Men's influence in effective uptake of contraceptives is well articulated by Dudgeon and Inhorn (2004), who also noted the challenges sociological research has pointed out towards understanding the circumstances under which men accept or refuse to use contraception. However, Iliyasu et al. (2010) asserted that men's perception of a high risk pregnancy and the preceding conditions influenced postpartum uptake of contraceptives while Miller et al. (1991) noted that motivation of a couple, among other reasons was key in choosing the sterilization contraceptive method. In light of our study findings, the wives' near miss experiences "*motivated*" and influenced the husbands to opt for permanent or long term contraceptive methods. Studies in Nepal (Kamal and Lim, 2010) and Bangladesh (Kamal, 2000) revealed that husband approval was a strong determinant of use of sterilization and long term contraceptive methods. Men's involvement in the uptake of sterilization method is a result of the need for written spousal permission and logistical support (Kamal, 2000). These findings give credence to our study results where sterilization of women in Uganda requires spousal permission and is a paid-for service in health facilities which could partly explain the role of spouses in the uptake of permanent methods in emergency obstetric conditions. Hence with the uptake of permanent and long term contraceptive methods during the postpartum period, couples greatly reduce the risk of pregnancy thereby reducing the women's lifetime risk of maternal death. Overall, although the maternal health benefits of contraceptives and men's role in contraceptive usage are well researched, not much is documented on men's role in postpartum uptake of permanent or long term contraceptive methods after occurrence of complications leading to maternal near miss. Thus this study contributes to our knowledge on men's involvement in postpartum uptake of long term or irreversible contraceptive methods after occurrence of maternal near miss events. However, there is still a need for future studies to

explore the linkage between occurrence of maternal near miss events and postpartum uptake of long-term or irreversible family planning methods.

With postpartum haemorrhage as the leading cause of maternal mortality in Uganda (MoH, 2012) and a high proportion of unskilled deliveries, male involvement in the management of haemorrhage at community level is important in averting maternal deaths. In this study, men were involved in administration of oral postpartum haemorrhage medication (misoprostol). These findings are consistent with previous studies (Prata et al., 2005b; Sanghvi et al., 2010) which showed that oral administration of haemorrhage drugs was effective in treatment of postpartum haemorrhage in the absence of a skilled health worker and injectable (oxytocin). These authors have noted that oral postpartum medication (misoprostol) can easily be accessed by a woman or any of her family members in the community and that she has the ability to correctly adhere to the dosage. Particularly, our study findings are in conformity with a study undertaken in Afghanistan (Sanghvi et al., 2010). This study showed that oral medication for haemorrhage can be correctly administered by semi-literate persons, which is characteristic of our study population, and that involving the husbands or other family members through educative messages on postpartum haemorrhage was key in ensuring that at least a knowledgeable person was present during a home delivery and could take steps to manage or refer the patient. Furthermore Prata et al. (2005b) supports the use of misoprostol especially in low resource areas where most births occur in homes and several delays could hinder utilization of emergency obstetric care.

In addition, men's efforts to administer intramuscular injectables (oxytocin), although inappropriate, showed that men made frantic efforts to save their wives during emergency conditions. No similar studies have been found to either confirm or reject this finding where men administered injectables to their wives, possibly because it was done by non-skilled health

professionals. Previous studies (Flandermeyer et al., 2010; Oladapo et al., 2012; Souza, 2013) have noted that oxytocin medication needs to be administered by a health professional and has to be refrigerated. Thus, our surprising findings highlight a critical gap in the country's health care system and national drug distribution and storage guidelines of essential medicines. These drugs (oxytocin) were sold over-the-counter in drug outlets with no refrigeration facilities and were easily accessible to the end users, while in other cases, men got the injectables from the health facilities. Self-administration of such injectable drugs may have adverse health implications on the women. As it was out of the scope of this study, it is unknown how men were able to correctly administer intramuscular postpartum haemorrhage medication (oxytocin) or the possible health implications resulting from administration of intramuscular injectables by non-skilled individuals.

Men were also involved in fundal massage of the uterus to allow expulsion of the uterus. By doing this, men exhibited knowledge of basic skills in managing a retained placenta which skills, most probably, have been acquired from traditional birth assistants during home deliveries of their wives. Anecdotal reports show that men whose mothers were traditional birth attendants acquired skills to deliver women and thus have the basic skills to enable them to deliver a woman and expel the placenta. This assertion could explain their ability in helping their wives to expel the placenta by massaging the uterus, hence averting maternal deaths.

Men are the household heads and the main decision makers at household level. Hence their role in decision-making processes is important in averting maternal deaths through reducing the delays that cause maternal deaths. Ideally, every woman should be able to make a prompt decision to seek emergency obstetric care at the onset of complications during home births. However, in this study, some of the maternal near misses waited for their husbands before seeking medical attention. This is consistent with previous studies (Odimegwu et al., 2005;

Okechukwu et al., 2007) which showed that majority of the women would decide to seek emergency obstetric care in the absence of the husband while only a few women and men reported the need to wait for husbands before seeking medical attention. A study in Uganda (Kaye et al., 2004a) also revealed that maternal near misses had low decision-making power in seeking health care. Furthermore, scholars (Essendi et al., 2011; Odimegwu et al., 2005) argue that such women who delay to seek emergency obstetric care in the absence of their husbands may be financially constrained and thus have to rely on the financial support from their partners, who in turn decide the course of action taken to manage the complications. The decisions that men made at this critical time saved women's lives after the onset of life-threatening pregnancy complications, hence averting maternal deaths. In addition, in cases where the men took the decisions to seek care, they choose higher health facilities as compared to the lower health facilities opted for by women. This could possibly be as a result of men's higher earning or financial power over that of the women who may be hindered to seek emergency obstetric care at health facilities that offer comprehensive emergency obstetric care.

Men's role in financing their wives' access to and utilization of maternal health services is well known (Odimegwu et al., 2005; Okechukwu et al., 2007; Thapa and Niehof, 2013). In addition, studies on birth preparedness and complication readiness (Iliyasu et al., 2010; Kakaire et al., 2011) showed that men saved finances for obstetric emergencies or complications. However, it remained unclear if they actually provide financial support during their wives' need to access or utilize emergency obstetric care, as only scanty information exists. This study affirms that men continue to provide financial support to facilitate their wives' access to emergency obstetric care, which extends beyond the financial support given in an uncomplicated pregnancy period (prenatal, delivery and postpartum) towards access and utilization of maternal health services. The study results are in conformity with previous studies in Nigeria and Uganda (Iliyasu et al.,

2010; Kaye et al., 2014) which showed that men paid for emergency obstetric care services for their wives. Hence, men, as financiers of women's obstetric care, enabled women to utilize emergency obstetric care and thus reduced delays that often hinder utilization of emergency obstetric care.

Male involvement in providing social and emotional support corroborates previous research which showed that men were more likely to accompany their wives to health facilities during emergencies as compared to non-emergency antenatal, delivery and postpartum periods (Barua et al., 2004; Odimegwu et al., 2005; Thapa and Niehof, 2013). A study in Egypt (Huntington et al., 1995) showed that men's display of emotional support was important in the speedy recovery of post-abortion care patients while a study in Uganda (Kaye et al., 2014) showed that men were also keen on providing social support to their partners who were critically ill. Anecdotal reports show that lack of social support is a barrier to utilization of emergency obstetric care, hence the husbands' role in providing social and emotional support plays an important role in enabling women's utilization of emergency obstetric care.

Lastly, men endeavoured to make transport arrangements to enable their wives' utilization of emergency medical care. This is in conformity with an Nigerian study (Odimegwu et al., 2005). By making transport arrangements, men were able to reduce delays associated with accessing health facilities, hence averting maternal deaths associated with transport delays.

Overall, men showed great resolve to save the women's lives through the various roles they performed. Male involvement largely reduced the barriers women often faced in accessing emergency obstetric care, thus averting maternal deaths.

8.4 Chapter Summary

Overall, men's involvement or role in averting maternal deaths was three-fold. First, it involved roles that prevented occurrence of maternal deaths by reducing the risk of pregnancy through

long term or permanent contraceptive uptake. Secondly, it involved roles that averted direct causes of maternal deaths by managing obstetric complications at household level through administering or provision of essential haemorrhage medication and management of retained placenta. Lastly, it involved supportive roles including decision-making processes during emergencies, financial support to access emergency obstetric care, transport, social or emotional support during the emergency period. The supportive roles address the underlying causes of maternal deaths by reducing the barriers or delays at household level and in accessing emergency obstetric care (transport) making male involvement in emergency obstetric care a critical resource in averting and reducing maternal deaths in this sample of women.

Chapter Nine: Summary, Conclusions and Recommendations

9.1 Introduction

In this chapter, a synthesis of all the information contained in the previous chapters is presented. An overview of the study, summary of the key findings, and conclusions drawn from the study findings are also presented. Additionally, the theoretical and policy implications of the study findings are also discussed along with recommendations and areas for further research.

9.2 Overview

A study on maternal near miss in Uganda is justified by the inadequate level of knowledge on its occurrence and prevalence, risk factors, and its implications for birth outcomes. Yet it is closely linked to other life events such as maternal and neonatal mortality. It is also linked to reproductive health services, availability, accessibility and effectiveness of health systems, household processes such as health care decision-making and the role played by partners of women not only during pregnancy and child birth, but also during actual maternal near miss events. These events greatly contribute to the disease burden among women of reproductive age and have long term health and socioeconomic impacts on women, their children and families. Furthermore, maternal near miss is an indicator of the quality of obstetric care and high maternal and infant mortality in Uganda. Therefore, exploring the dynamics of maternal near miss offers a unique opportunity to increasing our understanding of Uganda's maternal and infant health situation.

Specifically, this study sought to address the following objectives.

- i. Estimate the magnitude of maternal near miss;
- ii. Identify and describe the main causes of maternal near miss in Central Uganda;
- iii. Explore the risk factors of maternal near miss;

- iv. Assess the effect of maternal near miss events on birth outcomes.
- v. Examine the role of male involvement in occurrence and averting of maternal near miss events.

To achieve these objectives, the study employed a cross-sectional retrospective design. Using a multi-stage sampling design, 1,557 women in Rakai district, aged between 15 – 49 years, who had a pregnancy in the three years preceding the survey were interviewed. Both quantitative and qualitative methods of data collection were used. In-depth interviews were conducted with both selected maternal near misses and their partners. Disease and management criteria were used to identify maternal near misses. The main form of analysis was binary logistic regression which was used to predict both risk factors and birth outcomes of maternal near miss, while content analysis was used to analyse qualitative data.

9.3 Summary of study findings

The profile of the study respondents is presented in three parts including a description of women's profile by socio-economic and demographic characteristics, maternal health attributes and birth outcomes. In addition, the summary of the main findings for each of the four main analytical chapters is presented.

9.3.1 Profile of respondents

The median age of the women was 28 years while that of their partners was 34 years; and majority of the women (87.1%) were in union. Overall, the majority of the study respondents were of a low socio-economic status or were economically disadvantaged. Their educational attainment was low, with the highest proportion of both women and their partners having attained primary education. Almost two thirds of the population (65.4%) resided in the rural areas and 61% were engaged in the agricultural sector. The majority of the women in the rural areas were engaged in agricultural activities while half of the women residing in urban areas

were engaged in the non-agricultural sector. About 13% of the women were unemployed. In addition, 18.1% of the women belonged to the poorest households. Women residing in rural areas belonged to the poor households while those in urban areas belonged to mainly the richest households. Furthermore, almost half of the study respondents belonged to the Baganda ethnic group, which is also the largest ethnic group in Uganda and the majority of the respondents were Catholics.

Women were also profiled based on the maternal health attributes. Similar to the age at first birth in Uganda, the median age at first birth in the study population was 18 years. Similarly, almost three quarters of the women were aged between 20 – 34 years at their last pregnancy which occurred in the three years preceding the survey. However, slightly more than a third (34%) of the women reported their last pregnancy to be unwanted and 11.2% experienced violence during their pregnancy. About 3.7% of the respondents disclosed being infected with HIV/AIDS; while 4.3% reported having chronic diseases such as diabetes or hypertension and 21.2% experienced malaria among other diseases during pregnancy. The highest proportion of both pregnancies (gravidity) and number of live births (parity) ranged from 2 – 4. However, almost a quarter of women had a history of termination of pregnancies. Notably, 5.8% of women consumed alcohol often and about 14% of the women had a short birth interval of less than 18 months. Lastly, nearly 16% of the women had a history of maternal near miss events and 5.6% delivered by caesarean section in their last pregnancy.

The majority of the women experienced a live birth, with only 5% of women having a negative birth outcome. Nearly 14% of the new-borns had high birth weight while 8.2% were low birth weight new-borns. The new-born care practices, as recommended by the World Health Organization, were generally poor in the study population with only half of the women initiating breastfeeding in the first hour of birth. While a third of the women practiced dry cord care,

slightly more than a quarter of the women practiced the kangaroo mother care or had skin-to-skin contact with their new-borns immediately after birth. However, while the majority of the women had their new-borns dried and wrapped, only 18.5% had eye care prophylaxis. Additionally 35.8% of new-borns experienced infant complications after birth.

9.3.2 Prevalence, causes and risk factors of maternal near miss

With a maternal near miss prevalence of 278.7 / 1000 pregnancies, 28 women out of every 100 were maternal near misses. The estimated prevalence shows that occurrence of maternal near miss events in Central Uganda is very high.

With divergent causes of maternal near miss across and within countries or populations (Amaral et al., 2011; Kaye et al., 2011b; Moraes et al., 2011), one of the study objectives was to investigate the causes of maternal near miss in Central Uganda. Several diseases or pregnancy conditions were found to cause maternal near miss complications in the study population including: postpartum haemorrhage, retained placenta, obstructed labour, prolonged labour, sepsis, abortion complications, ectopic pregnancies, ruptured uterus and hypertensive disorders or pre-eclampsia. However, haemorrhage accounts for more than half of maternal near miss events in this study population. Similarly, the most prevalent causes of maternal near miss events were postpartum haemorrhage with a prevalence of 170/ 1000 pregnancies, followed by retained placenta, obstructed labour, prolonged labour, sepsis and severe malaria (9.6/ 1000 pregnancies) respectively.

Preliminary bivariate analysis on the risk factors of maternal near miss revealed differentials across several socio-demographic and maternal health attributes. Maternal near misses had a low socio-economic status as most were poor, and had primary or no education. A similar socio-economic status pattern was also observed among their partners. Similarly, the majority were employed in the agricultural sector and resided in rural areas. Additionally, most of the maternal

near misses were in union and were of non-Baganda ethnicity. More than a third of maternal near misses were affiliated to other Christian groups and had no spousal age difference.

The study also found that maternal near misses were predominant among older women (35+ years), women with unwanted pregnancies, high birth order, high gravidity and low parity. Additionally, women who experienced violence, danger signs, and had a history of previous pregnancy complications and pregnancy termination had a higher risk of maternal near miss events. Maternal near misses were also higher among women with HIV/AIDS, and chronic diseases such as hypertension and diabetes conditions and malaria.

Bivariate statistical analysis showed that all the above socio-economic and demographic characteristics – except education and spousal age difference - were significantly associated with occurrence of maternal near miss events ($p < 0.05$). While maternal health attributes that were significantly associated with events of maternal near miss were birth order, pregnancy termination, timing of pregnancy, history of pregnancy complications, malaria and experience of pregnancy danger signs ($p < 0.05$).

Results from the multivariate analysis, which was used to ascertain the risk factors of maternal near miss in the study population showed that:

- i. Women with unwanted pregnancies are more likely to experience maternal near miss events compared to women with planned pregnancies.
- ii. Women who experience any of the pregnancy danger signs are at a higher risk of experiencing maternal near miss complications compared to those who do not experience any pregnancy danger sign.
- iii. Women with a history of maternal near miss complications are also more likely to experience maternal near miss events in their subsequent pregnancies compared to their counterparts who did not experience a previous complication.

- iv. The first birth increases the woman's chances of experiencing maternal near miss complications compared to those of birth order 2 – 4.
- v. Women's ethnicity plays a strong part in the occurrence of maternal near miss events, with women of Banyokore ethnicity living in Central Uganda more likely to experience maternal near miss events compared to Baganda women.
- vi. Partner attributes also influence the occurrence of maternal near miss events. Particularly, men's education was found to be a significant predictor or risk factor for occurrence of maternal near miss events. Women whose partners had primary education were at a greater risk of experiencing maternal near miss complications compared to women whose partners had secondary education.

9.3.3 Birth outcomes of maternal near misses

A summary of the main findings on the death rates and birth outcomes of maternal near misses in the study population revealed that:

- i. Perinatal death rates are very high in the study population (24.7 deaths/ 1000 pregnancies).
- ii. Similarly, neonatal death rates are also high (10.8 deaths/ 1000 live births) and accounted for more than half of the infant death rates (17.6 deaths/ 1000 live births).
- iii. Early pregnancy losses and still births (negative birth outcomes) are more likely to occur among maternal near miss compared to having live births.
- iv. Maternal near misses are more likely to deliver very big or high birth weight infants (> 4500g) compared to non-maternal near miss cases who gave birth to infants with average size or normal weight infants (2500 – 4499g).
- v. Maternal near misses exhibited poor new-born care practices including late initiation of breastfeeding within the first hour and drying and wrapping of new-borns

immediately after birth. Maternal near misses are more likely not to initiate breastfeeding within the first hour of birth compared to non-maternal near misses. Additionally, they were more likely not to have their new-borns dried and wrapped immediately after birth.

- vi. Unlike other new-born care practices, eye care prophylaxis was significantly associated with maternal near misses.
- vii. No significant association was found between maternal near miss status and new-born care practices such as dry cord care and kangaroo mother care.

9.3.4 Male involvement in women's utilization of emergency obstetric care and averting of maternal deaths

The study findings showed that partners play a central role in women's utilization of emergency obstetric care and averting of maternal deaths after the onset of maternal near miss events.

Men's roles were categorized into six areas of involvement as shown below:

- i. Men played a key role in utilization of permanent or long term family planning methods by their partners, after the occurrence of maternal near miss events.
- ii. Men were involved in managing of obstetric complications that occurred during home births. This was done through administering of haemorrhage medication and abdominal massage in case of retained placenta.
- iii. Decision-making regarding when and where to seek emergency obstetric care was another key role played by men after the onset of maternal near miss events.
- iv. Provision of financial support was another role observed from the data. These finances were fundamental in accessing emergency obstetric care services.
- v. Men provided social support to their partners by accompanying their wives to health facilities, offering emotional support and caring for the sick mothers.

- vi. Results also showed that men were involved in making transport arrangements after onset of maternal near miss events, thus enabling their wives to access emergency obstetric care.

9.4 Conclusions

This study, which set out to examine several aspects of maternal near miss in Central Uganda, identified the prevalence, causes, risk factors and birth outcomes of maternal near misses, in addition to partner's roles during maternal near miss events. Based on the study findings, the following conclusions were drawn.

The study profile of the respondents is similar to the observed pattern of women's socio-economic and demographic characteristics in Central Uganda. Likewise, similar patterns are observed across the maternal health attributes and birth outcomes of the study population with regional and national estimates. Therefore, it can be concluded that the study findings are representative of the general population and maternal near miss situation in Central Uganda.

The prevalence of maternal near miss morbidity in Central Uganda is high. The study prevalence is higher than previous estimates of maternal near miss in Uganda. This shows that estimation of maternal near miss morbidity in a hospital setting relying solely on the organ dysfunction criterion under-estimates the magnitude of maternal near miss morbidity in Uganda and elsewhere in poor resource or low income countries. Therefore, a community based study provides better estimates of maternal near miss morbidity in low-resource settings such as Uganda where health facilities deliveries are few and many women do not report to health facilities after birth. Additionally, the high prevalence of maternal near miss is mainly caused by postpartum haemorrhage. Other prevalent causes of maternal near miss in the study population included retained placenta, obstructed labour, prolonged labour, sepsis and severe malaria.

Occurrence of maternal near miss in Central Uganda is influenced by several risk factors. These include having unwanted pregnancy, history of maternity complications, and experience of pregnancy danger signs, first birth order, Banyakore ethnicity, and partner's primary education. The findings on ethnicity as a predictor of maternal near miss events are a pointer to the cultural influence in maternal health seeking behaviour, which require further investigation. Also, partner attributes greatly influence occurrence of maternal near miss and should, therefore, not be excluded when predicting risk factors of maternal near miss.

The study also found that men play a key role in women's access to emergency obstetric care, thereby averting maternal deaths. Men's roles can best be summarized into three domains: roles that prevent or reduce pregnancy risk through family planning uptake; roles directly related with management of obstetric complications; and supportive roles that enable women's access to emergency obstetric care.

Regarding the effect of maternal near miss events on birth outcomes, this study concluded that maternal near miss events are closely associated with poor birth outcomes. These poor birth outcomes include negative birth outcomes, high birth weight infants, and poor new-born care practices (late initiation of breastfeeding and failure to dry and wrap infants after birth). However, only one new-born care practice - eye care prophylaxis - is common among maternal near misses.

9.4.1 Literature and theoretical implications

The theoretical and literature review on this topic was inconclusive especially in Uganda where the prevalence was unknown and culture was found to play a strong part in maternal health seeking behaviours of women. However, the study results are, in part, similar to other findings elsewhere and thus contribute to the scientific body of knowledge on maternal near miss in Uganda and in sub-Saharan Africa. This study provides population estimates of maternal near

miss morbidity, which aspect has previously not been examined in Uganda in particular and in many developing countries in general. The study therefore provides a bench mark for the importance of using community/population based approaches in better understanding and estimating maternal near miss in future population surveys on maternal near miss morbidity in Uganda and elsewhere.

This study also contributes to the determinants of maternal morbidity and mortality framework by McCarthy (1992) by expanding the scope of risk factors influencing occurrence of maternal near miss morbidity. Notably, this study shows that ethnicity and partner attributes are some of the background characteristics that influence occurrence of maternal near miss events, which characteristics were not included in earlier theoretical frameworks. Additionally, the study findings affirm the postulations of the Three Delays model regarding men's roles in women's access to emergency obstetric care. Men played a key role in averting delays in seeking health care at the household level and in accessing transport means to health facilities which were found to be possible contributors to the incidence of maternal near miss events.

9.4.2 Policy Implications

Overall, the study findings have implications for the maternal and child health policy environment in Uganda in particular and in other countries where resources for primary health care and reproductive health care services are limited. Although Uganda has a strong health policy environment, these study findings reveal that there are serious gaps in implementation of existing health care strategies in the country which explains the high maternal near miss rate and poor birth outcomes observed in this study. This evidence points to the fact that emphasis on reducing maternal deaths must begin by improving the overall health care services for women and addressing issues concerning maternal near miss morbidity. Several implications for policy

concerning increased utilization of health facilities, increased utilization of family planning methods and access to emergency obstetric care are supported by the findings of this study. The proposed strategies can contribute to achieving Uganda's Roadmap for accelerating the reduction in maternal and neonatal morbidity and mortality (2015-2020). Policy-makers at both national and district level can benefit from the suggested recommendations.

9.5 Recommendations

Based on the study findings and conclusions, a set of recommendations have been proposed. The recommendations presented are chapter specific and based on the main analytical chapters.

9.5.1 Recommendations to address the high prevalence, causes and risk factors of maternal near miss

Maternal near miss complications are preventable and avoidable. The proposed recommendations or strategies are envisaged to contribute greatly to reduction of maternal near miss events not only in the study population and region, but also in other areas of Uganda where maternal near miss cases occur.

With haemorrhage as the main cause of maternal near miss events, The Ministry of Health should promote prophylaxis for postpartum haemorrhage for all women immediately after birth by including it as part of the health policy implementation strategy. The Ministry of Health can implement and achieve this strategy through several ways.

- i. District Health Officers or Heads of health facilities may offer support supervision and monitoring of midwives to ensure that prophylaxis for postpartum haemorrhage is implemented for every woman who delivers at a health facility.
- ii. The Ministry of Health should ensure that health facilities have the recommended drugs for management of intra-partum and postpartum haemorrhage by ensuring there are no drug outages and stock-outs.

- iii. The Ministry of Health should develop the capacity of Community Health Workers to respond immediately and effectively to cases of maternity complications within their jurisdictions.
- iv. Distribution of misoprostol medication should be done as part of efforts to manage haemorrhagic complications that occur during home births. Distribution of these drugs can be done through health workers as part of antenatal care or by Community Health Workers. This will involve sensitization of women regarding its storage and usage. Misoprostol can be used by women as part of prophylaxis or for quick uterine contractions immediately after birth preventing severe blood loss or even managing postpartum haemorrhage complications that may occur in the communities.
- v. Women at risk of experiencing postpartum haemorrhage, based on their history of previous haemorrhagic complications, should have their blood group or type ascertained during antenatal care. This should reduce delays at health facilities in management of intra-partum and postpartum haemorrhage in cases where blood transfusion may be required to manage the complication.
- vi. Promotion of family planning methods will reduce the occurrence of maternal near miss events. The Ministry of Health should increase availability and access to family planning services and method mix so as to increase its usage by both women and men. Use of family planning will reduce the risk of both unwanted pregnancies, and subsequent pregnancies, in high-risk women.
- vii. Continuous efforts should be made in sensitizing women to have supervised deliveries at appropriate health facilities with at least basic obstetric care services. This can be done during antenatal care visits or through community mobilization and sensitization programs by Community Health Workers.

- viii. There is a need for improved access to emergency obstetric care. Deliberate efforts should be made by health facilities to have all the necessary supplies or essential medicines needed in the management of maternal near miss complications.
- ix. Antenatal care counseling should prioritize women at high-risk of experiencing maternal near miss through tailor-made counseling. Additionally, there is a need for intensified counseling of women, their spouses and family members on pregnancy danger signs and maternal near miss complications during antenatal care visits and community programmes. This will enable women to seek care on manifestation of these pregnancy danger signs or complications.
- x. The maternal health services should adopt the rights based approach more effectively and specifically target minority groups for support.
- xi. Lastly, male involvement in maternal health care should be promoted, encouraged and strengthened by developing their capacity to respond timeously so as to reduce occurrence of maternal near miss events.

9.5.2 Recommendations to improve birth outcomes of maternal near misses

Below is a set of recommendations that can be implemented to achieve better infant outcomes.

- i. Early detection of maternal near miss risk factors during antenatal care, and improved access to high quality obstetric care will result in prevention and management of maternal near miss events. This will in turn lead to improved birth outcomes.
- ii. There is need for early detection of big or high-weight foetuses during antenatal care so that women at risk of delivering very big babies have planned operative deliveries and at appropriate obstetric health care facilities.
- iii. Health care providers should assist maternal near misses to initiate breastfeeding at the earliest opportunity during the first hour after birth.

- iv. Health providers should nurture thermal protection through immediate drying and wrapping of babies born to maternal near misses.
- v. Eye care prophylaxis should not only be administered to new-borns with eye infections but to all new-borns as stipulated in the national guidelines. Therefore, health workers should be monitored and supervised to see that they administer eye care treatment to all new-borns.
- vi. Antenatal care counselling can also be used as a forum for sensitizing women on the recommended new-born care practices, especially in the event of maternal near miss complications.
- vii. Skilled birth attendance and postnatal care should also be encouraged so that poor infant outcomes can be averted through timely access to emergency obstetric care for the new-borns who may develop complications.

9.5.3 Recommendations to address male involvement in aversion of maternal near miss complications or access to emergency obstetric care

Male involvement in reproductive health care in general and emergency obstetric care in particular is critical in averting and reducing maternal deaths in Uganda. Based on the study findings, the following recommendations are proposed:

- i. Tailor-made counselling on uptake of permanent or long term contraceptive methods for maternal near misses and their partners during the postpartum period offers a window of opportunity for couple discussion and increased uptake of contraceptives among high risk women.
- ii. Men should be trained in home-based-life-savings skills (HBSLSS) so as to equip them with emergency life-saving measures. These skills will equip men with

knowledge of home management of life-threatening complications, prompt decision-making and referral of women to the health facility.

- iii. Community sensitization of men on the dosage and administration of the recommended oral medication for management of postpartum haemorrhage at the community level should be done.
- iv. Maternal health programmes should consider community distribution of postpartum haemorrhage drugs (misoprostol) during pregnancy through Community Health Workers and men as partners of women, in administering these drugs in case of haemorrhagic emergency complications.
- v. Men should also be sensitized on the benefits of health facility or supervised deliveries and the need for prompt referral of their wives at the onset of complication in lieu of buying drugs from outlets. Additionally, they should be encouraged to ensure that they remain prepared to take their expectant wives/partners to deliver in health facilities in good time.
- vi. Men's supportive roles during emergency obstetric care should be enhanced through counselling on couple decision-making; having a birth plan and emergency fund for accessing emergency obstetric care; and increased social support for their wives.

9.5.4 Areas for further research or consideration

As already stated in the significance of the study, women occupy a central role in the social and economic wellbeing of households and their health has significant ramifications on the entire wellbeing of the household. The focus on selected aspects of maternal near miss events, which this study examined, raised new questions of research interests. These included:

- i. The impact of maternal near miss on the health status of women;
- ii. The impact of maternal near miss on the health status of other household members;
- iii. The impact of maternal near miss on household productivity;
- iv. Intervention studies to mitigate the impact of maternal near miss on the health and productivity of households; and
- v. The role of women's partners in occurrence of maternal near miss events.

Lastly, data on maternal near miss morbidity should be included in the demographic health surveys or in maternal audits done in communities. This information will be useful in providing national estimates on the magnitude of maternal near miss in countries where traditional and indigenous maternity practices such as home deliveries are still common.

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APPENDICES



Appendix 1: Individual Questionnaire

**Individual Questionnaire
Risk Factors and Outcomes of Maternal Near Miss in Uganda: A Community Based
Study**

IDENTIFICATION				
District	RAKAI			A
Sub/County				
Parish Name				
Village Name				
Interviewer Number				
Questionnaire Number				
Household ID				
Location of sub county	1 – Urban 2- Rural			
Household Listing ID				
Name of Respondent				
	Interviewer Visits			Final visits
	1	2	3	
Date				
Time of start (24 hour clock)				
Time at end of interview				
Result of visit				
Result codes: 1-Completed 2-Refused 3-Not at home 4-Interview terminated 5-Household not found 6-Other (specify).....				
Language used: 1 – English; 2 - Luganda; 3 – Runyakore; 4 – Rukiga; 5 – Other (specify)				
Supervisor's name				
Data Entrant				

Checklist

Have you ever had a pregnancy in the last three years? Age?

1. Woman **has had** a pregnancy in the last 3 years and is aged between 15 - 49 years

Yes No

If answer to statement 1 is yes, proceed to get informed consent from respondent.

Confidential: Information to be used for research purposes

Informed Consent

Hullo madam, my name is We are conducting a study on maternal health in this community. The purpose of this study is to investigate factors and outcomes associated with severe ill-health among women during pregnancy, childbirth and after delivery. We are speaking with women who had a pregnancy in the last three years in this community. The information collected will be used to make recommendations that will guide policy making and improve interventions in the area of maternal and child health in the country.

You have been selected for interview by random or by chance. We would very much appreciate your participation. Participation in the study is voluntary and you can stop the interview at any time you feel like. The information got will be strictly kept confidential and will only be used for research purposes. The interview will last about 30 - 40 minutes.

Do you have any questions that you would like to ask?

If you have any more questions about this study, please contact:

Ms Elizabeth Nansubuga
 Makerere University
 Department of Population Studies
 Tel; 0772 382377

May I begin the interview now? 1 - Yes 2 – No (*circle appropriate response*)

Signature of Interviewer

SECTION 1: RESPONDENT'S BACKGROUND

First, I would like to ask you questions about yourself and your household.

No.	Questions	Responses	Skip
101.	In what month and year were you born?	Month <input type="text"/> <input type="text"/> Don't Know Month. 98 Year <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> Don't Know Year9998	
102.	How old are you? (<i>Compare and correct 101 and/or 102 if inconsistent</i>)	Age in completed years <input type="text"/> <input type="text"/>	
103.	What is the highest level of education attained?	None.....1 Primary.....2 O'Level.....3 A'Level.....4 Tertiary.....5	→ 105

		University.....6	
104.	What is the highest (class/year) you completed at that level?	Class/Year..... <input type="text"/> <input type="text"/>	
105.	What is your religion?	Catholic.....1 Anglican.....2 Pentecostal.....3 Muslim.....4 Others (specify).....5	
106.	What is your tribe?	Muganda.....1 Munyakore.....2 Musoga.....3 Mukiga.....4 Munyarwanda.....5 Others (Specify).....6	
107.	Are you engaged in any form of economic activity?	Yes.....1 No.....2	
108.	What is your main occupation?	Subsistence Farmer.....1 Commercial Farmer.....2 Fishing.....3 Technical works.....4 Skilled Labour / Professional.....5 Bussiness woman.....6 Shop Attendant.....7 Casual Labourer.....8 Service Industry (Hotelier, etc).....9 House wife.....10 Bar / Restaurant attendant.....11 Alcohol brewer.....12 Unemployed.....13 Others (Specify).....14	→110
109.	Are you paid in cash or kind for this work or are you not paid at all?	Cash Only.....1 Cash and Kind.....2 In Kind Only.....3 Not Paid.....4	
110.	What is your current marital status?	Single.....1 Married /Living Together.....2 Widowed.....3 Divorced/Separated.....4	→116 →116 →116
111.	What is the highest level of education your husband / partner attained?	None.....1 Primary.....2 O'Level.....3 A'Level.....4 Tertiary.....5	→113

117.	What type of fuel does your household mainly use for cooking?	Electricity.....1 LPG/Natural Gas.....2 Biogas.....3 Kerosene/Paraffin.....4 Charcoal.....5 Firewood.....6 Straw/Shrub/Grass.....7 Animal Dung.....8 No food cooked in household.....9 Other (specify).....10	
118.	Main material of the floor (Observe)	Natural Floor Earth/Sand.....1 Earth and Dung.....2 Finished Floor Polished Wood.....3 Tiles.....4 Bricks.....5 Cement.....6 Stones.....7 Others (specify).....8	
119.	Main material of the roof (Observe)	Natural Roofing Thatched.....1 Mud.....2 Finished Floor Wood/Planks.....3 Iron sheets.....4 Asbestos.....5 Tiles.....6 Tin.....7 Cement.....8 Others (specify).....9	
120.	Main material of exterior walls (Observe)	Natural Walls Thatched/Straw.....1 Rudimentary Walls Mud and Poles.....2 Unburnt bricks.....3 Unburnt bricks with plaster.....4 Burnt bricks with mud.....5 Finished Walls Cement blocks.....6 Stone.....7 Timber.....8 Burnt bricks with cement.....9 Burnt bricks with plaster.....10 Plastered wall with cement.....11 Others (specify).....12	

121.	Does any member of this household own?			
			Yes	No
	a.	A bicycle?	1	2
	b.	A motorcycle/motor scooter?	1	2
	c.	An animal drawn-cart?	1	2
	d.	A car or truck?	1	2
	e.	A boat with a motor	1	2
	f.	A boat with no motor	1	2
122.	Does any member of this household own any agricultural land?	Yes.....1 No.....2		→124
123.	How many acres of agricultural land do members of this household own?	Acres..... <input type="text"/> <input type="text"/> <input type="text"/> 95 and above.....95.0 Dont Know/ Don't Remember.....98.0		
124.	How many of the following animals/birds does this family own? If none, enter 00, if more than 95, enter 95 and if unknown, enter 98.	Local cattle..... <input type="text"/> <input type="text"/> Exotic cattle..... <input type="text"/> <input type="text"/> Goats..... <input type="text"/> <input type="text"/> Sheep..... <input type="text"/> <input type="text"/> Pigs..... <input type="text"/> <input type="text"/> Chickens..... <input type="text"/> <input type="text"/> Horses/Donkeys/Mules..... <input type="text"/> <input type="text"/> Other (specify)..... <input type="text"/> <input type="text"/> Others I (Specify)..... <input type="text"/> <input type="text"/>		

SECTION 2: MATERNAL FACTORS & REPRODUCTIVE HISTORY

Now I would like to ask you some questions about your last pregnancy.

201.	How old were you at your first birth? (If respondent has had only one pregnancy/birth, record same information in 202.)	Age in completed years <input type="text"/> <input type="text"/>	
202.	How old were you at your last pregnancy?	Age in completed years <input type="text"/> <input type="text"/>	
203.	Before this pregnancy, were you using any contraceptives?	Yes.....1 No.....2	
204.	At the time of this pregnancy, did you want to get pregnant <u>then</u> , did you want to wait until <u>later</u> , or did you <u>not want</u> to have any more children at all?	Then.....1 Later.....2 Not at all.....3	→206 →206
205.	How much longer would you have wanted to wait?	Months.....1 <input type="text"/> <input type="text"/> Years.....2 <input type="text"/> <input type="text"/> Don't Know.....998	
206.	During this pregnancy, how often	Never.....1	

	did you take alcohol?	Rarely.....2 Often.....3 Very often.....4	
207.	Did you ever experience any form of violence (physical / sexual violence) during this pregnancy?	Yes.....1 No.....2	→209
208.	If yes, which form of violence?	Physical (Beaten/Kicked/Slapped).....1 Sexual (Rape).....2 Other (Specify).....3	
209.	How many pregnancies have you had in total? (If currently pregnant, include pregnancy)	Number..... <input type="text"/> <input type="text"/>	
210.	How many deliveries have you had in total?	Number..... <input type="text"/> <input type="text"/>	
211.	Have you ever had a pregnancy that ended up in a miscarriage or abortion / was terminated?	Yes.....1 No.....2	→213
212.	How many?	A. Miscarraiges..... <input type="text"/> <input type="text"/> B. Abortions..... <input type="text"/> <input type="text"/> C. Ectopic pregnancies..... <input type="text"/> <input type="text"/>	
213.	Have any of your pregnancies resulted in a baby that was born dead?	Yes.....1 No.....2	→215
214.	How many of these pregnancies resulted in a baby that was born dead / still birth?	Still births..... <input type="text"/> <input type="text"/>	
215.	Have any of your pregnancies resulted in a baby that was born alive? <i>(Probe for any baby who cried or showed any signs of life at birth but may have later died.)</i>	Yes.....1 No.....2	→217
216.	How many of these pregnancies resulted in a live birth?	Live births..... <input type="text"/> <input type="text"/>	
217.	CROSS CHECK: * Sum of 212, 214 and 216 should equal to number stated in 209. Correct any inconsistencies. ** The sum in 214 and 216 should equal to the sum in 210. Correct any inconsistencies.		
218.	Did this last pregnancy result in a live birth, still birth or was it terminated? If live birth : In what month and year did it occur? If still birth : In what month and year did it occur? If pregnancy was terminated : In	Live Birth01 Month..... <input type="text"/> <input type="text"/> Year..... <input type="text"/> <input type="text"/> Still Birth02 Month..... <input type="text"/> <input type="text"/> Year..... <input type="text"/> <input type="text"/> Pregnancy Terminated03 Month..... <input type="text"/> <input type="text"/>	

	what month and year did it occur?	Year.....	
219.	What is the birth order of (name) / this pregnancy?	First.....1 Second.....2 Third.....3 Fourth.....4 Fifth.....5 Sixth.....6 Others (Specify).....7	→221
220.	What is the spacing between (name) / this pregnancy and the previous birth order? (<i>Record in months</i>)	Months..... <input type="text"/> <input type="text"/> <input type="text"/>	
221.	Did you have any chronic condition /disease prior to this pregnancy? (<i>Probe for diseases like HIV, pressure, diabetes, heart disease, asthma, liver, kidney problems, epilepsy, sickle cells</i>)	Yes.....1 No.....2	→224
222.	Which diseases or health problems did you have before this pregnancy? (<i>Probe and List all mentioned by respondent</i>)	HIV/AIDS.....A Hypertension / Pressure.....B Diabetes.....C Heart disease.....D Liver problems.....E Kidney problems.....F Epilepsy.....G Sickle Cells.....H Asthma.....I Others (Specify).....J Others1 (Specify).....K	→225
223.	Which of the following diseases / conditions did you suffer from during this pregnancy? (Circle all mentioned)	Hypertension / Pressure.....B Diabetes.....C Heart disease.....D Liver problems.....E Kidney problems.....F Epilepsy.....G Sickle Cells.....H Asthma.....I Others (Specify).....J Others1 (Specify).....K	
224.	Do you think you are at risk of having HIV/AIDS?	Yes.....1 No.....2 Dont Know.....8	
225.	Are you on any long term medication?	Yes.....1 No.....2	→301
226.	What medication are you taking?	Septin.....1 ARVs.....2 Others (specify).....3 Others1 (specify).....4	

SECTION 3: ANTENATAL, DELIVERY & POSTPARTUM CARE																											
Now, I would like to ask you questions related to the care you received during pregnancy, childbirth and after childbirth.																											
301.	During the last pregnancy, did you see anyone for antenatal care?	Yes.....1 No.....2	→317																								
302.	Whom did you see for antenatal care during this pregnancy? (<i>Probe: Anyone else?</i>) (Record all mentioned)	Doctor.....A Nurse / Midwife.....B Medical Assistant/Clinical officer....C Nursing Aide.....D Traditional Birth Attendant.....E Other (specify).....F																									
303.	Where did you receive antenatal care for this pregnancy? (<i>Anywhere else?</i>)	Respondent/ TBA's home.....A Government hospital.....B Government health center.....C Private hospital.....D Private health center.....E Drug shop / dispensary.....F Other (specify).....G																									
304.	Who made the final decision regarding the place of antenatal care attendance?	Woman/Respondent:.....1 Husband.....2 Joint decision.....3 Mother/Mother-in-law.....4 Respondent's family member.....5 Friend / Neighbour.....6 Other (specify).....7																									
305.	How many months pregnant were you when you first received antenatal care for this pregnancy?	Months..... <input type="text"/> <input type="text"/> Dont Know/Dont Remember.....98																									
306.	How many times, did you receive antenatal care during this pregnancy?	Number of times..... <input type="text"/> <input type="text"/> Dont Know/ Dont Remember.....98																									
307.	How many months pregnant were you when you last received antenatal care for this pregnancy?	Months..... <input type="text"/> <input type="text"/> Dont Know/ Dont Remember.....98																									
308.	As part of your antenatal care during this pregnancy, were any of the following done at least once?	<table border="1"> <thead> <tr> <th></th> <th>Yes</th> <th>No</th> <th>DK</th> </tr> </thead> <tbody> <tr> <td>a. Were you weighed?</td> <td>1</td> <td>2</td> <td>8</td> </tr> <tr> <td>b. Was your blood pressure measured?</td> <td>1</td> <td>2</td> <td>8</td> </tr> <tr> <td>c. Did you give a blood sample?</td> <td>1</td> <td>2</td> <td>8</td> </tr> <tr> <td>d. Did you give a urine sample?</td> <td>1</td> <td>2</td> <td>8</td> </tr> <tr> <td>e. Were you given a tetanus injection?</td> <td>1</td> <td>2</td> <td>8</td> </tr> </tbody> </table>			Yes	No	DK	a. Were you weighed?	1	2	8	b. Was your blood pressure measured?	1	2	8	c. Did you give a blood sample?	1	2	8	d. Did you give a urine sample?	1	2	8	e. Were you given a tetanus injection?	1	2	8
	Yes	No	DK																								
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d. Did you give a urine sample?	1	2	8																								
e. Were you given a tetanus injection?	1	2	8																								

	f. Where you given iron tabs?	1	2	8	
	g. Did you buy any iron tabs?	1	2	8	
	h. Did you take any drugs for intestinal worms?	1	2	8	
	i. Where you given antimalarials?	1	2	8	
	j. Did you buy any antimalarials?	1	2	8	
309.	If 308a is Yes, Ask: Were you told the results?	Yes.....1 No.....2 Dont Know/ Dont Remember..... 98			→311 →311
310.	What were the results?	Kgs from recall..... Dont Know/ Dont Remember.....98			
311.	If 308b is Yes, Ask: Were you told the results?	Yes.....1 No.....2 Dont Know/ Dont Remember..... 98			→313 →313
312.	What were the results?	High blood pressure.....1 Normal blood pressure.....2 Low blood pressure.....3 Dont Know/Dont Remember.....8			
313.	If 308f or g is Yes, Ask: For how many days did you have to take the iron tabs?	Days..... <input type="text"/> <input type="text"/> Dont Know/Dont Remember.....98			
314.	During (any of) your antenatal care visit(s), were you told about the danger signs of pregnancy complications?	Yes.....1 No.....2 Dont Know/Dont Remember.....8			→316 →316
315.	Which danger signs of pregnancy / pregnancy complications were you told about?			
316.	During (any of) your antenatal care visit(s), were you told where to go in case you developed any pregnancy complications?	Yes.....1 No.....2 Dont Know/Dont Remember.....8			} 318
317.	Why didn't you attend antenatal care or see anyone for antenatal care? (Multiple response)	It was not necessary.....A Health facility too far.....B Lack of finances.....C Others (Specify).....D Others1 (Specify).....E			
318.	During pregnancy, did you experience any of the following: (READ OUT)				
			Yes	No	
	a. Swelling of the face?	1	2		

	b. Swelling of the leg?	1	2			
	c. Difficulty with vision during day light / Blurred vision?	1	2			
	d. Fits?	1	2			
	e. Paleness?	1	2			
	f. Difficult breathing / Shortness of breath when carrying out regular activities?	1	2			
	g. Lose weight?	1	2			
	h. Fever?	1	2			
	i. Bleeding?	1	2			
	j. Cough?	1	2			
	k. Night blindness?	1	2			
	l. Severe headache?	1	2			
	m. Convulsions?	1	2			
	n. Loss of consciousness?	1	2			
	o. Severe weakness?	1	2			
	p. Severe abdominal pains?	1	2			
	q. Accelerated / reduced fetal movement?	1	2			
	r. Water breaks without labour?	1	2			
	s. Excessive vomiting	1	2			
	t. Malaria	1	2			
	u. Others (Specify).....	1	2			
CHECK 218, IF PREGNANCY WAS TERMINATED (code 03), THEN SKIP TO 401.						
319.	Who assisted with the delivery? Multiple response <i>(Anyone else?)</i>	Doctor.....A Nurse / Midwife.....B Medical Assistant/Clinical officer....C Nursing Aide.....D Traditional Birth Attendant.....E No One.....F Other (specify).....G				
320.	Where did you give birth from? <i>(Write down name and location of health facility)</i>	Home/TBA's home.....1 Government hospital.....2 Government health center.....3 Private hospital.....4 Private health center.....5 Other (specify).....6				→323 → 323
321.	What means of transport did you use to reach this health facility?	Private car.....1 Taxi/Bus.....2 Ambulance.....3 Motorcycle.....4 Bicycle.....5				



		Boat.....6 Cart.....7 On Foot.....8 Others (Specify).....9					
322.	In general, how long did it take you to reach this health facility? <i>(If less than one and half hours, record in minutes, otherwise, record in hours)</i>	Hours.....1 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> Minutes.....2 Dont Know / Dont Remember.....98					} 324
323.	Why didn't you give birth from a health facility? (Multiple response)	Long distance.....A No transport.....B Lack of finances.....C Rude health workers.....D No one to escort me to health facility.E Preference for TBAs.....F Husband refused.....G Not necessary.....H Lack of required birth materials.....I Baby came out fast.....J Others (Specify).....K Others1 (Specify).....L					
324.	Who made the final decision about the choice of place of delivery?	Respondent.....1 Husband.....2 Joint decision.....3 Mother / Mother-in-law.....4 Respondent's family member.....5 Friend / Neighbour.....6 Others (specify)..... 7					
325.	Who accompanied you to the place of delivery? <i>(Record all applicable responses)</i>	Husband.....A Mother / Mother-in-law.....B No one.....C Respondent's family member.....D Friend / Neighbour.....E Traditional Birth Attendant.....F Others (specify).....G					
326.	How was (name) delivered?	Spontaneous vaginal delivery.....1 Assisted vaginal delivery.....2 Induced vaginal delivery.....3 Elective/ Planned caesarean.....4 Emergency caesarean.....5	} 328				
327.	What prior health problems or conditions led to this caesarean (planned/ emergency) sectionABC	} 329				

	delivery?																																
328.	Have you ever given birth by caesarean section?	Yes.....1 No.....2	→330																														
329.	How many deliveries have you had by caesarean section?	Number..... <input type="text"/> <input type="text"/>																															
330.	During labour and childbirth , did you experience any of the following: (READ OUT)																																
		<table border="1"> <thead> <tr> <th></th> <th>Yes</th> <th>No</th> </tr> </thead> <tbody> <tr> <td>a. Severe bleeding?</td> <td>1</td> <td>2</td> </tr> <tr> <td>b. Severe headache?</td> <td>1</td> <td>2</td> </tr> <tr> <td>c. Convulsions?</td> <td>1</td> <td>2</td> </tr> <tr> <td>d. High Fever?</td> <td>1</td> <td>2</td> </tr> <tr> <td>e. Loss of consciousness?</td> <td>1</td> <td>2</td> </tr> <tr> <td>f. Labour lasting > 12 hours?</td> <td>1</td> <td>2</td> </tr> <tr> <td>g. Placenta not delivered 30 minutes after baby?</td> <td>1</td> <td>2</td> </tr> <tr> <td>h. Others (Specify).....</td> <td>1</td> <td>2</td> </tr> <tr> <td>i. Others I (Specify).....</td> <td>1</td> <td>2</td> </tr> </tbody> </table>		Yes	No	a. Severe bleeding?	1	2	b. Severe headache?	1	2	c. Convulsions?	1	2	d. High Fever?	1	2	e. Loss of consciousness?	1	2	f. Labour lasting > 12 hours?	1	2	g. Placenta not delivered 30 minutes after baby?	1	2	h. Others (Specify).....	1	2	i. Others I (Specify).....	1	2	
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i. Others I (Specify).....	1	2																															
CHECK 320: FOR HEALTH FACILITY DELIVERIES, SKIP TO 333.																																	
331.	For deliveries outside the health facilities (home deliveries), Ask: Did you visit any health facility, after delivery?	Yes.....1 No.....2	→338																														
332.	Where did you go?	Government hospital.....1 Government health center.....2 Private hospital.....3 Private health center.....4 Other (specify).....5																															
333.	How long after delivery , did you stay at the health facility? (<i>If less than one day, record hours. If less than one week, record days.</i>)	Hours.....1 <input type="text"/> <input type="text"/> Days.....2 <input type="text"/> <input type="text"/> Weeks.....3 <input type="text"/> <input type="text"/> Dont Know/ D.R.....998	→335 →335																														
334.	What was the cause of the prolonged hospital stay? (<i>Ask if hospital stay is more than one day</i>)ABC																															
335.	After delivery/ before you were discharged from the health facility, did any health worker: Check your abdomen Check your eyes	Yes No Don't Know 1 0 8 1 0 8 } 338 1 0 8 } 338 1 0 8																															

	Check for vaginal discharge Other (Specify).....																																									
336.	How long after delivery, did the first check take place? (<i>If less than one day, record hours. If less than one week, record days.</i>)	Hours.....1 Days.....2 Weeks.....3 Dont Know/ D.R.....998	<table border="1"><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table>																																							
337.	Who checked on your health at that time?	Doctor.....A Nurse / Midwife.....B Medical Assistant/Clinical officer...C Nursing Aide.....D Traditional Birth Attendant.....E Other (specify).....F																																								
338.	After child birth, did you experience any of the following: (READ OUT)																																									
		<table border="1"><thead><tr><th></th><th>Yes</th><th>No</th></tr></thead><tbody><tr><td>a. Severe bleeding?</td><td>1</td><td>2</td></tr><tr><td>b. Severe headache?</td><td>1</td><td>2</td></tr><tr><td>c. Blurred vision?</td><td>1</td><td>2</td></tr><tr><td>d. Convulsions?</td><td>1</td><td>2</td></tr><tr><td>e. Swollen hands / face?</td><td>1</td><td>2</td></tr><tr><td>f. High Fever?</td><td>1</td><td>2</td></tr><tr><td>g. Loss of consciousness?</td><td>1</td><td>2</td></tr><tr><td>h. Malodorous vaginal discharge?</td><td>1</td><td>2</td></tr><tr><td>i. Difficult breathing?</td><td>1</td><td>2</td></tr><tr><td>j. Severe weakness?</td><td>1</td><td>2</td></tr><tr><td>k. Others (Specify).....</td><td>1</td><td>2</td></tr><tr><td>l. Others1 (Specify).....</td><td>1</td><td>2</td></tr></tbody></table>		Yes	No	a. Severe bleeding?	1	2	b. Severe headache?	1	2	c. Blurred vision?	1	2	d. Convulsions?	1	2	e. Swollen hands / face?	1	2	f. High Fever?	1	2	g. Loss of consciousness?	1	2	h. Malodorous vaginal discharge?	1	2	i. Difficult breathing?	1	2	j. Severe weakness?	1	2	k. Others (Specify).....	1	2	l. Others1 (Specify).....	1	2	
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a. Severe bleeding?	1	2																																								
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k. Others (Specify).....	1	2																																								
l. Others1 (Specify).....	1	2																																								
SECTION 4: MATERNAL NEAR MISS																																										
401.	During this pregnancy, delivery or after delivery, did you develop or encounter any severe health or pregnancy related complications?	Yes.....1 No.....2	→ 403																																							
402.	What severe health problems or complications did you encounter? (<i>Probe and can list all mentioned</i>)	Severe blood loss.....A Severe sepsis/infection.....B Obstructed labour.....C Prolonged labour.....D Abortion complications.....E Ruptured Uterus.....F Retained placenta.....G	} 404																																							

		Pre-eclampsia / eclampsia.....H Hypertension.....I Ectopic pregnancy.....J Others (specify).....K Others! (specify).....L			
403.	Did you encounter any of the following during pregnancy, delivery and postpartum? (<i>Read options</i>)	Severe blood loss.....A Severe sepsis/infection.....B Obstructed labour.....C Prolonged labour.....D Abortion complications.....E Ruptured Uterus.....F Retained placenta.....G Pre-eclampsia/ eclampsia.....H Hypertension.....I Ectopic pregnancy.....J Others (specify).....K Others! (specify).....L			
404.	Did you undergo through any such procedures during pregnancy, delivery or postpartum period? (<i>Read responses: If NO response is ticked in BOTH 403 AND 404, then proceed to 418</i>)	Admission to ICU.....A Emergency Caesarean sectionB Removal of uterus.....C Admitted to hospital.....D Given injection to stop blood loss...E Given drugs to stop blood loss.....F Oxygen resuscitation.....G Blood transfusion.....H Others (Specify).....I			
For any complications mentioned in 402 or 403, proceed to 405.					
405.	State the problem/ condition.	Problem 1	Problem 2	Problem 3	Problem 4
406	When was that? (Multiple response)	During: Pregnancy.A Delivery....B After Delivery...C	During: Pregnancy.A Delivery...B After Delivery...C	During: Pregnancy.A Delivery...B After Delivery...C	During: Pregnancy.A Delivery...B After Delivery...C
407.	Where did the problem/ complication start from?	Home.....1 TBA home.2 Health facility3 Other(specify)4	Home.....1 TBA home.2 Health facility3 Other(specify)4	Home.....1 TBA home.2 Health facility3 Other(specify)4	Home.....1 TBA home.2 Health facility3 Other(specify)4

→ 411

408.	How long after the onset of the problem or complication did you decide to seek medical assistance? <i>(If immediately, record 00 minutes)</i>	Minutes.....1 Hours.....2 Days.....3 Sought no care..... 4 DK / DR...98 1 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> 2 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> 3 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table>																			Minutes.....1 Hours.....2 Days.....3 Sought no care..... 4 DK / DR...98 1 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> 2 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> 3 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table>																			Minutes.....1 Hours.....2 Days.....3 Sought no care..... 4 DK / DR...98 1 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> 2 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> 3 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table>																			Minutes.....1 Hours.....2 Days.....3 Sought no care..... 4 DK / DR...98 1 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> 2 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> 3 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table>																		
409.	What was the cause of the delay to seek or get care?																																																																								
410.	After the onset of the complication where did you first go to seek care?	TBA.....1 Drug shop/ Dispensary.2 Pvt clinic.....3 Pvt hosp.....4 Govt HC.....5 Govt hosp...6 Other(specify)7	TBA.....1 Drug shop/ Dispensary.2 Pvt clinic.....3 Pvt hosp.....4 Govt HC.....5 Govt hosp...6 Other(specify)7	TBA.....1 Drug shop/ Dispensary.2 Pvt clinic.....3 Pvt hosp.....4 Govt HC.....5 Govt hosp...6 Other(specify)7	TBA.....1 Drug shop/ Dispensary.2 Pvt clinic.....3 Pvt hosp.....4 Govt HC.....5 Govt hosp...6 Other(specify)7																																																																								
411.	After how long at the health facility, did you get medical attention?	Minutes.....1 Hours.....2 Days.....3 DK / DR...98 1 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> 2 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> 3 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table>																			Minutes.....1 Hours.....2 Days.....3 DK / DR...98 1 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> 2 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> 3 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table>																			Minutes.....1 Hours.....2 Days.....3 DK / DR...98 1 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> 2 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> 3 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table>																			Minutes.....1 Hours.....2 Days.....3 DK / DR...98 1 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> 2 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> 3 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table>																		
412.	What was the cause of the delay to seek or get care at HF?	No drugs....A No health provider.....B No equipmentC No power...D No water....E	No drugs....A No health provider.....B No equipmentC No power...D No water....E	No drugs....A No health provider.....B No equipmentC No power...D No water....E	No drugs....A No health provider.....B No equipmentC No power...D No water....E																																																																								

413.		Theatre fully booked.....F No ANC cardG No delay....H Other(specify)	Theatre fully booked.....F No ANC cardG No delay....H Other(specify)	Theatre fully booked.....F No ANC cardG No delay....H Other(specify)	Theatre fully booked.....F No ANC cardG No delay....H Other(specify)	} 415
	Where you referred to another health facility? (If YES, write name of health facility referred to)	Yes.....1 No.....2	Yes.....1 No.....2	Yes.....1 No.....2	Yes.....1 No.....2	
	414. Why didn't you seek medical assistance or care?	
415.	What was the gestational period of the pregnancy at the time of the complication	Months.....1 <input type="text"/> <input type="text"/> <input type="text"/> DK/DR....98	Months.....1 <input type="text"/> <input type="text"/> <input type="text"/> DK/DR....98	Months.....1 <input type="text"/> <input type="text"/> <input type="text"/> DK/DR....98	Months.....1 <input type="text"/> <input type="text"/> <input type="text"/> DK/DR....98	
416.	What interventions / procedures were done to manage the complications at the health facilities visited? (State problem and intervention)					
417.	Give narration or brief explanation of the complication(s) as reported by the respondent. <i>(More details can be written at the end of the questionnaire)</i>					

	
418.	Prior to this pregnancy, had you experienced any pregnancy complications?	Yes.....1 No.....2 Dont Know/ Dont Remember.....98
419.	State previous SEVERE pregnancy complications experienced.

SECTION 5: INFANT SURVIVAL

501.	What was the outcome of your last pregnancy?	Early pregnancy loss.....1 Still birth.....2 Live birth.....3	→End →End
------	--	---	--------------

		Child 1	Child 2	Child 3	Child 4	
502.	Is (name) still alive?	Yes.....1 No.....2	Yes.....1 No.....2	Yes.....1 No.....2	Yes.....1 No.....2	→ 504
503.	After how long, did (name) die?	In the first 7 days.....1 In the first month.....2 Before one year.....3 After one year.....4	In the first 7 days.....1 In the first month.....2 Before one year.....3 After one year.....4	In the first 7 days.....1 In the first month.....2 Before one year.....3 After one year.....4	In the first 7 days.....1 In the first month.....2 Before one year.....3 After one year.....4	
504.	Was (name) weighed at birth?	Yes.....1 No.....2 DK/ Don't Remember..8	Yes.....1 No.....2 DK/Don't Remember..8	Yes.....1 No.....2 DK/Don't Remember..8	Yes.....1 No.....2 DK/Don't Remember..8	} 506
505.	How much did (name) weigh?	Kgs from card..... Kgs from recall.....	Kgs from card..... Kgs from recall.....	Kgs from card..... Kgs from recall.....	Kgs from card..... Kgs from recall.....	
506.	At birth, was he/she very big, bigger than average, average, smaller than average, or very small?	Very big...1 Bigger than average....2 Average.....3 Smaller than average....4 Very small.....5	Very big...1 Bigger than average....2 Average.....3 Smaller than average....4 Very small.....5	Very big...1 Bigger than average....2 Average.....3 Smaller than average....4 Very small.....5	Very big...1 Bigger than average....2 Average.....3 Smaller than average....4 Very small.....5	

507.	Did you ever breastfeed?	Yes.....1 No.....2	Yes.....1 No.....2	Yes.....1 No.....2	Yes.....1 No.....2	510	
508.	How long after birth, did you first put (name) to the breast?	Immediately000 Hours <input type="text"/> <input type="text"/> Days <input type="text"/> <input type="text"/>	Immediately000 Hours <input type="text"/> <input type="text"/> Days <input type="text"/> <input type="text"/>	Immediately000 Hours <input type="text"/> <input type="text"/> Days <input type="text"/> <input type="text"/>	Immediately000 Hours <input type="text"/> <input type="text"/> Days <input type="text"/> <input type="text"/>		
509.	For how long did you breastfeed?	Months..... Years..... Still B/feeding...3 DK.....98	Months..... Years..... Still B/feeding...3 DK.....98	Months..... Years..... Still B/feeding...3 DK.....98	Months..... Years..... Still B/feeding...3 DK.....98		
510.	In the two months after birth, did any health provider check on his/her health?	Yes.....1 No.....2 DK/ DR...8	Yes.....1 No.....2 DK/ DR...8	Yes.....1 No.....2 DK/ DR...8	Yes.....1 No.....2 DK/ DR...8		513
511.	Who checked on (name)'s health at that time?	Doctor.....A Nurse / Midwife....B Nursing Assistant....C Other (specify)...D	Doctor.....A Nurse / Midwife....B Nursing Assistant....C Other (specify)...D	Doctor.....A Nurse / Midwife....B Nursing Assistant....C Other (specify)...D	Doctor.....A Nurse / Midwife....B Nursing Assistant....C Other (specify)...D		
512.	Where did this check of (name) take place?	Govt HC....1 Govt hosp...2 Pvt hosp....3 Pvt HC.....4 Other(specify)5	Govt HC....1 Govt hosp...2 Pvt hosp....3 Pvt HC.....4 Other(specify)5	Govt HC....1 Govt hosp...2 Pvt hosp....3 Pvt HC.....4 Other(specify)5	Govt HC....1 Govt hosp...2 Pvt hosp....3 Pvt HC.....4 Other(specify)5		
513.	What care was given to (name) immediately and within 2 days after birth?	Initiated breastfeeding within 1 st hour...A Exclusive breastfeeding.....B Dry and wrap.....C Eye careD Dry Cord CareE Kangaroo mother care (skin-to-skin)...F Others (Specify).....G					
514.	If live birth occurred: Ask: Did (name) experience any of the following:						
			Yes	No			
	a. Difficult or fast breathing?		1	2			

	b. Yellow skin/eye colour (jaundice)?	1	2		
	c. Poor sucking or feeding?	1	2		
	d. Pus, bleeding, or discharge from around the umbilical cord?	1	2		
	e. Baby very small?	1	2		
	f. Skin lesions or blisters?	1	2		
	g. Convulsions / spasms/rigidity?	1	2		
	h. Lethargy/unconsciousness?	1	2		
	i. Red/swollen eyes with pus	1	2		
	j. Others (Specify).....	1	2		
	Comments:				

THANK YOU

Appendix 2: In-depth interview guide

In-depth interview guide

Name:.....

Questionnaire number.....

Cultural Perceptions regarding Pregnancy, Child birth and Postpartum care

1. What is the current understanding of the process of pregnancy, childbirth and postpartum care among the (Insert ethnic group)? [Probe for beliefs, values, practices, norms / rules, prohibited foods, practices regarding multiple pregnancies do's and dont's]
2. What is the role of your partner during pregnancy and childbirth?
3. What support did you receive from your partner during your last pregnancy?
4. In this culture, what is termed as unsafe pregnancy? How is it detected?
5. What are some of the things that can go wrong during pregnancy, delivery and after delivery?
 - i. during pregnancy
 - ii. during delivery
 - iii. after delivery
6. Who is responsible for making decisions regarding place of ANC attendance, place of delivery and postpartum care and why?

Maternal Near Miss Cases

Please give an account of what happened from the onset of the pregnancy complications.

Probe for the following:

- Places visited to seek help
- Use of herbs
- Medication or type of assistance got from each place visited.
- Means of transport to reach place where assistance was sought.

- Type of illness or complication got by the woman.
- Possible delays at household, accessing health facility and at the health facility.
- Medical intervention got for last place of referral.
- Male involvement.
- Decision-making processes.

Appendix 3: Focus Group Discussion Guide - Women

FOCUS GROUP DISCUSSION GUIDE – WOMEN

Purpose: To explore the role of cultural attributes in influencing maternal near miss events and outcomes

What do we want to know??

Current knowledge, practices, beliefs and attitudes relating to pregnancy, delivery, postpartum care and also about severe maternal complications.

SECTION A: PREGNANCY

1. How does a woman in this community know that she is pregnant? Signs??
2. What are the practices of telling people that one is pregnant in this community? Who does a woman have to tell first / not to tell first that she is pregnant in this community? Why?
3. What happens to women's body during pregnancy?
4. What is the understanding of the process of pregnancy in this community? What applies to this community currently? [Probe for beliefs, values, practices, norms / rules]
5. Ask women to tell you any proverbs related to pregnancy in this community and their meaning and if they believe in these different proverbs.
6. What terms or expressions (words) are used to describe or discuss pregnancy in this community?
7. Explore with participants **antenatal care** by asking: "What special care does a pregnant woman take/ need? Why?"

Probing:

- What herbs are commonly used during pregnancy in this community? Why?
 - Different Places / Sources of antenatal care in this community.
 - Reasons for non-attendance of ANC?
 - What does the midwife / TBA do and say during an antenatal care visit?
8. In this community, what is regarded as a safe and unsafe pregnancy?
 - How is an unsafe pregnancy detected?
 9. What things should pregnant women do or not do during pregnancy and Why?

Probing:

Food taboos: In many communities, pregnant women tend to eat less to avoid giving birth to big babies and having a difficult and painful delivery. Are pregnant women afraid to have big babies in this community? Why? Is it the case in your community? What foods / drinks are specially avoided / taken? Why? Who decides what food should be avoided or eaten?

Workload: Does the general workload of women reduce during pregnancy? What works are usually done by women during pregnancy? How does this division of labour affect the woman's pregnancy? Discuss with participants the consequences of workload on women's health during pregnancy. What is considered "light work" and "heavy work"? How does this division of labor affects maternal and young children's health.

10. Do you know of any danger signs during pregnancy? What are they? What health problems do women in this community experience during pregnancy? Which are the most common of these problems in this community?
11. Who/ which persons are the most influential people in the family or the community regarding decision making antenatal care attendance? When (under what conditions)? Why?
12. Who are the most important people to support a woman during pregnancy period (in the family, in the community)? Why
13. Do men in this community attend antenatal care with their partners / wives? Give reasons to support each response (yes and no).
14. Ask women to tell you any proverbs related to pregnancy in this community and their meaning and if they believe in the different proverbs.

SECTION B: BIRTH EXPERIENCES

We would like to learn or know from you the birth experiences and practices in this community.

15. What is the understanding of the process of child birth / delivery in this community? What applies to this community? [Probe for beliefs, values, practices, norms / rules]
16. What terms or expressions (words) are used to describe or discuss pregnancy in this community? ?
17. What herbs are commonly used during delivery in this community? Why?

18. Which persons are allowed to be present to support the women during delivery or in the labour ward? Why these persons?
19. In this community, what is regarded as a safe/ healthy birth and what is regarded as an unsafe / unhealthy birth?
 - How is an unsafe birth detected in this community?
20. What foods/ drinks do women take/avoid after onset of labour? Why? Who decides what food should be avoided or eaten?
21. Who/ which persons are the most influential people in the family or the community regarding decision making place of delivery? When (under what conditions)? Why?

SECTION C: POST DELIVERY

22. In this community, what practices, rules, beliefs, norms are valued or practiced after delivery or during the first six weeks after delivery? What applies in this community? [Probe for: - beliefs, values, practices, rules / norms in case of the mother, child and the different kind of births i.e twins]
23. What terms or expressions (words) are used in this community to describe or discuss the period after delivery?
24. What herbs are commonly used after delivery in this community? Why?
25. What foods/ drinks do women take/avoid immediately after child birth and during the post partum period? What do recently delivered women / new mothers in your community usually eat? What food should be avoided? Why? Who decides what food should be avoided or eaten?
26. Who/ which persons are the most influential people in the family or the community regarding decision making postnatal care? When (under what conditions)? Why?
27. Who are the most important people to support a woman during the post delivery period (in the family, in the community)?

SECTION D: MATERNAL NEAR MISS

28. Which **SEVERE** problems have women experienced that **almost killed** them or that other women known to you have died of?
29. What is the cultural understanding or explanation of the severe pregnancy complications faced by women in this community? What causes these complications? [Probe for beliefs, values, practices, norms / rules]

30. With occurrence of such severe complications, how are they handled locally in your community (probe for type of care culturally administered to the women with different severe problems).
31. What treatment do women use (including use of herbs) in such cases?
32. Whom do women with severe complications consult? Probe for all persons....and also find out who is usually consulted first.
33. Do you think these complications can cause death? Do you think occurrence of these complications can be caused by certain practices or beliefs or customs practiced by women during pregnancy?
34. Explore with participants near missed stories: Among cases of women you know who experienced severe maternal or pregnancy complications, we would like to know:
 - What happened during pregnancy, delivery, or after delivery? (Probe for issues: ANC attendance, process up to delivery, severity of complication, places visited, decision making, support got, possible reasons for delays?)
 - What was the actual cause of the complication?
 - What was the pregnancy outcome?
 - What should be done to prevent maternal morbidities, mortality and neonatal deaths?

SECTION E: OUTCOMES OF MATERNAL NEAR MISS

35. What is done with the baby immediately after delivery? (**Probe about:** bathing / cleaning, drying, wrapping, warming, eye care)...i.e When do you bathe the baby the new-born? Why?
36. Which complications do babies / newborns face or usually experience in this community usually face.
37. Do women who experience severe maternal complications in this community have negative pregnancy outcomes?
38. Among cases of babies who passed away during or immediately after delivery? We would like to know:
 - What happened during pregnancy, child birth or after delivery? (Probe for issues: ANC attendance, process up to delivery, severity of complication, places visited, decision making, possible reasons for delays?)
 - What was the actual cause the death?

- What should be done to prevent maternal and new-born deaths?

SECTION F: SERVICE DELIVERY

39. What is your opinion about services provided by health providers during:

- i pregnancy
- ii childbirth
- iii after delivery

- Probe for emergency obstetric or maternal health care

THANK YOU VERY MUCH FOR YOUR TIME!!!!!!

Appendix 4: Focus Group Discussion Guide - Men

FOCUS GROUP DISCUSSION GUIDE – MEN

Purpose: To explore the role of cultural attributes in influencing maternal near miss events and outcomes

What do we want to know?? Current knowledge, practices, beliefs and attitudes relating to pregnancy, delivery, postpartum care and also about severe maternal complications.

SECTION A: PREGNANCY, CHILDBIRTH, POSTPARTUM CARE

1. What is the understanding of the process of **pregnancy, childbirth and postpartum** in this community? [Probe for beliefs, values, practices, norms / rules]
 - Pregnancy?
 - Childbirth?
2. Postpartum? In this community, what practices, rules, beliefs, norms are valued or practiced after delivery or during the first six weeks after delivery? [Probe for: - beliefs, values, practices, rules / norms in case of the mother, child and the different kind of births i.e twins]
3. Ask participants to tell you any proverbs related to pregnancy in this community and their meaning and if they believe in these different proverbs.
4. What terms or expressions (words) are used to describe or discuss **pregnancy, childbirth, postpartum** in this community?
5. Explore with participants **antenatal care** by asking: “What special care does a pregnant woman take/ need? Why?”
6. In this community, what is regarded as a safe / unsafe pregnancy and what is regarded as a safe/ healthy birth or unsafe birth?
7. How is an unsafe pregnancy detected?
8. How is an unsafe birth detected in this community?
9. What things should pregnant women do or not do during pregnancy and Why?
10. What foods/ drinks do women take/avoid during **pregnancy, childbirth or after onset of labour and immediately after childbirth**? Why? Who decides what food should be avoided or eaten?
 - Pregnancy
 - Childbirth / After onset of labour

- After childbirth / Postpartum period

Probing:

Food taboos: In many communities, pregnant women tend to eat less to avoid giving birth to big babies and having a difficult and painful delivery. Is it the case in your community?

11. **Workload:** Does the general workload of women reduce during pregnancy? What works are usually done by women during pregnancy? How does this division of labour affect the woman's pregnancy? Discuss with participants the consequences of workload on women's health during pregnancy. What is considered "light work" and "heavy work"? How does this division of labor affects maternal and young children's health.
12. What health problems or danger signs do women in this community experience during pregnancy? What are the local terms associated with these problems and why?
13. Do men in this community attend antenatal care with their partners / wives? Give reasons to support each response (yes and no).
14. What are the different places / sources of antenatal care in this community.
15. Why don't some women go for antenatal care?
16. What herbs are commonly used by women in this community:
 - during pregnancy?
 - during child birth / after onset of labour pains?
 - after child birth?

Probe for the purpose of each of the herbs mentioned.

17. What is the role of men during **pregnancy, childbirth and postpartum** period?
18. Who/ which persons are the most influential people in the family or the community regarding decision making on:
 - antenatal care attendance? When (under what conditions)? Why?
 - choice of place of delivery? When (under what conditions)? Why?
 - postnatal care attendance? When (under what conditions)? Why?
19. Who are the most important people to support a woman during **pregnancy, childbirth and postpartum period** (in the family, in the community)? Why
 - Pregnancy
 - Child birth
 - Postpartum

SECTION B: MATERNAL NEAR MISS & BIRTH OUTCOMES

20. Which **SEVERE** problems have women experienced that **almost killed** them or that other women known to you have died of?
21. What is the cultural understanding or explanation / causes of the severe pregnancy complications faced by women in this community? Do you think occurrence of these complications can be caused by certain practices or beliefs or customs practiced by women during pregnancy? [Probe for beliefs, values, practices, norms / rules]
22. How are these complications handled locally in your community? (Probe for type of care culturally administered to the women with different severe problems). What treatment do women use (including use of herbs) in such cases?
23. Whom do women with severe complications consult? Probe for all persons and also find out who is usually consulted first and the different places women visit while seeking for care.
24. Explore with participants near missed stories: Among cases of women you know who nearly died or missed death, we would like to know:
25. What happened during pregnancy, delivery, after-delivery? (Probe for issues: pregnancy behavior, ANC attendance, process up to delivery, severity of complication, places visited, decision making, possible reasons for delays?)
26. What was the actual cause of the complication?
27. What was the pregnancy outcome?
28. What should be done to prevent maternal morbidities, mortality and neonatal deaths?
29. Which complications do babies / newborns face or usually experience in this community usually face.
30. Among cases of babies who passed away during or immediately after delivery? We would like to know:
 - What happened during pregnancy, delivery, or after delivery? (Probe for issues: ANC attendance, process up to delivery, severity of complication, places visited, decision making, possible reasons for delays?)
 - What was the actual cause the death?
 - What should be done to prevent maternal and newborn deaths?

SECTION F: SERVICE DELIVERY

31. What is your opinion about services provided by health providers during:
- a. i pregnancy
 - b. ii childbirth
 - c. iii after delivery

Probe for emergency obstetric or maternal health care

THANK YOU VERY MUCH FOR YOUR TIME!!!!!!

Appendix 5: Informed Consent Form

Informed Consent

Informed Consent

Hullo madam, my name is We are conducting a study on maternal health in this community. The purpose of this study is to investigate factors and outcomes associated with severe ill-health among women during pregnancy, childbirth and after delivery. The information collected will be used to make recommendations that will guide policy making and improve interventions in the area of maternal and child health in the country.

We would very much appreciate your participation. Participation in the study is voluntary and you can stop the interview at any time you feel like. The information got will be strictly kept confidential and will only be used for academic purposes. The interview will last about 45 minutes or less.

Do you have any questions that you would like to ask?

May I begin the interview now? 1 - Yes 2 – No (*circle appropriate response*)

Signature of Interviewer

Appendix 6: Household Listing Form

Household Listing Form

Study: Risk Factors and Outcomes of Maternal Near Miss in the Central Region of Uganda

District:.....
 Location: Rural Urban
 Name of Household Head.....
 Sub-County:.....
 Household ID:.....
 Parish:.....
 Village:.....
 Interviewer ID:.....
 Date:.....

Line No.	Usual Residents & Visitors Please give me the names of the persons who usually live in your household, starting with the head of the household	Relationship to the Head of the Household	Sex Is (Name) male or female?	Age (Years) How old is (Name)?	ASK IF FEMALE					Eligibility
					Ever Been Pregnant	Pregnancy in last 1 year	Pregnancy in last 2 years	Pregnancy in last 3 years	Currently Pregnant	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
			M F		Y N	Y N	Y N	Y N	Y N	Y N
			M F		Y N	Y N	Y N	Y N	Y N	Y N
			M F		Y N	Y N	Y N	Y N	Y N	Y N
			M F		Y N	Y N	Y N	Y N	Y N	Y N
			M F		Y N	Y N	Y N	Y N	Y N	Y N
			M F		Y N	Y N	Y N	Y N	Y N	Y N

Appendix 7: Research Outcomes

Conference Presentations

1. International Epidemiological Association (IEA) World Congress of Epidemiology (WCE), Alaska Anchorage – USA: 17th – 21st August 2014: Poster presentation: “Prevalence and Risk Factors of Maternal Near Miss in Central Uganda: a community based study.”
2. 10th Annual PHASA Conference, Polokwane, South Africa: 3rd – 6th September 2014: Oral Presentation: “Prevalence and Risk Factors of Maternal Near Miss in Central Uganda: a community based study.”
3. 10th Annual PHASA Conference, Polokwane, South Africa: 3rd – 6th September 2014: Oral Presentation: “Male involvement in averting maternal deaths after onset of maternal near miss complications in Central Uganda.”

Other Presentations:

1. Policy Presentation: Population Reference Bureau (PRB), Washington D.C, USA 4th– 15th August 2014: Effect of family planning utilization on occurrence of maternal near miss in Central Uganda.
2. Population Reference Bureau: Policy Presentation at the Population Association of America (PAA) conference, San Diego 28th Apr – 01st May 2015: Effect of family planning utilization on occurrence of maternal near miss in Central Uganda.

Publications

1. Nansubuga, E., & Ayiga, N. (2015). Male involvement in utilization of emergency obstetric care and averting of deaths for maternal near misses in Rakai district in Central Uganda. *African Population Studies*, 29(2), 1810-1819.
2. Nansubuga, E., Ayiga, N., Moyer, C. Community Based Prevalence and Risk Factors of Maternal Near Miss in Central Uganda. - Accepted for publication in the *International Journal of Gynecology & Obstetrics (IJGO)*