RISK FACTORS TO FETAL AND EARLY NEONATAL DEATHS IN HEALTH FACILITIES IN KAMULI DISTRICT, UGANDA

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DECLARATION

I hereby declare to the best of my knowledge that this dissertation presented has never been submitted anywhere for academic award of any kind. Where other individuals' information has been used, references have been provided and in some cases quotations made

Signature: …….. Date: ……..

Nabagereka Hellen (Researcher)

APPROVAL

I, the supervisor for the dissertation of Nabagereka Hellen, a student of Masters of Science in Public health declare that the research dissertation entitled **RISK FACTORS TO FETAL AND EARLY NEONATAL DEATHS IN HEALTH FACILITIES IN KAMULI DISTRICT, UGANDA,** was supervised in accordance with the guidelines of International Health Science University. This dissertation has not been submitted elsewhere with my authority and approval as a university supervisor.

Supervisor name: Dr. Peter Kirabira

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Date: ……..…..

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LIST OF ABBREVIATIONS

ANC	: Antenatal care
EmOC	: Emergency Obstetrical Care
END	: Early Neonatal Death
EN/M	: Enrolled Nurse/Midwife
HCP	: Health care profession
HCS	: Health care systems
HSSIP	: Health Sector Strategic and Investment Plan
MDG	: Millennium Development Goal
MOH	: Ministry of Health
PNC	: Postnatal Care
PROM	: Premature Rupture of Membranes
RNM	: Registered Nurse/Midwife
SDG	: Sustainable Development Goal
UDHS	: Uganda Demographic Health Survey
WHO	: World Health Organization

OPERATIONAL DEFINITIONS

Early neonatal death: All deaths of live-born occurring on or before the first seven days of life.

Fetal death or stillbirth: Death of the fetus occurring prior to expulsion or extraction from the mother.

Fetus: A human conception of 8 weeks in the uterus until term

Prenatal death: Death of a baby that occur from 28 weeks of gestation up to the first seven days of life

Preterm delivery: Delivery of the new born before 37 weeks gestation.

Post- natal period: The duration (42 days) immediately after childbirth.

Low birth weight: Birth weight less than 2500grams.

Live Birth: A complete extraction **of** human conception products from a mother regardless of the pregnancy duration.

Neonate: A new born not more than 28 days of birth.

Neonatal mortality: The statistical rate r of babies who die within the first 28 days of life.

Neonatal mortality rate: Number of Neonatal deaths per 1,000 live births.

The Under- Five Mortality: Death between birth and exactly five years of age

ABSTRACT

Background

Fetal and early neonatal death is still a significant public health concern in both developing and developed countries. This study aimed to assess the risk factors associated with fetal and early neonatal deaths in health facilities in Kamuli district, Uganda.

Methodology

This study was a case control, where by cases were fetal and early neonatal deaths(n=102) live births (n=204) that occurred within the maternity wards and the newborn units of Kamuli General Hospital, Namwendwa HC IV and Nankandulo HC IV from 1st July 2014 to 30th June 2016. Univariate, bivariate and multivariate levels, chi-square test for independence and logistic regression analysis were taken

Results

The odds of having 0-2 ANC visits relative to three visits were much higher for cases than controls (AOR--).There were lower odds among cases of having doctors rather than a midwives as a birth attendance AOR 0.37, 95%CI 0.03-5.31, P-Valve 0.467.The odds of having Apgar score of below six at five minutes and ten minutes AOR 0.36 .95% CI 0.17 .0.80 p-values 0..012 were higher for cases than controls. The odd of cases who received resuscitation were much lower compared to those who did not receive any resuscitation.(AOR 0.05,95%CI 0.00-054,P-value 0.013).There were lower Odd among cases of babies weighing 2.5kgs above compared to those weighing less than 1.5kg

Conclusion

Fetal and early neonatal death in Kamuli district accounts for 91/1000 live births higher than that of the national average of 51/1000 live births. The risk factors that were significantly associated with fetal and early neonatal deaths were low Apgar score at five minutes, low birth weight,

poor/non-antenatal clinic attendance and high birth order. Additionally, the most frequently noted causes of neonatal death were Asphyxia (10%), fetal distress (6%), However, missing data could have reduced the magnitude of these causes of death.

Recommendations

In order to ensure new born survival, Resuscitation equipments, skilled personnel attendance must be available during birth and emergences. The stakeholders should promote and strengthen family planning interventions in order to reduce on parity , strengthen the ANC attendances as recommended by WHO and involving the community health workers and the political leaders in sensitization and mobilization of mothers, hence reducing on fetal and early neonatal deaths

CHAPTER ONE: INTRODUCTION

1.1 Introduction

This chapter presented an introduction to the study, Background of the study, Background of the study area, Statement of the problem, Research objectives, Research questions, Hypothesis , Conceptual framework and Justification of the study. This enabled the researcher to obtain accurate information on risk factors for fetal and early neonatal deaths in health facilities in Kamuli district, Uganda. For Public Health practitioners, prolonging lives and preventing diseases is the main focus as well as promoting the health of populations which involves the actions of participants at different levels of society.

1.2 Background of the study

Fetal and early neonatal death is still a significant public health concern in both developing and developed countries. The world health organization, (2006) estimated the neonatal death to be 30% times higher within the neonatal period than above of 28 days to 59 months. Basing on Lawn et al.,(2006) analysis, three quarters of the deaths occur within the first seven days of life and about 25% to 45% happen within the 24hours after birth. He further states that early neonatal mortality rate is still very high. Yego et al., (2014), defines neonatal death as death of a live newborn occurring within the first twenty eight days (28) after birth. Yego*et al*. (2014) further defined early neonatal death as all deaths of live-born occurring within the first seven days of life.

Lawn et al., (2009) cited that fetal death accounts for 46% of the life birth. He further observed that most of the babies are born dead (stillbirth) and mainly occur in lower and middle income countries. Nikolaos (2016) defines fetal death as death of the fetus that occurs prior to expulsion or extraction from the mother and is determined by no signs of life after delivery. The Signs of life include; breathing or voluntary muscle movement, umbilical cord pulsations and heartbeats.

Nastratullah A. (2012) cited that fetal and early neonatal death result from poor maternal health, poor management of complications during pregnancy, poor antenatal attendance, poor hygiene during intra-partum period and inadequate care during the first critical hours after delivery. Furthermore, other factors that may lead to fetal and early neonatal deaths include; the woman's status in the society, too late or too early child bearing age and the nutrition status of a woman during the time of conception(Nastratullah A.2012).

Globally, according to World Health Organization media centre (2016), updates on neonatal deaths represent 45% of children dying at or before the 59 months of life, 2.7 million babies die every year during the neonatal period and a similar number are fetal death, and 99% of these deaths occur in developing countries. WHO media centre (2016) observed that half of all deaths occur within the first 24hours of life and 75%occur within seven days of life. India has the highest number of neonatal death; over one million newborns die each year.

98% of the fetal deaths occur in lower and middle income countries .According to the WHO,(2014),7200 babies are born dead every day and between 1995 to 2009, WHO (2014) observed a reduction of only 1% from 3 million to 2.6 million fetal deaths occurred.

Despite the progress made in reducing the under-five mortality rate from 91 deaths per 1000 live births in 1990 to 43 in 2015, the overall reduction in under-five deaths was not sufficient to meet the MDG 4 target of two-thirds reduction of 1990 mortality levels by the year 2015.

Owais*et al*. (2013) cited that high or low parity, lack of maternal education, maternal age, maternal complications, lack of access to antenatal care, ante partum care and early postnatal care are significantly related to the increased risks of fetal and early neonatal deaths. Other risk factors include infections during pregnancy, congenital anomalies and maternal nutritional status. The leading causes of early neonatal deaths worldwide are preterm births (27%), severe infections (26%), asphyxia (23%), and neonatal tetanus (7%).

In history, neonatal has been forgotten (WHO, 2006) and was left in between the cracks of the safe mother hood. In additional, Bhutta et al., (2008) observed that in many societies, both fetal and early neonatal death was not perceived as a problem. It was left to the family people (the mother and the father) alone to take care because the situation was adopted and not recognizing the completeness of the birth. Actually, the naming of a newborn was done after the neonatal period. Lawn et al (2009), added that neonatal health (early neonatal) has been neglected at all levels (International policy, national programmes and at the implantation levels). Furthermore, the safe motherhood initiative was carried out 20years ago which focused on reduction of maternal mortality and childhood initiative like Integrated management of childhood illness, Integrated community case management of malaria, pneumonia and diarrhea, vaccine preventable conditions, were geared towards improving child survival after the first four weeks of life leaving out the critical period of early neonatal growth (0-7 days of life). (WHO annual report, 2009, Yegoet al., 2014)

About two-thirds of neonatal deaths occur in African countries (World Health report, 2005) .99% occurs in low and middle income countries; and Nigeria scoring the highest number of neonatal death of 700 per day in Africa (Ezeh et al., 2014).in addition, Waiswa et al., (2012) observed that most neonatal deaths take place on the day of delivery and about 40% of the neonatal deaths occur within 24 hours of life and 75% occur within seven days of life. Furthermore, Lawn et al., (2009) revealed that the risk of dying for newborns is very high thus the first 24 hours of life carries the greatest risk of death.

In Sub-Saharan Africa, between 1990 and 2010, the percentage of neonatal deaths among the under- five deaths increased by 3% (UN Report, 2012). Children in sub-Saharan Africa are 14 times more likely to die before the age of five compared to children in developed regions.

Lawn *et al.,* (2009) observed that countries with highest neonatal mortality rates (NMR greater

than 45 per thousand live births) are mostly in sub-Saharan Africa. Furthermore, high neonatal mortality rate is specifically seen in countries with recent civil wars such as Liberia and Sierra Leon. Countries like the Democratic Republic of Congo stand at 47 deaths per 1000 live births, Ethiopia 51 per 1000 and Somalia 52 per 1000 live births (Lawn *et al.*, 2009).

Lawn et al., (2009) further observed that greatest risk of these deaths in sub-Saharan Africa occur during birth and the first day after delivery.

Uganda for the past 15 years has adopted a number of policies, strategies and interventions for safe motherhood and childhood survival. However, integration is slow and little attention has been paid to care for the newborn.

Uganda was ranked fifth with the highest newborn deaths in the sub-Saharan Africa. Every year,it was estimated that 45,000 newborns die (WHO-Uganda Annual report, 2009). Furthermore, HSSP II Vol. I 2005/06-2009/2010 stated that more than a third of infant mortality was contributed by the newborn deaths and at least one-fifth of under-five mortality. As infant and under-five mortality seemed to be decreasing, newborn mortality remained constant. 29% of all infants' deaths occured during the first month of life, three-quarters during the first week and half of all newborn deaths occurred during the first 24 hours of life. (HSSP II Vol.I 2005/06-2009/2010)

Fetal death in Uganda had been left out of the discussion of maternal, newborn and child health. It had been estimated at 31 deaths per 1,000 total births and of these cases, the majority are fresh stillbirths and happen during labour. Some of the risk factors for the fetal death are inappropriate antenatal screening and unskilled care during childbirth. Fetal death indicates suboptimal service utilization, especially regarding emergency obstetric care (WHO-Uganda Annual report, 2009)

According to Kananura et al (2016), neonatal deaths are not evenly distributed regionally; some

districts have a higher neonatal mortality compared to the national average of 27 per 1000 live births, Kamuli district has a higher neonatal death rate estimated at 32 deaths per 1000 live births. The HSSIP target was 23 deaths per 1000 live births by 2015, however, there was little progress towards achieving the Millennium Development Goal four (MDG 4) for child survival (UN Report 2012; WHO & UNICEF Report, 2012).

The Uganda's health system is similar to other health systems in African countries .The health system of Uganda was decentralized in 1992 and in 1997; all districts in the country had established local governments with the full administrative and political structures (Yates.R.et al, 2006). The delivery of health services was cascaded to the district and sub-district level in order to bring services closer to people and improve the efficiency and effectiveness of service delivery (MoH, 2008). The ministry of health plays a stewardship role and the districts are responsible for implementation and service delivery including newborn health issues. The challenge that the decentralization of health systems is facing is lack of resources to attract and retain health workers, especially in hard-to-serve areas. (Kananura et al 2016).

In addition, World Health Organization developed the Global standard interventions for newborn care; these were incorporated in the National Minimum Health Care Package of Uganda, which was adopted by MoH and rolled them out to all districts in Uganda. These included, The National Health Policy (NHP) which is implemented through the Health Sector Strategic Plan II (HSPP). The HSSP outlines the core interventions of maternal and newborn health, which include; Provision of care during pregnancy, prevention and treatment of maternal infections, infection control during and after delivery, Newborn resuscitation, provision of postnatal care, counseling and education on newborn care practices, especially careful management of low birth weight babies during the postnatal period, Sensitization and education on danger signs for the mother and newborn, Promotion of appropriate care-seeking and home care practices for the

mother and newborn.(MoH,2008). Furthermore,Waiswa et al., (2010), observed that one cannot separate a mother and the child since most of the newborn's interventions mothers benefits from them. Waiswa et al., (2010) furthermore noted that if free antenatal services, safe delivery care and first 24 hours postnatal care are introduced, may bring about a reduction in fetal and early neonatal deaths in the developing countries as demonstrated in the western countries.

In addition to the polices and Interventions, the World Health Organization set up the Essential Maternal and Neonatal Care Clinical Guidelines for health workers, national guidelines on Infant , Young Child Feeding, the Integrated Management of Childhood Illnesses (IMCI) guidelines that were rolled out to all districts in Uganda by Ministry of health . However, recent studies has shown gaps in the implementation guidelines and set interventions (MoH 2006, UNICEF 2007, MoH 2007, save the children 2008, MoH 2008, Kiwanuka et al., 2008, WHO, 2012).

Uganda is among the 35 African countries that joined a high level of commitment and multi-sectoral involvement that was formed since 2003 to address the Maternal and neonatal mortality in the landmark document titled Roadmap for Accelerating Reduction of Maternal and Neonatal Mortality was adopted. The road map, in Uganda focuses on increasing and strengthening service provision during pregnancy, childbirth and the postnatal period and at all levels of service delivery and promotes the provision of skilled care, as well as the empowerment of families and communities to demand quality care. The Road Map is seen as a great commitment from government to improve newborn health (MoH, 2006, MoH, 2008).

Bradshaw, D. et al. (2008) observed the biggest gap being in the implementation of health care programmes and service packages within the continuum of care not within policies. In addition to Bradshaw, D. et al. (2008) observed that Policies and guidelines have not been sufficiently disseminated at lower levels because of inappropriate resources to support effective programmes

Kamuli district is one of the districts in Uganda that is benefiting from the ideal structure of the Ugandan health sector that was established by the health sector strategic plan (HSSP) to deliver the Ugandan minimum health care package .This structure comprises both private and public partnership(DHO's report,2015) .

Background of the study area

Kamuli district is located in East Central Uganda in Busoga region. The district has a population of 490,255 people and a population growth rate of 2.54% per annum (UBOS 2014). Further, the district has 93,789 households with an average household size of 5.2 people and a population density of 199.6 persons per square km. The district is bordered by River Nile and Kayunga district in the west, Jinja district in the South, Luuka district in the South East, Buyende District in the North and Northeast. The major tribe living in the district is the Basoga.

Kamuli district like other districts in Uganda, benefits from the health system decentralization.

Following the decentralization in the 1990s, according to Yates.R.et al, (2006), the district health management team under the leadership of the District health officer, played a role of planning, management and provision of health services in the district (the district hospital, and the Health sub-districts) in order to bring services closer to people and improve the efficiency and effectiveness of service delivery (MoH, 2008).The challenge that the decentralization of Health systems is facing is lack of resources to attract and retain health workers, especially in hard-to-serve areas (MoH, 2008).

The District has 3 Health Sub-Districts (Bugabula North, Bugabula South and Buzaaya HSDs) and a total of 1252 health facilities; 37 government, 27 private not for profit (PNFP) and 1194 private for profit(PFP) as seen in the tables below;

Table1.Health infrastructure in Kamuli district

Category	**Ownership**		**Total**
	Government	**PNFP**	
Hospital	01	01	02
HC IV	02	00	02
HC III	10	08	18
HC II	24	12	36
Total	**37**	**21**	**58**
Number of Staff Houses	56	08	64

Table 2: Private for Profit Health Facilities in Kamuli district

Facility	Number
Private Pharmacies	20
Drugs	258
Clinics	15
Allied Clinics	20
Domiciaries	10
Traditional Healers	851
Private Pharmacies	20
Total	**1194**

Kamuli district is employing 501(70%) health workers out of 700 approved post leaving out a gap of 193 (29%) health workers across the government facilities by April 2015

Which is below to HSSIP target of 75% of the approved post filled by the health workers, hence Kamuli district is below the set target (MOH Performance report, 2015).

The district has two hospitals: Kamuli general hospital and Kamuli mission hospitals which are also referrals for the lower level facilities in the district.

The district has a total of seventy three(73) midwives ,ninety two (92) nurses ,eight (8) doctors ,twenty seven (27) clinical officers, twenty three(23).laboratory assistants, and two(2) Anesthetic officers serving a population of approximately 630,255 people(DHO's office report 2015/2016) The Kamuli district's delivery in both government and private not for profit health facilities's performance at the national level is 57.2% and this is below the HSSIP target of 90%.this means that 22.5% deliveries are carried out at home and not supervised by the skilled personnel hence increasing the fetal and early neonatal death (38.2% and 11.8%) in Kamuli in the financial year of 2014/2015 (DHO's report, 2015)

1.3 Statement of the Problem

Still birth and early neonatal mortality is a public health concern worldwide (Yego*et al*., 2014). It reflects on the quality of maternal health care in a given society. Despite the availability of peri-natal care services which include among others; Antenatal care, Emergency obstetric care, Provision of essential care during postnatal period, Immunization and eMTCT in Kamuli district, there are persistently high fetal and early neonatal death rates which now stand at 38.2% and 11.8% respectively (DHO report, 2015) and besides, the factors influencing this trend of fetal and early neonatal death rates within Kamuli district are not well understood.

In Kamuli district, efforts to improve newborn health have focused on influencing the supply side, which usually involve training of health workers in both comprehensive and basic emergency obstetric care, provision of life saving commodities and health education. Besides, fewer interventions have been directed towards influencing the community since previous efforts were geared at improving safe motherhood and child health neglecting newborn care hence not achieving the millennium Development Goal 4. Furthermore, United Nations Organization has developed 20 Sustainable Development Goals (SDGs) to be achieved by year 2030 and among them is Goal 3 Target 3.2 and in Uganda it can only be achieved if there is a deliberate effort to reduce the high fetal and early neonatal death rates.

The suspected factors responsible for fetal and early neonatal death include direct, indirect and underlying factors. Mbonye *et al*. (2012) in their study observed that neonatal mortality rates have stagnated. Therefore, the study examined the maternal and neonatal risk factors associated with fetal and early neonatal deaths that provided insights into the circumstances surrounding fetal and early neonatal mortality in health facilities in Kamuli district, Uganda.

1.4. Study Objectives

1.4.1. General Objective

To assess the risk factors associated with fetal and early neonatal deaths in health facilities in Kamuli district, Uganda.

1.4.2 Specific Objectives were

1. To determine obstetric factors related to fetal and early neonatal deaths in health facilities in Kamuli district, Uganda.
2. To assess the perinatal healthcare service factors related to fetal and early neonatal deaths in health facilities in Kamuli district, Uganda.
3. To determine neonatal factors related to fetal and early neonatal deaths in health facilities in Kamuli district, Uganda.

1.5 Research Questions

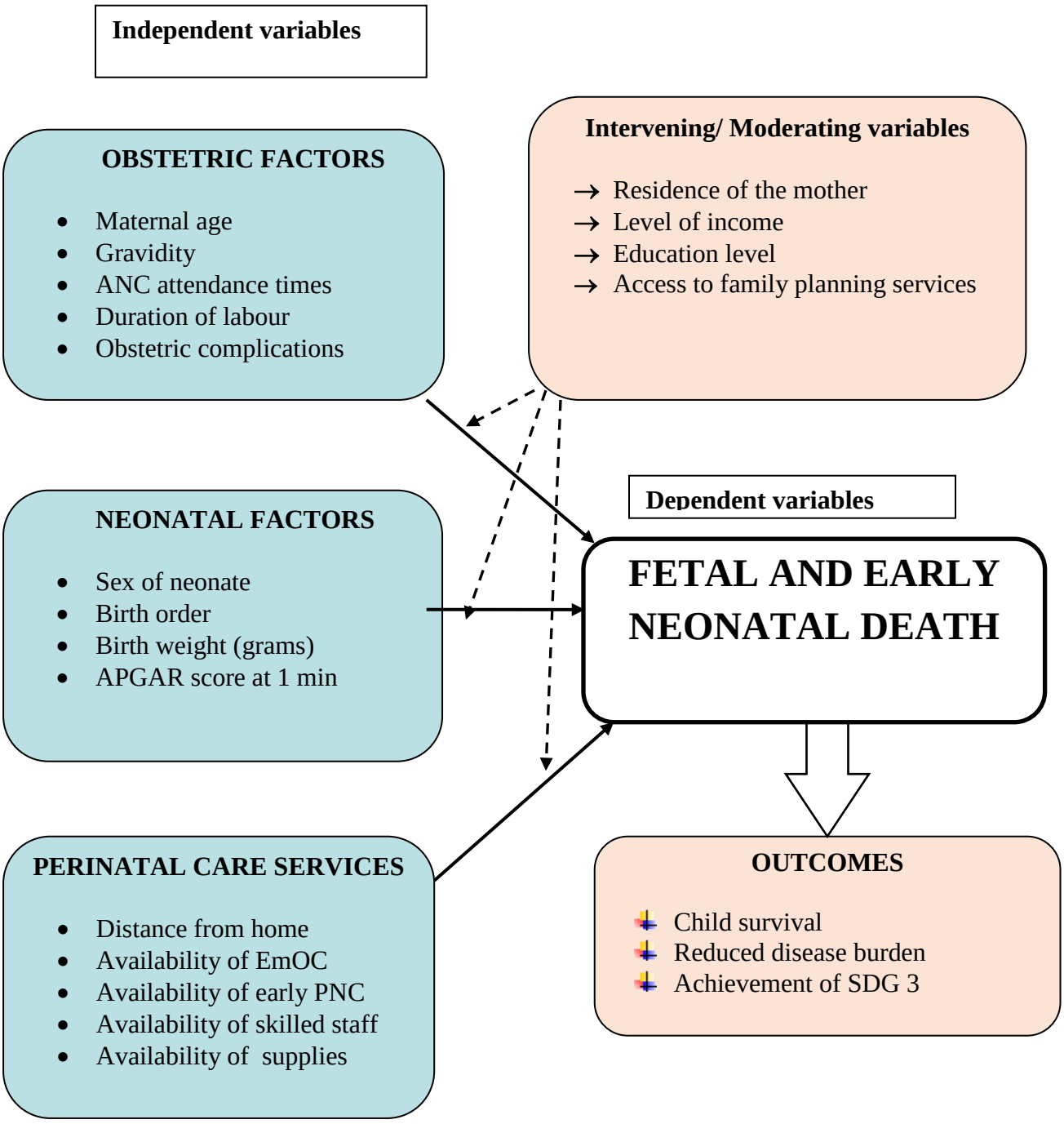
1. What are the obstetric factors that are related to fetal and early neonatal deaths in health facilities in Kamuli district, Uganda?
2. What are the perinatal healthcare services factors that are related to fetal and early neonatal deaths in health facilities in Kamuli district, Uganda?
3. What are the neonatal factors that are related to fetal and early neonatal deaths in health facilities in Kamuli district, Uganda?

1.7 Justification of the study

In Uganda as is the case with most developing countries, vital registration has a low coverage especially in rural areas (Dery, 2009). Death estimates are mainly derived from censuses and demographic surveys and each of these sources has its own limitations. At national level, child mortality can be assessed using the demographic health survey data; however, district-level assessment needs community-based data from other sources. Therefore, this study will contribute to further understanding of maternal and other risk factors of fetal and early neonatal deaths that are important for proper planning and development of interventions. Additionally, the findings from the study will help bridge the information gap and enable the DHT and other stakeholders to formulate appropriate interventions to address fetal and early neonatal deaths in the district.

The study findings may help in guiding the policy makers specifically ministry of health when drafting new policies in line with strengthening the interventions aimed at reducing the risk factors that are linked with fetal and early neonatal mortality. Once in place, these interventions will be able to address the problem of fetal and early neonatal death. Thus contribute to achieving the sustainable development goal (SDG) 3 target 3.2. Further, the study findings will help generate information for government and other development partners in developing a comprehensive maternal and early neonatal health care package.

1.8 Conceptual Framework



Narrative of the Conceptual Framework

There are several factors which influence fetal and early neonatal death, these include; obstetric factors, neonatal factors and perinatal health care services. They directly or indirectly affect fetal and early neonatal mortality. Obstetric factors include maternal age, gravida, number of antenatal clinics attended, and duration of labour and obstetric complications. Neonatal factors include; sex of neonate, birth order, birth weight in grams and Apgar score at one minute. Peri-natal care services include; distance from home to the nearest health facility, health education on neonate care, availability of EmOC, availability of early post natal care, skilled health workers and availability of supplies.

These factors act singly or in a combination to cause death, so in practice it is hard to point out one cause of death with a high degree of certainty.

Intervening/ moderating variables are other factors which influence fetal and early neonatal mortality and these include; residence of the mother, level of income, education level and access to family planning services.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviewed existing literature on the risk factors that are linked with the fetal and early neonatal deaths. It consisted of obstetric factors, peri-natal care services and neonatal factors. The review of the literature was done according to chronological order of the objectives.

2.2 Obstetric factors

2.2.1 Maternal age

The age of a pregnant mother could have an influence on the occurrence of fetal and early neonatal deaths. According to a study by Sangeber-Dery (2009) in Ifakara demographic surveillance survey area in rural Tanzania, it was revealed that pregnant mothers who were aged less than 20 years were more likely to have fetal and early neonatal deaths compared to pregnant mothers aged 20-34 years, and 35 years and above(Sangeber-Dery ,2009). Furthermore, a study carried in the labor ward and neonate intensive care unit at Mulago National Referral Hospital in Kampala, revealed that the age of pregnant mothers do influence the occurrence of fetal and early neonatal deaths (Musooko*et al*., 2014). The study found that higher maternal age (P=0.022) was significantly associated with lower risk of early neonatal mortality (Musooko*et al*., 2014).Contrary to the above findings, another study carried out in three rural districts of Pallisa, Kibuku and Kamuli in eastern Uganda, found that newborns whose mothers were between the age group of 35-39 years were more likely to have fetal and early neonatal death compared to those whose mothers belonged to the age group of 25-29 years and 15-19 years (Kananura*et al*., 2016). The above findings are inconsistent and therefore requires further research hence the purpose of this study.

2.2.2 Gravidity and fetal /early neonatal deaths

According to Ouyang *et al*. (2013) in their analyses of data from Global survey collected in 23 developing countries in Africa, Asia and Latin America, gravidity has an influence on the fetal and early neonatal death . Furthermore, women whose first pregnancies had either ended in stillbirths or live newborns that died in neonatal period were found to have a higher risk of experiencing exactly the same tragedy in their subsequent pregnancies. Therefore, identification of risk factors for such women would allow them to be closely monitored for various fetal and maternal complications, with the aim of increasing their chances of delivering healthy babies .According to a study by Poudel (2013) carried out in Nepal using data for Demographic and Health Survey 2011, women with gravidity of five and above had a higher risk of fetal and neonatal death compared to primigravida. Furthermore, frequent births as well as high gravidity predispose both the mothers and neonates to higher risks of unfavorable outcomes (Poudel, 2013). In another study by Dahiru (2015) carried out in Nigeria using demographic and health survey 2013, women with high parity of five and above were found to be linked with increased risk of early neonatal death compared to women with parity of four and below (OR=1.09, 95% CI: 1.04-1.15) (Dahiru, 2015).This study in Kamuli therefore will seek out to assess the relationship between gravidity of mothers in the district and the fetal and neonatal deaths.

2.2.3 Antenatal clinic attendance times

According to a study by Engmann*et al*. (2009) carried out in four health districts of the Equator Province in northwest Democratic Republic of Congo, it was revealed that the risk of occurrence of stillbirth or early neonatal deaths is two times higher in pregnant mothers who did not attend

any antenatal care clinics compared to those women who received at least one ANC visit in a health facility. Further, a study byMålqvist (2011) carried out in QuangNinh province in northern Vietnam, revealed that pregnant mothers who had not attended any ANC visit, and had three times higher risk of experiencing neonatal death than pregnant women who had attended at least one Antenatal clinic. Furthermore, pregnant women who did not attend antenatal care and who also delivered at home were at an even higher risk of experiencing fetal and early neonatal deaths. This implies that antenatal care attendance and place of delivery were significantly linked with fetal and early neonatal death (Milqvist, 2011).

In another study by Mpembeni*et al.* (2014) carried out in three municipal council hospitals of Ilala, Kinondoni and Temeke, Dar es Salaam region, Tanzania revealed that antenatal care visits were significantly associated with fetal and early neonatal death ($P<0.05$). Mothers who had attended ANC at most three visits were two times more likely to have a perinatal death compared to mothers who attended more than three times (Mpembeni*et al*., 2014). In another study by Yego*et al.* (2014) conducted at Moi Teaching and Referral Hospital (MTRH) in UasinGishu County in the Rift Valley Province of Kenya, revealed that the number of antenatal care visits ($P<0.001$) was significantly associated with fetal and early neonatal mortality. Further, Debelew*et al.* (2014) in their study carried out at Jimma zone, Oromia Regional State, southwest Ethiopia; found that antenatal care attendance was significantly linked with reduced risk of neonatal death. This is due to the fact that pregnant women with danger signs may be screened and treated promptly (Debelew*et al*., 2014).

More still, a study by Li *et al.* (2015) carried out in the five rural counties of Shaanxi province of northwestern China, it revealed that antenatal health care attendance in the first twelve weeks of pregnancy significantly decreases neonatal mortality rate. The risk of neonatal deaths for

mothers who did not attend antenatal care clinics in their first trimester of pregnancy was 2.5 times higher compared to those who attended. Furthermore, mothers who had attained at least junior school level of education had reduced risk of neonatal mortality since they could easily recognize the danger signs of pregnancy and delivery and immediately seek medical services compared to their counterparts (Li *et al*., 2015).

In another study by Dahiru (2015) carried out in Nigeria using the demographic and health survey data 2013, attending ANC at least four times was significantly related to reduced risk of early neonatal death. Furthermore, women with at least primary education, being either in middle or rich wealth index as well as delivering in a health facility were linked to reduced risk of early neonatal death (Dahiru*et al*, 2015).

2.2.4: Duration of labour

According to their study by Yego*et al*. (2014) conducted at Moi Teaching and Referral Hospital (MTRH) in UasinGishu County in the Rift Valley Province of Kenya, it was revealed that prolonged labour of more than 8 hours was significantly associated with fetal and early neonatal deaths (Yego*et al*., 2014). Similarly, another study by Mpembeni*et al*. (2014) carried out in three municipal council hospitals; Ilala, Kinondoni and Temeke, Dar es Salaam region, Tanzania, found that prolonged and obstructed labour was significantly linked with fetal and early neonatal death, 44 (22%) of all deaths were caused by prolonged and obstructed labour.

2.2.5: Obstetric complications

According to Titaley*et al.* (2008) in their study conducted using the 2002-2003 Indonesia Demographic and Health Survey carried out in 26 provinces, it revealed that 81% of neonatal deaths were due to mothers who experienced obstetric complications during delivery compared

to mothers with no complications. Furthermore, another study by Nakimuli*et al*. (2015) at Jinja Regional Referral Hospital and Mulago National Referral Hospital found that severe obstetric complications significantly contributed to fetal and early neonatal deaths. Neonates whose mothers have had severe obstetric complications were found to be at a higher risk of morbidity and death.

Furthermore, a study conducted in Dar es Salaam region in Tanzania revealed that women with history of previous adverse pregnancy outcome had three times increased risk of fetal and early neonatal death (Mpembeni*et al*., 2014).Additionally, women who had hypertension during pregnancy, had their odds of experiencing perinatal death seven times higher compared to mothers who had no hypertension during pregnancy (Mpembeni*et al*., 2014). Another study carried out in Jimma zone, Oromia regional state, southwest Ethiopia revealed that the risk of maternal obstetrics complications during labour were seven times more likely to cause neonatal death (Debelew*et al*., 2014). Further, a study by Abdullah *et al*. (2016) carried out at Nusa TenggarTimur province in eastern Indonesia found that complications during pregnancy and mothers having a history of obstetric complications were considerably related to fetal and early neonatal deaths. The risk of neonatal mortality was 80% higher compared with neonates whose mothers had none of these complications. It is not clear whether similar factors could be influencing fetal and early neonatal deaths in Kamuli district hence the purpose of this study.

2.3 Perinatal care services and fetal and early neonatal deaths

2.3.1: Distance from homeand fetal and early neonatal deaths: According to a study by Pilkington *et al*. (2014) carried in France using data from the French National Vital Statistics Registry, there was no association between distance from the health maternity facility and fetal and early neonatal deaths. Fetal and neonatal death rates were highest for mothers living at a

distance of less than 5km from a health maternity facility (Pilkington *et al*., 2014). Similarly, According to Lohela*et al*. (2012) in their study conducted in Malawi and Zambia using data from two Demographic and Health Survey (DHS) of Malawi (DHS-2004) and Zambia (DHS-2007) found that there was no relationship between distances from home to the nearest health facility in both countries and adverse pregnancy outcomes. Contrastingly, in Malawi the distance to health facility and early neonatal death were not statistically linked, while in Zambia, distances that were longer were statistically associated with greater chances of survival for neonates (Lohela*et al.,* 2012).

Contrary to the above, Owais *et al*. (2013) in their study in Karimganj rural sub-district of Kishoreganj and Katiadi sub-district of Bangladesh found that less than 20% of pregnant mothers delivered at a health facility. The high percentage of deliveries home was due to the difficulty in accessing health care facilities (Owais *et al.,* 2013). Furthermore, educational level of mothers was significantly associated with health seeking behaviors. Newborns who survived up to the age of three months, their mothers were literate compared to those who were stillborn or died within 28 days of life. Similarly, a study by Gizaw *et al.* (2014) carried out in Gurage Zone, Butajira Rural Health Programme, Butajira district, south central Ethiopia; found that the risk of death for newborns whose mothers were living in a distance of 5-9km away from the hospital was 1.5 times higher than those who lived within 5km radius. Neonatal mortality was increasing with long travel time to hospital in Butajira district (Gizaw *et al*., 2014). In contradiction to the above findings, the same study found that a distance farther than 10 km had no considerable outcome on neonatal death (Gizaw *et al*., 2014). Similarly, another study by McKinnon *et al*. (2014) carried out using household survey data from Ethiopia's 2011 Demographic Health Survey found

that other socio-economic determinants remaining constant, distance from home to the nearest health delivery facility was linked to lower early neonatal death in rural Ethiopia.

2.3.3 Availability of emergency obstetric care

According to the study by Yego*et al*. (2014) at Moi Teaching and Referral Hospital (MTRH) in UasinGishu County in the Rift Valley Province of Kenya, pregnant mothers who experience obstetric complications may both be saved if emergency obstetric care is available. The availability of a skilled medical doctor at birth increases proper management hence decreases maternal and early neonatal deaths (Yego*et al*., 2014). Further, a study in Karimganj rural sub-district of Kishoreganj and Katiadi sub-district of Bangladesh found that 63% of all deaths in their study were either fetal or early neonatal deaths which imply lack of access to quality obstetric care during labour and delivery (Owais*et al*., 2013). These deaths could have been prevented if pregnant women are able to access quality healthcare on time (Owais*et al*., 2013). Similarly, a study conducted at the labor ward and the neonatal intensive care unit of Mulago Hospital, Kampala, Uganda found that poor fetal monitoring during labor was significantly related to increased risk of early neonatal death (Musooko*et al*., 2014). Furthermore, newborns whose mothers were referred as emergencies were more likely to die in the early neonatal period (P=0.003) (Musooko*et al*., 2014).

2.3.4 Availability of early post natal care

According to Titaley*et al*. (2008) in their study which examined the 2002-2003 Indonesia Demographic and Health Survey data that was conducted 26 provinces there was a considerable decrease in the risks associated with neonatal death by 37% for new born who received early postnatal care checks compared to those who did not receive any health care immediately after

birth. Postnatal care services received by newborns showed a significant protective effect, hence an indicator of health care service utilization after delivery. Furthermore, in Indonesia, each newborn within the period of 0-7 days is recommended to receive two basic health care checks and from 8-28 days the newborn was to be examined for illness and mothers was to be provided information on appropriate newborn care (Titaley*et al*., 2008). In another study by Abdullah *et al*. (2016) carried out at Nusa TenggarTimur province in eastern Indonesia, found that fetal and early neonatal deaths was considerably related to neonatal complications at delivery . The risk of neonatal mortality was 80% higher compared with neonates who had no complications at the time of delivery which is an indicator of lack or poor quality early perinatal care services (Abdullah *et al.*, 2016).

Similarly, a secondary analysis of Nigeria Demographic and Health Survey 2013 found that having postnatal care within 48 hours after delivery reduces the risk of early neonatal death (Dahiru, 2015). Additionally, a study in Oromia regional state, southwest of Ethiopia, found that newborns who received good comprehensive care during the neonatal period were 10 times less likely to die (Debelew*et al*., 2014).

Conversely to the studies above, a study conducted in Latifabad, Hyderabad, Pakistan in four of 12 administrative units, revealed that there were 53 neonatal deaths with 45% of the deaths occurring in the first 48 hours and 73% within 7 days (Jehan*et al*., 2009). Surprisingly, 80% of newborns who died were born in a hospital or maternity clinic, and 69% were delivered by a doctor (Jehan*et al*., 2009). Further, thirty-five per cent of neonates who died and 55% of those that occurred within 48 hours followed delivery by Caesarean section. The findings show that early postnatal care was relatively high despite the high mortality of neonates (Jehan*et al*., 2009). Furthermore, another study carried out in six developing countries; South Africa, Egypt,

Argentina, India, Peru, and Viet Nam revealed that 62% of early neonatal deaths were due to prematurity, 28.7% were spontaneous preterm delivery and 23.6% were due to hypertensive disorders and all these occurred in a hospital setting where intensive neonatal care is available (Nguyen Ngoc, 2006). The above studies show mixed results regarding roles played by early postnatal care in relation to fetal and early neonatal deaths hence the objective of this study.

2.3.4: Availability of supplies and fetal and neonatal deaths

According to Ministry of Health (MOH) (2007), Uganda experiences shortages of essential equipment and supplies. Further, the 2004 Status of EmOC in Uganda report indicates that 77.5% of districts lacked specific signal functions for EmOC (MOH, 2007). Additionally, only 42% of district hospitals and 31.5% of HC IVs had oxytocics in stock, while most health units including referral hospitals had stock-outs of key antibiotics yet these medicines are essential for neonatal care (MOH, 2007). This study therefore seeks to find out the effect of stock out of supplies on fetal and early neonatal deaths.

2.4 Neonatal factors and fetal and early neonatal deaths

2.4.1 Sex of neonate and fetal and early neonatal deaths: According to Hafizur*et al*. (2010) in their study in Matlab, a rural sub district of Bangladesh found that male newborns had a higher risk of experiencing fetal and early neonatal mortality than females. Male neonates accounted for 54.8% deaths compared to 45.2% for females (Hafizur*et al*., 2010). Similarly, another study was conducted in Karimganj, a rural sub-district of Kishoreganj and Katiadi sub-district of Bangladesh found that males accounted for 60% of fetal and early neonatal mortality. The research is consistent with the well-known view that the rate of survival for girls during the neonatal period is higher compared to boys (Owais*et al.,* 2013). Further, a similar study at

Dezyani hospital in Gorgan, North of Iran found that the sex of a neonate is closely associated with fetal and early neonatal deaths (Mirfazeli*et al*., 2014).

More still, another study by Sangeber-Dery (2009) in Ifakara demographic surveillance survey area in rural Tanzania found that female neonates have higher chances of survival than male neonates. Newborn girls are biologically advantaged to survive on their first birthday

This study showed that females have higher survival chances than their male counterparts. (Sangeber-Dery, 2009). However, it is not clear whether the above trend is similar to the local situation Kamuli district hence the objective of this study

2.4.2 Birth order and fetal and early neonatal deaths

According to the study by Sangeber-Dery (2009) in Ifakara demographic surveillance survey area in rural Tanzania, first births and six or more birth orders were significantly linked to fetal and early neonatal mortality compared to second-to-fifth birth order. Further, the higher death rates among the first and higher (6 and above) are due to the fact that the birth order reflects the infant's components of biological endowment (Sangeber-Dery, 2009). Furthermore, he observed that the influence of birth order on fetal and early neonatal deaths it mainly depends on the cultural, social and historical context in which the studies are conducted.

2.4.3 Birth weight and fetal and early neonatal deaths

According to a study by Kidando (2009) conducted at Muhimbili National Hospital in Dar es Salaam, Tanzania, birth weight of less than 2500grams of newborns is major contributor to neonatal and post neonatal deaths. It was further noted that both pre-term birth and low birth weight were significantly related to pregnant women with severe anaemia (Kidando, 2009). Furthermore, another study carried out in Latifabad, Hyderabad, Pakistan in four of 12

administrative units, found that neonates weighing less than 2500 grams were linked to stillbirths and early neonatal deaths; where 54% of neonates who died weighed less than 2500 grams and 87% of low birth weight newborns were preterm (Jehan, 2009). Similarly, a study by Titaley*et al*. (2008) using the 2002-2003 Indonesia Demographic and Health Survey conducted in 26 provinces revealed that birth weight was a strongly associated with neonatal mortality. The risk of mortality for newborns of low birth weight less than 2500grams was 5.5 times greater than the normal weight of newborns of between 2500-3500grams (Titaley*et al*., 2008). However, it is not clear whether this is the same situation locally thus needed for this research to be carried out.

2.4.3 APGAR score and fetal and early neonatal deaths

According to Abdullah *et al*. (2016) in their study carried out at Nusa TenggarTimur province in eastern Indonesia, newborns with low Apgar scores were six times at the risk of death compared with neonates with normal Apgar scores. Furthermore, neonates with low birth weight and low Apgar scores, the risk of neonatal death was 28 times higher than those with normal Apgar scores (Abdullah *et al*., 2016). Oliveira (2012) in a study at a hospital São Paulo City, Brazil found a positive association between perinatal mortality and Apgar score of less than 4 at 1 minute. However, the same study found that the risk of perinatal deaths associated with low Apgar score at 1 minute was highly dependent on birth weight where those having weight < 1,000 g and Apgar score< 4 in the 1st minute having greater mortality compared to the group that had birth weight ≥ 3,000 g and Apgar score< 4 (Oliveira, 2012). This seems to suggest that Apgar score itself may not predict perinatal mortality. This is supported by the finding of the study that the rate of mortality and low weight among newborns with Apgar 8-10, was two times greater than in those with weight > 2,499 g (Oliveira, 2012).

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter focused on methods that were employed in conducting the study. The chapter consists of study area, study design, study population, sample size and selected sampling techniques and procedures, data collection methods and instruments and quality control measures. It further described the data processing and analysis that was employed in the study as well as possible study limitations and dissemination plans.

3.2 Study area

The study was conducted at Kamuli general hospital, located in Kamuli municipality, Namwendwa HC IV in Bugabula south health sub-district and Nankandulo HC IV in Buzaaya health sub-district, Kamuli district which is located in East Central Uganda in Busoga region.

Kamuli General Hospital is a public health facility located within Kamuli municipality,Kamuli district. The hospital serves approximately 630,255 people from Kamuli district and the neighbouring districts of Jinja, Buyende, Luuka, Kaliro and Kayunga (DHO report, 2015/16). The hospital has a bed capacity of 200 beds, with 32 maternity beds, and conducts over 1900 deliveries per year. The hospital has several wards, which include; maternity, female, male and pediatric wards. The hospital has 71% staffing level (DHO report, 2015).Kamuli general hospital has a reproductive health wing which consists of antenatal clinic, maternity ward and a family planning unit. The maternity ward consists of labour suite, newborn unit and postnatal ward with a capacity of 32 beds (DHO report, 2015).

Nankandulo HC IV is a public health facility in Buzaaya HSD, Kisozi sub-county, Nankandulo parish in Kamuli district. The health facility serves approximately 159,666 people from various sub-counties like Wankole, Bugulumbya, Mbulamuti and Nawanyago.

Nankandulo HC IV is also a referral for lower level facilities from the neighboring sub-counties in Kamuli district (DHO report, 2015/16). The health facility has a bed capacity of 40 beds, with 10 maternity beds, and conducts over 1146 deliveries per year.

Nankandulo HC IV has several wards, which include; maternity, female, male and pediatric wards. The health centre has 60% staffing level (DHO's report 2015). The health facility has a reproductive wing which consists of antenatal clinic, maternity ward and a family planning unit. The maternity ward consists of labor suite, a combined newborn unit and postnatal ward with a capacity of 10 beds (DHO's report, 2015).

Namwendwa HC IV is a public health facility like Nankandulo HC IV. It is located in Bugabula south HSD, Namwendwa town council in Kamuli district. The health facility serves approximately 170,757 people from various sub-counties of Butasa, Bulopa and Kitayunjwa. In addition, Namwendwa HC IV is also a referral for lower level facilities in the aforementioned sb-counties in Kamuli district (DHO report 2015/16). The health facility has a bed capacity of 40 beds, with 10 maternity beds and conducts over 2291 deliveries per year.

Namwendwa HC IV has several wards, which include; maternity, female, male and pediatric wards and an operating theatre. The facility has 78% staffing level (DHO report 2015/16). The staff work on wards in two shifts of twelve hours and other nurses work in different departments of the facility (DHO report 2015/16). The health facility has a reproductive wing consisting of

antenatal clinic, maternity ward and a family planning unit. The maternity consists of labour suite, a combined newborn unit and postnatal with a capacity of 15 beds (DHO report 2015/16.

3.3 Study design

This was a case-control study and involving the review of medical admissions records for maternity wards and newborn units at the hospital and health centre IV facilities from 1st July 2014 to 30th June 2016.

A Case was defined as a stillbirth (fetal death) or a neonate who died within seven days of birth (early neonatal death) and a control was defined as a surviving neonate born within the same period as the cases. The cases and controls were compared to identify factors that are responsible for the stillbirths and neonatal deaths at Kamuli General Hospital, Namwendwa and Nankandulo health centre IV. The time period was purposely chosen to ensure that the study period is as close as possible to the current time.

3.4 Sources of data

3.4.1: Primary data sources: Primary Data was was got from the key informants who were from the DHO's officer for Kamuli district and all the registered midwives from Kamuli general hospital, Namwendwa HC IV and Nankandulo HC IV, who were all in-charges of maternity.

3.4.2: Secondary data sources: Secondary Data was extracted from the medical records of patients admitted to the maternity wards and newborn units at Kamuli general hospital, Namwendwa HC IV and Nankandulo HC IV from 1st July 2014 and 30th June 2016.

3.5 Study population

The study population consisted of neonates who attended the maternity wards and the newborn units at Kamuli General Hospital, Namwendwa HC IV and Nankandulo HC IV from1st July 2014 to 30th June 2016.

3.6 Sample size and sample size calculation

Sample size was determined using James Schlesslman (1982) model for case-control studies, whereby the number of subjects to be selected depends on the specified values as shown below:

Estimated exposure rate among controls =Po

A hypothesized relative risk (estimated by odds ratio) associated with exposure that would be sufficient for public health importance to warrant its detection 'R' which is assumed to be 2.

$Z\alpha$ = standard normal value corresponding to the required level of significance for 0.05=1.96

Z_β= standard normal value corresponding to required power of study for 80% =0.84

n = number of the required sample size of the case.

The desired level of significance for this study α is 5%

The desired power of this study β is 80%

For every case, 2 controls will be taken. Hence a ratio 1:2 for cases and controls respectively

Using the formula;

$$n = \frac{(1+1/C)\, PQ\, (Z\alpha+Z_\beta)^2}{(P_i - P_o)^2}$$

Where

C =2
Z_α =1.96
Z_β = 0.84
P_o = Proportion of fetal and early neonatal deaths =0.5(50% of the pregnant women experienced fetal death or early neonatal death, Kamuli financial report 2014/2015).
$P_i = P_oR/1+ P_o(R-1)$ =0.667
$P = (P_i+CP_o)/1+C$ =0.556
Q = 1-P = 0.444

Therefore, substituting the values above in the formula;

$n= (1+1/2)\ 0.556x\ 0.444\ (1.96+ .84)^2/(0.667-0.5)^2$ =104 cases

Since we have a ratio of 1: 2 for cases to controls;

No. of controls= 2n= 2x 104= 208 controls

Hence, the sample size n= 104 cases, and controls(C) =208

Therefore, the total sample size for the study was 312 (104 cases and 208 controls).

3.7 Sampling procedures

The study team reviewed records of fetal from the maternity wards as well as the records of all early neonatal deaths from the newborn units of Kamuli General Hospital, Namwendwa HC IV and Nankandulo HC IV which were purposively selected because they are the biggest health facilities in the district and have the largest proportion for fetal and early neonatal deaths.

Each case of stillbirth or early neonatal death was assigned a unique identification number. The numbers were written on small pieces of separate papers which were put in a container, and then simple random sampling was used to select the cases.

Following this, the researcher identified the time period in which each case was delivered and identified the live births that occurred within the same week with the case. If there were only two live births that occurred within the same week with a particular case, both of them were taken as

controls for that case. If there were more than two live births for a given case, then simple random sampling was used, as described above, to select two controls for that case.

The controls were matched for age and sex in order to eliminate confounding.

3.8 Study variables

3.8.1 Dependent variable: The dependent variable in this study was a stillbirth/fetal death or early neonatal death.

3.8.2. Independent variables

The independent variables were;

- The obstetric factors (including maternal age, gravidity, ANC attendance times, duration of labour in hours and obstetric complications)
- The peri-natal healthcare service factors (including distance from home, health education on neonatal care, availability of EmOC and availability of early PNC)
- The neonatal factors (including sex of neonate, birth order, birth weight (grams), Apgar score at 1 min and APGAR score at 10 min.)

3.8.3 Moderating /intervening variables

These included: Residence of the mother, Level of income, Education level, Access to family planning services

3.9 Exclusion and Inclusion Criteria

3.9.1 Inclusion Criteria: All documented cases of stillbirths, early neonatal deaths and live births that occurred within the maternity wards and the newborn units of Kamuli General Hospital, Namwendwa HC IV and Nankandulo HC IV from 1st July 2014 to 30th June 2016 were eligible for inclusion in the study.

3.9.2 Exclusion criteria

All cases of stillbirths, early neonatal deaths and live births that meet the inclusion criteria above but have missing medical records were excluded from the study.

3.10 Data collection method, tools, techniques and procedures

3.10.1 Quantitative data; Quantitative data was collected by the study team by conducting a review of medical records for all those who were admitted and managed at the maternity wards and the newborn units of Kamuli General Hospital,Namwendwa HC IV and Nankandulo HC IV from 1st July 2014 to 30th June 2016.

A structured "data extraction form" was used to extract data from the patients' medical records. The data collectors read through the patients' files identifying cases of fetal death and early newborn deaths first. This helped in sorting out those cases that do not meet the inclusion criteria and needed to be excluded from the study. This was followed by a detailed review of those identified as meeting the criteria for the inclusion in the study and extraction of data on specific variables from the medical records of the cases identified using the structured data extraction form. Once done with the cases, the same procedure was followed to collect data for the selected controls as well.

3.10.2 Qualitative data:

Qualitative data was collected from Key Informants with the aid of a Key Informant Interview Guide. The respondents included the District Health Officer, the District Nursing Officer, and the District Reproductive health focal person, the head of Maternity department of the hospital, the Ward In-charge, and the District Health Inspector.

3.11 Data analysis plan and presentation

3.11.2 Quantitative data: The units of analyses were adverse pregnancy outcomes. Data entry was done using Epidata version 3.0 and later exported to STATA version 13 for analysis. The analyses were done at univariate, bivariate and multivariate levels.

At univariate analysis level; variables were summarized using frequencies, and percentages. These were presented as descriptive statistics by objective in form of tables.

At bivariate analysis level; each independent variable was run against the dependent variable to determine any association present using chi-square test for independence and logistic regression. The independent variables that were found to have a p-value of 0.2 or less, and those that are known (from literature) to have a significant relationship with the dependent variable, were considered for inclusion into the multivariate model.

Multivariate analysis; A multivariate model was used for the variables that were significant at bivariate level of analysis for further analysis to determine risk factors for adverse pregnancy outcomes using conditional logistic regression analysis. Logical model building approach was used in the model building process.

3.11.2 Qualitative data: The qualitative data from the Key Informants was analyzed manually using manifest content analysis and the emerging themes were presented in form of quotations as verbatim in the text.

3.12 Quality control issues to minimize errors and eliminate bias

3.12.1: Training of Research Assistants

The Researcher trained two (2) Research assistants [Registered Nursing Officer (Midwifery)] to undertake the review of admission records at the study sites. Their prior knowledge about

obstetric, peri-natal and neonatal issues would be key achieving important deliverables for the data collection process to inform the study objectives.

3.12.2: Pre-Testing

Questionnaires, key informants and focus group discussion guides were pre-tested at Kamuli (Rubaga) Mission Hospital. It involved testing for wording, clarity of questions and adequacy of the instruments in addressing the study objectives. Research assistants were involved in the pre-testing to ensure that they were conversant with the study tools.

3.13 Ethical considerations

Permission and Clearance to conduct the study was obtained from the Institute of Public Health and Management, International Health Sciences University, and also sought ethical approval from the Research and Ethics Committee (REC) for International Health Sciences University (IHSU). Additionally, the Researcher sought permission from District Health Office, Kamuli Hospital Management, In-charges of Namwendwa and Nankadulo HC IVs to access patients' medical records, hence obtaining a waiver of consent from the individual mothers/care takers of the neonates all of who has well been discharged from the said health facilities under study.

Further, only the required data was extracted and no personal identification information was extracted. Data access was restricted to only the study team members thereby ensuring confidentiality and anonymity.

3.14 Limitations of the study

The sample size of 104 cases and 208 controls may be small for generalizing the study findings to all cases of fetal and early neonatal deaths. Further, the data was collected from Kamuli General Hospital, Namwendwa HC IV and Nankandulo HC IV, found in Busogas region

predominantly inhabited by the Basoga people and so the results of the study may not be representative of the whole country.

3.15 Dissemination plan

The report generated from the study shall be submitted to Institute of Public Health and Management, International Health Sciences University.

Additionally, a copy of the report shall be submitted to Kamuli District Health Office. Further, the researcher shall present the study findings at different national and international conferences related to maternal and child health care. In addition, the researcher will also share the study findings with different stakeholders with interest in maternal and child health care.

CHAPTER FOUR: RESULTS

4.0 Introduction

This chapter presents the findings following the critical analyses on the data collected. It specifically presents the findings related to the factors associated with fetal and early neonatal deaths in health facilities in Kamuli district. Data was collected from 102 Cases and 204 Controls. Specifically we looked at;

- obstetric factors related to fetal and early neonatal deaths
- perinatal healthcare service factors related to fetal and early neonatal deaths
- neonatal factors related to fetal and early neonatal deaths

Response rate: The total number of participants was 305 out of the 312 that had been calculated.

Figure 1: Response rate

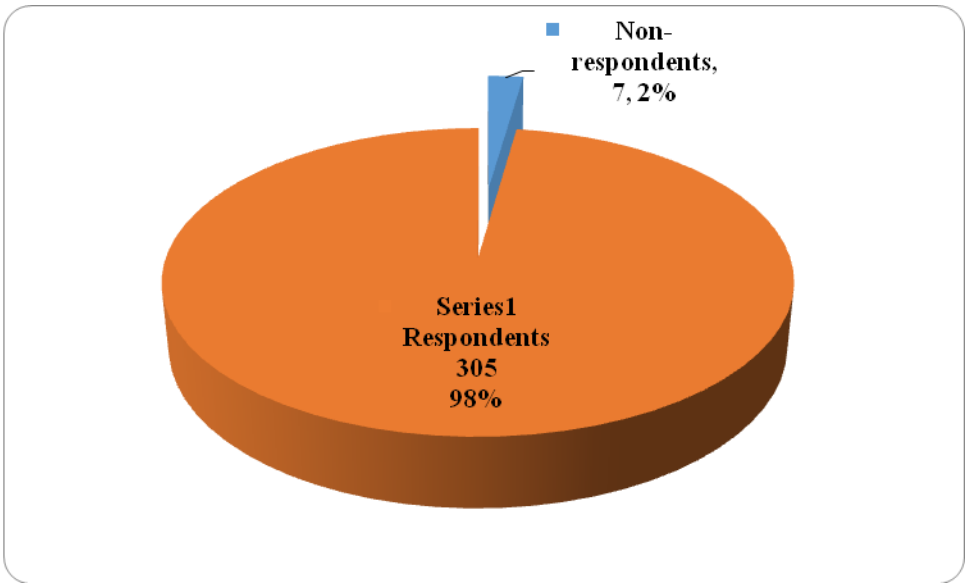


Figure 1 shows that only 7 (2.24%) participants did not respond, with a 97.76% response rate due to missing data in the client files.

4.1 Demographic characteristics of neonates (cases and controls)

Table 4.1.2: Univariate analysis of demographic characteristics

Variable	N	Percentage
Cases	102	33.44
Controls	203	55.56
Health facility		
Nankandulo HC IV	96	31.37
Namwendwa HC IV	96	31.37
Kamuli General Hospital	114	37.25
Education		
No education	12	20.00
Primary school	32	53.33
Secondary school and above	16	26.67
Maternal age		
18 years and below	41	13.53
19-35 years	234	77.23
35 years+	28	9.24
Baby's sex		
Male	155	50.82
Female	150	49.18
Preterm baby		
Yes	60	23.72
No	193	76.28

The study population was relatively evenly distributed through the three health facilities, as shown in Table 1 above. 53.33% (32) of the mothers had primary school as the highest level of education, and 77.23% (234) of the mothers were between 19-35 years of age. In addition, 50.82% (155) of the babies were males and majority, 76.28% (193), were not born prematurely.

The graph below illustrates that relationship between maternal age and birth weight. It shows that birth weight increased with maternal age among the cases; however, there was no such relationship noted among the controls.

4.2 Obstetric factors influencing fetal and early neonatal deaths

Predictor variable	Cases	Controls
Gravidity		
Primigravida	24(26.67%)	66(73.33%)
Multigravida	58(33.33%)	116(66.67%)
Grand multigravida	20(48.78%)	21(51.22%)
ANC attendance		
0-2	38(46.34%)	44(53.66%)
3	15(23.44%)	49(76.56%)
4+	49(31.21%)	108(68.79%)
Normal delivery		
No	33(82.50%)	7(17.50%)
Yes	66(25.68%)	191(74.32%)
Use of family planning		
Yes	31(23.85%)	99(76.15%)
No	58(44.62%)	72(55.38%)
Maternal age		
19-35 years	74(31.62%)	160(68.38%)
18 years and below	16(39.02%)	25(60.98%)
35+	11(39.29%)	17(60.71%)
Birth attendant's qualification		
Nurse/midwife	91(31.16%)	201(68.84%)
Doctor	8(80.00%)	2(20%)
Intra partum complications		
Yes	37(78.72%)	10(21.28%)
No	24(17.91%)	110(82.09%)
Gestation age at membrane rupture		
Normal gestation age	9(27.27%)	24(72.73%)
Premature	7(43.75%)	9(56.25%)
Education		
No education	6(50.00%)	6(50.00%)
Primary school	14(43.75%)	18(56.25%)
Secondary school and above	3(18.75%)	13(81.25%)
IPT received		
IPT 1 received	11(57.89%)	8(42.11%)

Received all IPT doses	67(28.76%)	166(71.24%)
Prolonged labour		
Yes	19(79.17%)	5(20.83%)
No	57(27.40%)	151(72.60)

As shown in table 4.2.1, 48.7% of the mothers were grand multi gravida, and 39.29 %cases were born to mothers above 35 and above.82 % of the babies born with assistance from a doctor and midwives. In addition, 56% of the babies were not born prematurely.

46.34% mothers attended antenatal clinics below 0-2 times and 78% of the mothers experienced complications.76% of the mothers who used family planning methods their babies survived.

Table 4.2.2 Bivariate analysis of Obstetric factors

Predictor variable	Cases	Controls	Crude OR(95% CI)	P value
Gravidity				
Primigravida	24(26.67%)	66(73.33%)	Ref	
Multigravida	58(33.33%)	116(66.67%)	1.43(0.62 - 3.33)	0.404
Grand multigravida	20(48.78%)	21(51.22%)	2.70(1.42 - 5.15)	0.002*
ANC attendance				
0-2	38(46.34%)	44(53.66%)	Ref	
3	15(23.44%)	49(76.56%)	0.37(0.32 - 0.42)	p<0.001*
4+	49(31.21%)	108(68.79%)	0.54(0.50 - 0.58)	p<0.001*
Normal delivery				
No	33(82.50%)	7(17.50%)	Ref	
Yes	66(25.68%)	191(74.32%)	0.08(0.04 - 0.16)	p<0.001*
Use of family planning				
Yes	31(23.85%)	99(76.15%)	Ref	
No	58(44.62%)	72(55.38%)	2.55(1.47 - 4.44)	0.001*
Maternal age				
19-35 years	74(31.62%)	160(68.38%)	Ref	
18 years and below	16(39.02%)	25(60.98%)	1.39(0.73 - 2.66)	0.316
35+	11(39.29%)	17(60.71%)	1.40(0.29 - 6.75)	0.672
Birth attendant's qualification				
Nurse/midwife	91(31.16%)	201(68.84%)	Ref	
Doctor	8(80.00%)	2(20%)	8.92(2.09 - 38.02)	

Intrapartum complications				
Yes	37(78.72%)	10(21.28%)	Ref	
No	24(17.91%)	110(82.09%)	0.06(0.02 - 0.16)	p<0.001 *
Gestation age at membrane rupture				
Normal gestation age	9(27.27%)	24(72.73%)	Ref	
Premature	7(43.75%)	9(56.25%)	2.10(1.05 - 4.21)	0.037
Education				
No education	6(50.00%)	6(50.00%)	Ref	
Primary school	14(43.75%)	18(56.25%)	0.77(0.41 - 1.46)	0.429
Secondary school and above	3(18.75%)	13(81.25%)	0.25(0.15 - 0.41)	p<0.001 *
IPT received				
IPT 1 received	11(57.89%)	8(42.11%)	Ref	
Received all IPT doses	67(28.76%)	166(71.24%)	0.30(0.21 - 0.41)	p<0.001 *
Prolonged labour				
Yes	19(79.17%)	5(20.83%)	Ref	
No	57(27.40%)	151(72.60)	0.10(0.08 - 0.13)	p<0.001 *

Statistically significant variable with 95% confidence

Figure 4.2.2 above, shows eleven obstetric factors that were associated with fetal and early neonatal deaths in health facilities in Kamuli district. These included; high gravidity, ANC attendance, normal delivery, use of family planning, maternal age, birth attendants qualification, Intra partum complications, gestation age of membrane rupture, education, receipt of IPT and prolonged labour.

Multigravida mothers were 1.43 times more likely to have fetal or early neonatal death compared to those who bore one child; however, this association was not significant (COR 1.43, 95% CI 0.62-3.33, P-value 0.404). on the other hand, mothers who had given birth to six or more children were 2.7 times more likely to have fetal or early neonatal deaths compared to those who

bore one child; (COR 2.70, 95% CI 1.42-5.15, P-value 0.002).Attending antenatal care clinics at least four times during pregnancy had 54% chances of not experiencing fetal or early neonatal death compared to two or no visits; (COR 0.54, 95% CI 0.50-0.58, P<0.001).

Mothers who delivered normally were 8% less likely experience fetal or early neonatal death, (COR 0.08, 95% CI 0.04-0.16, P<0.001).

Mothers who did not use family planning were 2.55 times more likely to experience fetal or early neonatal deaths compared to those who used family planning methods; (COR 2.55, 95% CI 1.47-4.44, P-value 0.001).

Mothers who had no Intra partum complications were 6% less likely to experience fetal or early neonatal death, (COR 0.06, 95% CI 0.02-0.16, P<0.001).

The odds of premature experiencing fetal or early neonatal death were 2.10 times higher compared to babies who were of normal gestation age, (COR 2.10, 95% CI 1.05-4.21, P-value 0.037).

Mothers who had attained primary school education were 7.7% less likely to experience fetal or early neonatal death compared to those with no education,(COR 0. 077, 95% CI 0.41-1.46, P-value 0.429). However, mothers who had attained secondary education and above were 25% less likely to experience fetal or early neonatal death compared to those with no education, (COR 0.25, 95% CI 0.15-0.41, P<0.001).

Mothers who were attended to by a doctor during delivery were 8.92 times less likely to experience fetal or neonatal deaths compared to mothers who were attended to by nurses/midwives ;(COR 8.92, 95% CI 2.09-38.02, P-value 0).

Mothers who received all IPT doses during pregnancy were 30% less likely to experience fetal or early neonatal deaths,(COR 0.30, 95% CI 0.21-0.41, P<0.001).

Mothers who did not experience prolonged labour were 10% less likely to suffer fetal or early neonatal death, (COR 0.10, 95% CI 0.08- 0.13, P<0.001).

In bivariate analysis; grand multi-gravida, ANC attendance of 3 times and more, normal delivery, use of family planning, birth attendant's qualification, intra-partum complications, gestation age of membrane rupture, education, IPT receipt and prolonged labour were all significantly associated with fetal or early neonatal deaths in Kamuli district health facilities.

Table 4.2.3 Multivariate analysis of Obstetric factors

Predictor variable	Cases	Controls	Adjusted OR(95% CI)	P value
Gravidity				
Primigravida	24(26.67%)	66(73.33%)	Ref	
Multigravida	58(33.33%)	116(66.67%)	1.46(0.82 - 2.60)	0.193
Grand multigravida	20(48.78%)	21(51.22%)	2.20(0.88 - 5.49)	0.091
ANC attendance				
0-2	38(46.34%)	44(53.66%)	Ref	
3	15(23.44%)	49(76.56%)	0.22(0.21 - 0.23)	p<0.001*
4+	49(31.21%)	108(68.79%)	0.44(0.25 - 0.76)	0.003*
Normal delivery				
No	33(82.50%)	7(17.50%)	Ref	
Yes	66(25.68%)	191(74.32%)	0.09(0.05 - 0.16)	p<0.001*
Use of family planning				
Yes	31(23.85%)	99(76.15%)	Ref	
No	58(44.62%)	72(55.38%)	2.64(1.53 - 4.55)	p<0.001*
Maternal age				
19-35 years	74(31.62%)	160(68.38%)	Ref	
18 years and below	16(39.02%)	25(60.98%)	0.79(0.21 - 2.91)	0.719
35+	11(39.29%)	17(60.71%)	0.84(0.09 - 7.94)	0.88
Birth attendant's qualification				
Nurse/midwife	91(31.16%)	201(68.84%)	Ref	
Doctor	8(80.00%)	2(20%)	0.37(0.03 - 5.31)	0.467

Statistically significant variable with 95% confidence

As shown in table 4.2.3 above, six obstetric factors were associated with fetal or early neonatal death in health facilities in Kamuli district. These included high gravidity, ANC attendance, having normal delivery, use of family planning, maternal age and the qualification of the person assisting during delivery. Mothers who had given birth to six children or more were 2.2 times more likely to have fetal or early neonatal death, compared to those who bore one child, controlling for other factors. However, this association was not significant (AOR 2.2, 95% CI 0.88-5.49, P-value 0.091).

Making three or more ANC visits, having a normal delivery and use of Family planning, were significantly associated with fetal or early neonatal deaths. Mothers who had made three ANC visits were 78% less likely to experience fetal or early neonatal deaths compared to those who had made one or no visits, controlling for other factors (AOR 0.22, 95% CI 0.21-0.23, $p<0.001$). Additionally, women who had made four or more ANC visits were 56% less likely to experience fetal or early neonatal deaths compared to those who had made two or less visits, controlling for other factors (AOR 0.44, 95% CI 0.25-0.76, P-value 0.003).

Women who also had a normal delivery were 91% less likely to experience fetal or early neonatal death, compared to those who had assisted delivery, controlling for other factors (AOR 0.09, 95% CI 0.05-0.16, $p<0.001$), controlling for other factors. In addition, 82.50% (33) of those that had assisted delivery gave rise to cases.

Mothers who had birth assistance from a doctor were 63% less likely to experience a fetal or early neonatal death compared to those who had got assisted by a nurse/midwife, holding other factors constant (AOR 0.37, 95% CI 0.03-5.31, P-value 0.467).

However, in the multivariate model, factors such as having Intra-partum complications, gestation age at rupture, education, receipt of IPT and prolonged labor were found not to be associated with fetal or early neonatal death in health facilities in Kamuli district.

4.3Perinatal healthcare service factors influencing fetal and early neonatal deaths

Table 4.3.1 Univariate analysis of perinatal healthcare service factors

Predictor variable	Cases	Controls
Apgar score timing		
<1 minute	73(53.14%)	67(47.86%)
≥ 5 minutes	24(15.29%)	133(84.71%)
Resuscitation done		
No	23(88.46%)	3(11.54%)
Yes	43(19.63%)	176(80.37%)
Artificial heat source used		
No	48(35.56%)	87(64.44%)
Yes	19(14.62%)	111(85.38%)
Tetanus Maternal immunization complete		
Yes	68(29.18%)	165(70.82%)
No	29(49.15%)	30(50.85%)

Table 4.3.1 above, shows the four perinatal healthcare service factors associated with fetal and early neonatal deaths in health facilities in Kamuli district. These included; Apgar score timing, resuscitation done, artificial heat source used and completion of tetanus maternal immunization course, and were all significantly associated with fetal or early neonatal deaths. Babies whose Apgar score was taken at 5 minutes were 15.29 % and 88.46% babies were not resuscitated.

Table 4.3.2: Bivariate analysis of perinatal healthcare service factors

Predictor variable	Cases	Controls	Crude OR	95% CI	P value
Apgar score timing					
<1 minute	73(53.14%)	67(47.86%)	Ref		
≥ 5 minutes	24(15.29%)	133(84.71%)	0.16	(0.10 - 0.26)	p<0.001*
Resuscitation done					
No	23(88.46%)	3(11.54%)	Ref		
Yes	43(19.63%)	176(80.37%)	0.03	(0.00 - 0.27)	0.002*
Artificial heat source used					
No	48(35.56%)	87(64.44%)	Ref		
Yes	19(14.62%)	111(85.38%)	0.32	(0.24 - 0.43)	p<0.001*
Tetanus Maternal immunization complete					
Yes	68(29.18%)	165(70.82%)	Ref		
No	29(49.15%)	30(50.85%)	2.24	(2.19 - 2.30)	p<0.001*

Statistically significant variable with 95% confidence

Table 4.3.2 above, shows the four perinatal healthcare service factors associated with fetal and early neonatal deaths in health facilities in Kamuli district. These included; Apgar score timing, resuscitation done, artificial heat source used and completion of tetanus maternal immunization course, and were all significantly associated with fetal or early neonatal deaths.

Babies whose Apgar score was taken at 5 minutes and above were 16% less likely to experience fetal or early neonatal deaths compared to babies whose Apgar score was taken at less than one minute, (COR 0.16, 95% CI 0.10-0.26, P<0.001).

Babies who had been resuscitated were 3% less likely to experience fetal or neonatal death compared to those who were not resuscitated, (COR 0.03, 95% CI 0.00-0.27, P-value 0.002).

Babies who received artificial heat source were 32% less likely to experience early neonatal deaths compared to those who did not receive any artificial source of heat, (COR 0.32, 95% CI 0.24-0.43, P<0.001).

Mothers who did not complete tetanus maternal immunization were 2.24 times more likely to experience fetal or early neonatal death compared to those who completed the dosage, (COR 2.24, 95% CI 2.19-2.30, P<0.001).

Table 4.3.3: Multivariate analysis of perinatal healthcare service factors

Predictor variable	Cases	Controls	Adjusted OR	95% CI	P value
Apgar score timing					
<1 minute	73(53.14%)	67(47.86%)	Ref		
≥ 5 minutes	24(15.29%)	133(84.71%)	0.36	(0.17 - 0.80)	0.012*
Resuscitation done					
No	23(88.46%)	3(11.54%)	Ref		
Yes	43(19.63%)	176(80.37%)	0.05	(0.00 - 0.54)	0.013*
Artificial heat source used					
No	48(35.56%)	87(64.44%)	Ref		
Yes	19(14.62%)	111(85.38%)	1.18	(0.47 - 2.93)	0.725
Tetanus Maternal immunization complete					
Yes	68(29.18%)	165(70.82%)	Ref		
No	29(49.15%)	30(50.85%)	2.27	(1.11 - 4.65)	0.026*

Statistically significant variable with 95% confidence

As shown in table 4.3.3 above, there were four perinatal healthcare service factors associated with fetal or early neonatal deaths in health facilities. These included Apgar score timing, resuscitation done, use of artificial heat source, and completion of maternal tetanus immunization

course. Three of these were significantly associated with fetal or early neonatal deaths, namely, Apgar score timing, resuscitation done, and completion of maternal tetanus immunization course.

Babies whose Apgar score was taken at five minutes and at 10 minutes were 64% less likely to experience early neonatal death compared to those who only had Apgar score taken at either one minute or even no recordings done (AOR 0.36, 95% CI 0.17-0.80, P-value 0.012). In addition, babies who received resuscitation were 95% less likely to experience early neonatal death compared to those who had no resuscitation done, controlling for other factors (AOR 0.05, 95% CI 0.00-0.54, P-value 0.013).

Women who had not received a complete course of tetanus vaccination were 2.27 times more likely to experience fetal/neonatal death, compared to those who had completed their tetanus vaccination course, holding other factors constant (AOR 2.27, 95% CI 1.11-4.65, P-value 0.026). However, babies that had received artificial heat source were 18% more likely to experience fetal/early neonatal death compared to those who did not get this exposure, but this association was not statistically significantly (AOR 1.18, 95% CI 0.47-2.93, P-value 0.725).

4.4Neonatal factors influencing fetal and early neonatal deaths

Table 4.4.1 Univariate analysis of Neonatal factors

Predictor variable	Cases n(%)	Controls n(%)
Apgar score		
<3	81(97.59%)	2(2.41%)
3-5	5(71.43%)	2(28.57%)
6-10	11(5.31%)	196(94.69%)
Birth order		
1-3	61(29.33%)	147(70.67%)
4-6	32(43.84%)	41(56.16%)
7+	9(37.50%)	15(62.50%)
Birth weight		
<1500g	7(43.75%)	9(56.25%)
1500 -2500g	5(11.36%)	39(88.64%)
≥2500g	11(6.92%)	148(93.08%)
Baby preterm		
Yes	39(65.00%)	21(35.00%)
No	43(22.40%)	149(77.60%)

As shown in table 4.4.1 above, there were four neonatal factors associated with fetal and early neonatal deaths in Kamuli district health facilities. These included; Apgar score, birth order, birth weight and being preterm.

Babies who had Apgar score <3 were 97.59% .Babies who were of birth order 7 and above were 37.50%

Babies whose birth weight was less than 1500g were 43.75% and babies born premature were 65.00%.

Table 4.4.2 Bivariate analysis of Neonatal factors

Predictor variable	Cases	Controls	Crude OR	(95% CI)	P valve
Apgar score					
<3	81(97.59%)	2(2.41%)	Ref		
5-Mar	5(71.43%)	2(28.57%)	0.077	(0.027-0.222)	p<0.001*
10-Jun	11(5.31%)	196(94.69%)	0.001	(0.001-0.003)	p<0.001*
Birth order					
3-Jan	61(29.33%)	147(70.67%)	Ref		
6-Apr	32(43.84%)	41(56.16%)	1.908	(1.375 - 2.647)	p<0.001*
7+	9(37.50%)	15(62.50%)	1.456	(0.984 - 2.155)	0.06
Birth weight					
<1500g	7(43.75%)	9(56.25%)	Ref		
1500 -2500g	5(11.36%)	39(88.64%)	0.170	(0.01 - 3.03)	0.228
≥2500g	11(6.92%)	148(93.08%)	0.100	(0.06 - 0.17)	p<0.001*
Baby preterm					
Yes	39(65.00%)	21(35.00%)	Ref		
No	43(22.40%)	149(77.60%)	**0.16**	**(0.11 - 0.23)**	p<0.001*

Statistically significant variable with 95% confidence

As shown in table 4.4.2 above, there were four neonatal factors associated with fetal and early neonatal deaths in Kamuli district health facilities. These included; Apgar score, birth order, birth weight and being preterm.

Babies who had Apgar score between 3 and 5 were 7.7% less likely to experience fetal or early neonatal death compared to babies whose Apgar score was less than 3, (COR 0.077, 95% CI 0.027-0.222, P<0.001). On the other hand, babies who had Apgar score between 6 and 10 were 0.1% less likely to experience fetal or early neonatal death compared to those who had Apgar score of less than 3, (COR,95% CI 0.001-0.003, P<0.001), which were both statistically significant.

Babies who were of birth order 4-6 were 1.908 times more likely to experience fetal or early neonatal death compared to those whose birth order were between 1 and 3,(COR 1,908, 95% CI 1.375-2.647, P<0.001), which was statistically significant. On the other hand, babies whose birth order were 7 and above were 1.456 times more likely to experience fetal or early neonatal death compared to those whose birth order was between 1 and 3, (COR 1.456, 95% CI 0.984-2.155, P-value 0.06), however, it was not statistically significant.

Babies whose birth weight was between 1500g and 2500g were 17% less likely to experience fetal or early neonatal death compared to babies whose birth weight was less than 1500g. (COR O.170, 95% CI 0.01-3.03, P-value 0.228), however, it was not statistically significant. On the other hand, babies whose birth weight was ≥2500g were 10% less likely to experience fetal or early neonatal death compared to babies whose birth weight was less than 1500g, (COR 0.100, 95% CI 0.06-0.17, P< 0.001), which was statistically significant.

Babies who were not premature were 16% less likely to experience fetal or early neonatal death compared to babies who were born prematurity, (COR 0.16, 95% CI 0.11-0.23, P<0.001), which was statistically significant.

Table 3.4.3: Multivariate analysis of Neonatal factors

Predictor variable	Cases	Controls	Adjusted OR (95% CI)	P value
Apgar score				
<3	81(97.59%)	2(2.41%)	Ref	
5-Mar	5(71.43%)	2(28.57%)	1.99(1.26 - 3.14)	0.003*
10-Jun	11(5.31%)	196(94.69%)	0.02(0.00 - 0.55)	0.022*
Birth order				
3-Jan	61(29.33%)	147(70.67%)	Ref	
6-Apr	32(43.84%)	41(56.16%)	1.92(1.39 - 2.66)	p<0.001*
7+	9(37.50%)	15(62.50%)	2.37(0.44 - 12.75)	0.315
Birth weight				
<1500g	7(43.75%)	9(56.25%)	Ref	
1500 -2500g	5(11.36%)	39(88.64%)	0.53(0.01 - 21.70)	0.739
≥2500g	11(6.92%)	148(93.08%)	0.37(0.13 - 1.04)	0.06*
Baby preterm				
Yes	39(65.00%)	21(35.00%)	Ref	
No	43(22.40%)	149(77.60%)	0.06(0.00 - 0.98)	0.048*

Statistically significant variable with 95% confidence

As shown in table 4.4.3 above, there were four Neonatal factors associated with fetal or early neonatal deaths in health facilities. These included Apgar score, birth order, birth weight, and being preterm.

Babies that had Apgar score of three to five (3-5) were 1.99 times more likely to experience fetal/early neonatal death compared to those that had a score of less than three (AOR 1.99, 95% CI 1.26-3.14, P-value 0.003). On the other hand, those whose score was six to ten (6-10) were 98% less likely to experience fetal/early neonatal death compared to those with a score of less than three, holding other factors constant (AOR 0.02, 95% CI 0.00-0.55, P-value 0.022).

Babies whose birth order was seven or higher were 2.37 times more likely to experience fetal/early neonatal death compared to those whose birth order was between one and three, but

this was not statistically significant (AOR 2.37, 95% CI 0.44-12.75, P-value 0.315). On the other hand, babies whose birth order was between four and six were significantly 1.92 times more likely to experience fetal/early neonatal death compared to those whose birth order was between one and three, controlling for other factors (AOR 1.92, 95% CI 1.39-2.66, p<0.001).

Babies who were not prematurely born were 94% less likely to experience fetal/early neonatal death compared to those who were premature, controlling for other factors (AOR 0.06, 95% CI 0.00-0.98, P-value 0.048).

In addition, babies whose birth weight was 2.5Kgs or greater were 63% less likely to experience fetal/early neonatal death compared to those with less than 1.5Kgs, controlling for other factors (AOR 0.37, 95% CI 0.13-1.04, P-value 0.06).

Additionally, the most frequently noted causes of neonatal death were Asphyxia (10%), fetal distress (6%), and IUFD (6%) and prematurity (6%). However, missing data could have reduced the magnitude of these causes of death.

4.5Qualitative findings on factors influencing fetal and early neonatal deaths

We also collected qualitative data from Key informants. These included: DHO‘s office, registered midwives from Kamuli general hospital, Namwendwa HC IV and Nankandulo HC IV.

4.5.1Obstetric factors influencing fetal and early neonatal deaths

The status of fetal and early neonatal deaths was revealed by of the key informers who said that;

> “*The status of fetal and early neonatal deaths in Kamuli district was still high (91/1000 live births) compared to that of the national target (51/1000 live births)*)”, **(KI, DHO’S Office)**

"This was equally high compared to that of the national target and was due to inadequate staffing and the unintended delays at the health facilities like Lack of gloves, emergence drugs and absence of a doctor to work on the emergence cases at that time". (**KI, Registered midwives Kamuli general Hospital, Namwendwa HC IV)**

"Lack of a functional emergency obstetric unit in Nankandulo HC IV may have lead to high of fetal and early neonatal deaths .in the district hence leading to a high fetal and early neonatal deaths (91/1000 live births) compared to that of the national target (51/1000 live births))",**(KI ,Registered midwife, Nankandulo HC IV)**

In response to obstetric factors that play a role in fetal and early neonatal deaths in the facilities, one key informer mentioned that;

"*Some of the unintended delays at the facilities lack of medical sundries and supplies like gloves, intravenous fluids. Absence of a doctor during emergency admissions may have increased the risk of fetal and early neonatal death. Some delays originated from mothers taking long to make decision to go to the facilities due to long distance and even lack of transport".* (**KI, Registered midwife, Namwendwa HC IV)**

"Obstetric labour, premature labour, CPD, pre -eclampsia,Eclampsia were mentioned to have been among the obstetric complications that influenced fetal and early neonatal deaths in the health facilities in Kamuli district". **(KI, DHO'S Office, Registered midwives Kamuli general Hospital, Namwendwa HC IV and Nankandulo HC IV)**

4.5.2 Perinatal healthcare services factors influencing fetal and early neonatal deaths.

This has been emphasized by one of the key informers who said that;

"*Distance from home to the health facilities having an influence on occurrence on fetal and early neonatal death, some health facilities in the sub counties like balawoli is 15 to 23 km yet the recommended distance according to the National Guideline is 5km to the health facilities".*(**KI, DHO'S Office)**

"*The fact is that some mothers end up delivering on the way yet have neither knowledge nor skills of cord clamping leading to over bleeding hence death of the baby. The long distance had also an influence on mother's decision making to seek for health services in the hospital whereby end up delivering at the traditional birth attendan*t**". (KI, Registered midwives Kamuli general Hospital, Namwendwa HC IV)**

In response to availability of emergency obstetric care have an effect on the reduction of fetal and early neonatal death during the Interviews the respondents strongly agreed that;

"The availability of essential emergency obstetric care with the new born care package, with all the emergency tray well set, can have a reduction on fetal and early neonatal death in our facilities .The availability of postnatal care have an influence in reducing the occurrence of early neonatal death in that ,if proper examination of baby is well done, mothers well health educated on the care of the baby, taught on the danger signs of the baby and emphasis on when to return to the hospital".(**KI, DHO'S Office, Registered midwives Kamuli general Hospital, Namwendwa HC IV and Nankandulo HC IV)**

In order to reduce of fetal and early neonatal death in the health facilities of Kamuli district, the respondent suggested some ways which include;

"*Continuous mentoring, coaching and support supervisor of the health workers should be strengthened both at the district and lower levels. Improving on attitude of the health staff through motivation, capacity building, ensure that the health facilities have received*

life saving commodities, medicines and supplies from NMS on time were the key ways on how reduce on fetal and early neonatal death in the health facilities of Kamuli district". **(KI, DHO'S Office)**

"In addition to reduction on fetal and early neonatal death reduce of fetal and early neonatal death in the health facilities of Kamuli district, there is need to involve the VHTs and the community leader in mobilization and sensitizing of the community on the importance of ANC visits, delivering in the health facilities and seeking for postnatal care after delivery". **(KI, Registered midwives Kamuli general Hospital, Namwendwa HC IV and Nankandulo HC IV)**

4.5.3 Neonatal factors influencing fetal and early neonatal deaths

In argument to sex having an influence to fetal and early neonatal deaths, the three Key informers differed from that of Namwendwa HC IV mentioned that:

"Through our experiences, there is a high death rate in male than female neonates. This is observed when responds quickly to stimuli than a baby boy comes to resuscitation, the baby girl". **(KI, DHO'S Office, Registered midwives Kamuli general Hospital, Nankandulo HC IV)**

Some of the birth related issues that were predicted to fetal and early neonatal outcome in their health facilities in Kamuli district mentioned included;

*" Prolonged and obstructed labour, pre eclampsia and Eclampsia, cord prolapsed and presentation".***(KI, Registered midwife Kamuli general Hospital)**

The finding on Apgar score at one minute was also emphasized by one of the Key informer who said;

*"Apgar score at one minute has an influence on the occurrence of fetal and early neonatal outcome. In that is this one minute is called the Golden Minute, the language of every midwife. This is the time that every baby must assessed and scored in order to see the baby's progress/response. This enables us to have a way forward on the baby's side."***(KI, Registered midwife Kamuli general Hospital and Namwendwa HC IV)**

CHAPTER FIVE: DISCUSSION

5.0 Introduction

This chapter discusses the research findings in relation to the problem statement, literature review of studies conducted elsewhere with and in line with the specific study objectives. It also explains the obtained results from the study.

5.1 Demographic Characteristics of Respondents.

The study findings indicate that population was relatively evenly distributed through the three health facilities, 53.33% (32) of the mothers attained primary school as the highest level of education, This could probably have been due to the fact that high level of poverty or lack of interest in furthering their education levels.

5.2Obstetric factors influencing fetal and early neonatal deaths

5.2.1 Gravidity: Gravidity has an influence on fetal and early neonatal death. 26.67 %were prime gravida, 33.33% multi gravida and 48.78% were grand multi gravida. However, at bivariate analysis, Multi gravida mothers were 1.43 times more likely to have fetal or early neonatal death compared to those who bore one child; however, this association was not significant (P-value 0.404). On the other hand, mothers who had given birth to six or more children were 2.7 times more likely to have fetal or early neonatal deaths compared to those who bore one child; (P-value 0.002) and it was significantly associated with fetal or early neonatal death.This is possibly due to the fact that, frequent births as well as high gravidity predispose both the mothers and neonates to higher risks of unfavorable outcomes. At multivariate analysis, mothers who had given birth to six children or more were 2.2 times more likely to have fetal or early neonatal death, compared to those who bore one child. But, this association wasn't

significant (P-value 0.091), which is in agreement with other studies done; Ouyang *et al*. (2013), Poudel (2013),Dahiru (2015)

5.2.2 Antenatal care (ANC) attendance

46.34% mothers attended antenatal clincs at most two (0-2) times; 23.44% mothers attended three times and those who attended four or more times were 31.21%, which was low relative to controls and some of the reasons for low attendance could be due to poverty, lack of female decision making, lack of education and lack of awareness on the importance of ANC visits. These factors could explain some of the relationship between ANC visit and fetal and early neonatal death (Dahiru, 2015). On the other hand, in bivariate and multivariate analyses; ANC attendance of 3 times and more was significantly associated with fetal or early neonatal deaths ($P<0.001$). This is possibly due to the fact that pregnant women with danger signs may be screened and treated promptly. Also mothers who did not use family planning were 2.55 times more likely to experience fetal or early neonatal deaths compared to those who used family planning methods; (P-value 0.001), which was significantly associated with fetal and early neonatal deaths. This can possibly be due to fewer or no ANC attendance during which family planning clinics are held.

These issues have been reported by other studies in developing countries; Engmann*et al*. (2009), Malqvist, (2011). However, making four or more ANC visits is the ideal and recommended according to WHO guidelines, because fewer ANC visits can result in poor supervision of the pregnancy and failure to prevent, detect and manage maternal conditions during pregnancy. Additionally, Women who had not received a complete course of tetanus vaccination were 2.27 times more likely to experience fetal/ early neonatal death, compared to those who had completed their tetanus vaccination course and this could only be achieved when pregnant

women attend at least three antenatal care clinics. Receipt of all IPT doses is significantly associated with fetal and early neonatal deaths (P<0.001).

5.2.3 Normal delivery

Up to82.50% (33) of mothers who had assisted delivery gave rise to cases compared to 17.50% (7) of the cases; however, 25.68% (66) of mothers who had normal delivery gave rise to cases compared to 74.32% (191). This could possibly be due to poor early postnatal care services like lack of resuscitation equipments, functional intensive care unit to provide artificial heat and skills. On the other hand, mothers who delivered normally were 8% less likely experience fetal or early neonatal death, (COR 0.08, 95% CI 0.04-0.16, P<0.001) and it was significantly associated with fetal and early neonatal deaths. These findings are in agreement with other studies done elsewhere; Titaley et al (2008), Abdullah et al (2016).

5.2.3 Birth attendant qualifications

31.16% (91) of cases were assistance from nurses/ midwives compared to 68.84% (201) of the controls and 80% (8) of the cases were assisted by a doctor compared to 20% (2) of the controls. This may possibly be due to lack of basic knowledge on emergency obstetric care on the part of nurses/midwives. On the other hand, mothers who were attended to by a doctor during delivery were 8.92 times less likely to experience fetal or neonatal deaths compared to mothers who were attended to by nurses/midwives; which was significantly associated with fetal and early neonatal deaths (P-value 0). On further analysis however, mothers who had birth assistance from a doctor were 63% less likely to experience a fetal or early neonatal death compared to those who had assistance by a nurse/midwife, other factors remaining constant (AOR 0.37, 95% CI 0.03-5.31, P-value 0.467), but wasn't significant. This is possibly due to the availability of emergency obstetric care. The findings of this study have been corroborated with findings from other studies

done elsewhere; Yego et al. (2014), Musooko et al. (2014). Some of these deaths could have been prevented if pregnant women are able to access quality health care on time (Owaiset al.2013).

5.2.5 Intra partum Complications

Mothers who had Intra partum complications gave rise to 37(78.72%) cases compared to 10(21.28%), on the other hand, mothers who did not experience intra partum complications had 24(17.91%) cases compared to 110(82.09%) controls. Additionally, mothers who had no intra partum complications were 6% less likely to experience fetal or early neonatal deaths. It was significantly associated with fetal or early neonatal deaths (P<0.001). This may possibly be due to lack or poor emergence obstetric care at the health facility, doctors might be absent at the time of delivery to immediately carry out emergence cesarean section. The ideal situation or policy is to have at least two doctors at HC IV to be able to manage any emergency cases.

This study is in consistent with other studies done elsewhere in developing countries. Titaley*et al.* (2008); Mpembeni*et al*. (2014); Debelew*et al*. (2014). Abdullah *et al*. (2016) Nakimuli*et al*. (2015)

5.3 Perinatal healthcare service factors associated with fetal and early neonatal deaths

5.3.1Apgar score timing: Babies whose Apgar score was taken at less than one minute, 53.14% (73) died as compared to babies whose Apgar score was taken at ≥5minutes, 24 (15.29%) died.

Babies whose Apgar score was taken at 5 minutes and above were 16% less likely to experience fetal or early neonatal deaths compared to babies whose Apgar score was taken at less than one minute, (COR 0.16, 95% CI 0.10-0.26, P<0.001) which was significantly associated with fetal

and early neonatal deaths.Babies whose Apgar score was taken at five minutes and at 10 minutes were 64% less likely to experience early neonatal death compared to those who only had Apgar score taken at either one minute or even no recordings done. This possibly due to the fact Apgar score was taken at a wrong time. Apgar score timing should be taken at the recommended time of one minute which is the golden minute and intervals of five minutes and ten minutes respectively. This may also be due to lack or poor perinatal healthcare services (skills).This study is consistent with other studies done in Indonesia Abdullah *et al*. (2016) and Brazil Oliveira (2012).

5.3.2 Resuscitation

43 (19.63%) of the babies who were resuscitated died compared to 176 (80.37%) controls, whereas 23 (88.46%) who did not receive resuscitation died compared to 3 (11.54%). On the other hand, babies who had been resuscitated were 3% less likely to experience fetal or early neonatal death compared to those who did not receive any resuscitation (COR 0.03, 95% CI 0.00-0.27, P-value 0.002), which was significantly associated with early neonatal death. In addition, babies who received resuscitation were 95% less likely to experience early neonatal death compared to those who had no resuscitation done, other factors remaining constant (AOR 0.05, 95% CI 0.00-0.54, P-value 0.013), which is statistically significant.

The high numbers of early neonatal mortality is possibly due to lack of basic know in resuscitation or had poor quality equipments as it was reported under the ministry of health review report 2007.

5.3.3 Use of artificial source of heat

Babies who received artificial heat source 19 (14.62%) were died compared to 111 (85.38%) controls, whereas 48 (35.56%) who did not receive artificial source of heat died compared to 87 (64.44%) who survived. Babies who received artificial heat source were 32% less likely to

experience early neonatal deaths compared to those who did not receive any artificial source of heat, (COR 0.32, 95% CI 0.24-0.43, P<0.001) and it was significantly associated with early neonatal death. This may be possibly due to lack of basic knowledge on the part of the medical personnel or lack of basic equipments in perinatal care.

5.3.4 Completion of tetanus maternal immunization

Women who received a complete course of tetanus maternal immunization gave rise to 68 (29.18%) cases compared to 165 (70.82%) controls, also women who did not receive the complete course tetanus maternal immunization had 29 (49.18%) of cases compared to 30 (50.88%) controls. On the other hand, mothers who did not complete tetanus maternal immunization were 2.24 times more likely to experience fetal or early neonatal death compared to those who completed the dosage, (P<0.001), and it was significantly associated with fetal and early neonatal death. Additionally, women who had not received a complete course of tetanus vaccination were 2.27 times more likely to experience fetal/neonatal death, compared to those who had completed their tetanus vaccination course, holding other factors constant (P-value 0.026), which is statistically associated with fetal or early neonatal death. This could possibly be due fewer or no (0-2) ANC visits.

These findings are consistent with other studies carried out in other developing countries; Dahiru, (2015), Titaley et al.(2008), Debelew et al. (2014), Abdullah et al. (2016).

5.4Neonatal factors associated with fetal and early neonatal deaths in health facilities

Neonatal factors associated with fetal or early neonatal deaths in health facilities were; Apgar score, birth order, birth weight, and being preterm.

5.4.1 Apgar score

Babies who had an Apgar score of less than three, 81 (97.59%) died compared to 2(2.42%) controls, also 5 (71.43%) of babies with an Apgar score of 3-5 died compared to 2 (28.57%) controls, whereas 11(5,31%) of babies with an Apgar score of 6-10 died compared to 196 (94.69%) controls.

Babies who had Apgar score between 3 and 5 were 7.7% less likely to experience early neonatal death compared to babies whose Apgar score was less than 3, (COR 0.077, 95% CI 0.027-0.222, P<0.001). On the other hand, babies who had Apgar score between 6 and 10 were 0.1% less likely to experience early neonatal death compared to those who had Apgar score of less than 3, (COR,95% CI 0.001-0.003, P<0.001), which were both statistically significant.

In this study, babies that had Apgar score of three to five (3-5) were 1.99 times more likely to experience early neonatal death compared to those that had a score of less than three (AOR 1.99, 95% CI 1.26-3.14, P-value 0.003). On the other hand, those whose score was six to ten (6-10) were 98% less likely to experience early neonatal death compared to those with a score of less than three. The findings of this study is consistent with other studies done elsewhere; Abdullah et al.(2016), Oliveire (2012).

5.4.2 Birth order: Babies who were of birth order 4-6 were 1.908 times more likely to experience fetal or early neonatal death compared to those whose birth order were between 1 and 3,(COR 1,908, 95% CI 1.375-2.647, P<0.001), which was statistically significant. On the other hand, babies whose birth order were 7 and above were 1.456 times more likely to experience fetal or early neonatal death compared to those whose birth order was between 1 and 3, (COR 1.456, 95% CI 0.984-2.155, P-value 0.06), however, it was not statistically significant. On the other hand, in multivariate babies whose birth order was seven or higher was 2.37 times more likely to experience fetal/early neonatal death compared to those whose birth order was between

one and three, but this was not statistically significant. Furthermore, babies whose birth order was between four and six were significantly 1.92 times more likely to experience fetal/early neonatal death compared to those whose birth order was between one and three. However, this is inconsistent with a study done in Tanzania by Sangerber-Dery (2009) and this could be due to the size of the sample.

5.4.3 Birth weight

In this study, babies whose birth weight was between 1500g and 2500g were 17% less likely to experience fetal or early neonatal death compared to babies whose birth weight was less than 1500g. (COR O.170, 95% CI 0.01-3.03, P-value 0.228), however, it was not statistically significant. On the other hand, babies whose birth weight was ≥2500g were 10% less likely to experience fetal or early neonatal death compared to babies whose birth weight was less than 1500g, (COR 0.100, 95% CI 0.06-0.17, P< 0.001), which was statistically significant. On the other hand under multivariate, babies who weighed 2.5Kgs or more were 63% less likely to experience fetal/early neonatal death compared to those with less than 1.5Kgs. Birth weight less than 2.5kg was one of the indicators for prematurity and associated with fetal and early neonatal death.

Babies who were not premature were 16% less likely to experience fetal or early neonatal death compared to babies who were born prematurity, (COR 0.16, 95% CI 0.11-0.23, P<0.001), which was statistically significant. Babies prematurely born were 94% more likely to experience fetal/early neonatal death compared to those who were mature. This could have been due to poor nutrition that leads to severe anemia, increased infections of the mother. Low birth weight also predisposes the new born to hypothermia and infections thus causing death compared to the baby with normal weight. These issues have been reported in other studies in developing countries, Kidondo (2009), Titaley et al. (2008).

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

This chapter deals with the brief summary of the steps taken in the study, conclusions, study findings and implications to District management and recommendations

6.1 Conclusions

Fetal and early neonatal death in Kamuli district accounts for 91/1000 live births higher than that of the national average of 51/1000 live births the findings indicate that population was relatively evenly distributed throughout the three health facilities, only 53.33% (32) of the mothers attained primary school as the highest level of education, This could probably be due to high or extreme levels of poverty or lack of interest in furthering their education levels, and it might have led to fetal and early neonatal death.

Obstetric factors: Some of the obstetric factors that were associated with fetal and early neonatal deaths in health facilities in Kamuli district included; attendance of ANC visits which were less than four times as recommended by the WHO guidelines, 46.34% ofmothers attended antenatal clincs less than 2 times, low uptake of family planning, maternal age, birth attendants qualification, Intra partum complications, and 78% of the mothers experienced complications. In addition, high gravidity, to low staffing norms, unintended delays at the facilities such lack of medical sundries and supplies like gloves, intravenous fluids, absence of a doctor during emergency admission. Other delays may have originated from mothers taking long to make decision to seek medical treatment to the facilities due to long distance and even lack of transport increased the risk of fetal and early neonatal death.

Perinatal healthcare services factors; Apgar score timing, resuscitation done, artificial heat source used and completion of tetanus maternal immunization course, were all significantly associated with fetal or early neonatal deaths. In addition, qualitative findings showed that distance from home to the health facilities some mothers ended up delivering on the way yet they neither had knowledge nor skills of cord clamping leading to over bleeding hence death of the baby. The long distance influenced a mother's decision making to seek for health services in the hospital end up delivering at the traditional birth attendant. The availability of essential emergency obstetric care with the new born care package, and postnatal health care services, mothers educated on the care of the baby, detection of danger signs of the baby and health seeking behaviors had an influence in reducing the occurrence of early neonatal death.

Neonatal factors: Neonatal factors associated with fetal or early neonatal deaths in health facilities were; Apgar score, birth order, birth weight, and being preterm.

Babies who had Apgar score between 6 and 10 were 0.1% less likely to experience early neonatal death compared to those who had Apgar score of less than 3, which were both statistically significant. In addition, Apgar score at one minute has an influence on the occurrence of fetal and early neonatal outcome. This is the time that every baby must be assessed and scored in order to monitor the baby's progress /response and enables the midwives and doctors to respond appropriately.Babies whose birth order were 7 and above were 1.456 times more likely to experience fetal or early neonatal death compared to those whose birth order was between 1 and 3.Sex of the baby, has a high fetal/early neonatal death, it was observed that males a high death rate than female neonates.

6.2 Recommendations

From the findings of the study, I therefore recommend the following;

To the health facility administration and management

- To provide the basic equipments, essential medicines and supplies to the heath facilities. These help to ease their work, hence reducing fetal and early neonatal death in their facilities.
- To train health workers on how to use some of the basicequipments the in the intensive and neonatal care unites.
- To provide guidelines that was recommended by WHO, UNICEF. These guidelines will help in the reduction of fetal and early neonatal deaths.
- The health facility administration and management should strengthen the internal supervision in the different department especially the Maternal and child health department hence creating strong work force and improving the quality care of service delivery.
- There is need to strengthen linkage with the community through the community health workers and the political leaders. These help the community to know and utilize the services that are offered at the facilities especially the MCH services like the ANCs, deliveries, postnatal services among others.
- Staff motivation is a key to service delivery. This could be done through appreciation, capacity building and staff welfare. These help in improving on the quality care of service delivery, hence reducing on the rate of fetal and neonates dying

To the Kamuli District Health Office

- The district should ensure staff norms to all the facility levels, strengthen support supervision and monitoring of the workers and oversee the medical sundries, medicines and equipments supplied by the NMS.

- There is need to build capacity of the staffs at the facility through in-service trainings, mentoring and coaching especially in basic obstetric emergency care. This helps to close the gaps in knowledge and skills that might have risen in the care of the mother and the baby hence reducing the rate of fetal and early neonatal deaths in Kamuli district.
- To distribute the updated guidelines and standards to all facilities and see that health staffs adhere to them.
- There is need to create more outreach sites in order to reduce on the distances moved from home to the facility and increase on the utilization of the health services in the district.

To the government/Ministry of Health

- Reinforce occupational health hazards regulation on the safety of workers.
- Support supervision, mentoring and coaching is need at all levels.

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APPENDIX 1A: Data Extraction form for the health facilities

Introduction

Am Hellen Nabagereka, pursing a master in sciences in public Health in International Health Sciences University. Iam caring out a study of risk factors to fetal and early neonatal deaths in kamuli district.

Your facility has been selected randomly to participate in the study regarding the above topic. I assure you with much respect and confidence that, the information that I will extract from your maternal and child registers will be treated with maximum confidentiality. I therefore request you to feel free and trust me with your documents. The findings of the research will help the Health facility administrators to reduce on of risk factors to fetal and early neonatal deaths in kamuli district. Also learning institutions can use the findings of this research as a basis for further research topics and also incorporate it in their syllabus.

Data Extraction form for the fetal and early neonatal deaths (July 2014/ June 2016)

Circle the appropriate most response

Answers to be obtained from medical record

Health facility ……

Serial No. ……..

Case ☐

Control ☐

Section A: Bio data/intervening variables

1. Maternal age (years)

A. <18 B. 18-24 C.25-24 D. 25-34 E.35-44 F. 45+

2. Maternal Residence
   A. Village……
   B. Sub-county……

3. Education level of mother

   A. Never gone to school B. Pre- primary C. Primary D. Secondary E. Tertiary

4. Marital status
   A. Single B. Married C. Cohabiting D. Widowed

5. Were any of family planning methods used?
   A. Yes B. No
6. Maternal income Level
   A <35,000/= B. 35,000- 70,000/= C. 70,001-140,000 D.>140,000/=

Section B: Obstetric Factors

7. State gravid of mother

   A. 1 B.2 C.3 D.4 E.5
8. Antenatal care attendance
   A. Never B once C. 2-3 D.4 +

9. Was the immunization status recorded?
   A. Yes B. No C. N/A

10. If yes, was mother adequately immunized against tetanus (received two doses of tetanus toxids during pregnancy).

A. Yes B. No C. Not stated

11. Nutritional status of the mother (Hemoglobin level

A. <7g/d1 B. 7-10.99g/d1 C. ≥11 grams

12. Was a mother given a malaria prophylaxis?

A. IPT1 B. IPT2 C.IPT3 D. A and B. D. All above

13. Screening for infectious diseases (HIV)

A. Yes B. No C. Not stated

14. If yes to (10), what was the result?

A. Positive B. Negative

15. If positive to (11), was the mother initiated to option B+

A. Yes B. No C. Not stated

16. Was mother screened for syphilis?

A. Yes B. No C. Not stated

17. If yes to (13), what was the result?

A. RPR +ve B.RPR-ve C. Not applicable

18. Was mother diabetic?

A. Yes B. No C. Not stated

19. Was the mother hypertensive before pregnancy or during pregnancy?

A. Yes: state blood pressure reading on admission B. No C. Not stated

20. Were there any complications during pregnancy?

A. Yes B. No C. Not stated

21. If yes to (17), what was the complication? (state)

Labour and delivery ……

22. What was the gestation age of the membrane rapture?

A. < 32 wks B.32-36 wks≥ C.≥37 D. Not stated

23. How long was the membrane rapture before delivery, just around or before delivery

A. ≤ 1week B.> One week D. Two weeks E.> Two weeks F. Not stated

24. Was any antibiotic given?

Please state (specify)…….

25. Was the labour prolonged >24hrs

A. Yes B. No C. Not stated

Section C: Neonatal Factors

26. Was the baby Born Alive?

A. Yes B. No

27. What was the sex of the baby?

A. Male B. Female

28. What was the birth Order?

A. 1st B.2nd C.3rd D.4th E.5th& above

29. Was the delivery normal?

A. Yes B. No

A. Male B. Female

30. If stillbirth in (28) was the stillborn weighed?

A. Yes B. No C. N/A

31. If yes to (30), write the weight of the stillbirth……

32. If yes to (28), what was the Apgar score of the baby?

A. At 1 minute (less than 3, 3-5, 6-9 or 10) B. At 5 minutes (less than 3, 3-5, 6-9 or 10) C .At 10 minutes (less than 3, 3-5, 6-9 or 10)

33. Was the baby preterm ≥ 28 weeks < 37 weeks

Yes, state the gestation week…….

34. What was the baby's weight at birth?

A. < 1500g B.1500-2500G C.≥ 2500g

Section D: Perinatal care services

35. Who attended to mother at birth?

A. Nurses B. Midwives C. Doctors D. Others (specify)

36. Was resuscitation adequately performed (skin dried, nostrils cleared or suction, infant kept warm)

A. Yes B. No C. Not stated

37. Was artificial source of heat used on newborn?

A. Yes B. No

38. If yes to (36), what source was used?

A. Lamp B. Incubator C. Kangaroo D. Others

39. Was baby breastfed after birth?

A. Yes B. No

40. If no, state reason

A. Within 2hrs of life B. Within 7days of life

41. What was the cause of death? Specify…….

42. Was the baby given BCG and polio O vaccine after birth?

A. Yes B. No

APPENDIX 1B: KEY INFORMER INTERVIEW GUIDE

Section A: Obstetric Factors

1. Kindly tell us the status of fetal and early neonatal deaths in your facility?
2. Could there be any of the obstetric factors that play a role in fetal and early neonatal deaths in your facility? Please Explain.
3. What obstetric complications would influence fetal and early neonatal deaths in your facility?

Section B: Neonatal Factors

4. Could sex of a fetus and a neonate have an influence neonatal deaths death in your facility? Please explain your answer?
5. What birth related issues will predict fetal and early neonatal outcome?
6. Could Apgar score at one minute have an influence on the occurrence of fetal and early neonatal outcome?

Section C: Perinatal care services

7. In which way could distance from home to this facility have an influence on occurrence on fetal and early neonatal death?
8. Could availability of emergency obstetric care have an effect on the reduction of fetal and early neonatal death?
9. How can the availability of postnatal care have an influence in reducing the occurrence of early neonatal death?
10. Is the availability of skilled staff a key factor in reduction of fetal and early neonatal death?
11. Suggest ways in which fetal and early neonatal death can be reduced in your the facility

APPENDIX 2: CONSENT FORM

Introduction

Am Hellen Nabagereka, pursing a master in sciences in public Health in International Health Sciences University. Iam caring out a study of risk factors to fetal and early neonatal deaths in Kamuli district

The study purpose

The DHO's report of 2015/2016 states persistent high fetal and early neonatal death rates which now stand at 38.2% and 11.8% respectively. The factors influencing this trend within the district are not well understood. For Uganda to achieve the Goal 3 Target 3.2 in the 20 Sustainable Development Goals (SDGs) by year 2030 lots of effort to reduce the high fetal and early neonatal death rates is needed.

That is why the study is seeking to examine the maternal and neonatal risk factors associated with fetal and early neonatal deaths in order to provide insights into the circumstances surrounding fetal and early neonatal death in Kamuli district.

Research Intervention

The study will take place one hour but will involve your participation of face to face interview.

Participant Selection

As a participant, you are invited to participate in this study because you have knowledge related maternal and neonatal risks associated with fetal and early neonatal death.

Voluntary Participation: Participation in this study will be purely voluntary. You have a right to participate or withdraw

Procedures: When you accept to participate in this study, you will be asked some question related to risk factors for Fetal and Early neonatal death in kamuli district. I can always move to the next question if you don't feel comfortable in answering the question asked. It is only the principle investigator and the researcher team to access the information that will be taken during the interview therefore, the Information shared with us, is confidential.

Risks

We are requesting you to share with us some confidential and personal information. You may not answer any question if you are uncomfortable talking about some of the topics.

Benefits

Your participation will help us to know more about the risk factors for fetal and early neonatal death and get solutions on how to overcome the issues of high Fetal and early neonatal death in Kamuli district.

Confidentiality

The Information you will share with us will be kept confidential and will not be shared with anyone outside the study team. We shall tag identification numbers instead of the names.

Part II: Consent form

I……..I have read, understood and accepted to participate in a case control study of risk factors for fetal and early neonatal deaths in Kamuli district.

Signature……

Date……..

Researcher's Signature……

Date……

APPENDIX 3: MAP OF KAMULI DISTRICT

Map of Kamuli District