PREVALENCE AND FACTORS ASSOCIATED WITH PRETERM BIRTHS IN UGANDA: A CASE STUDY OF KIRYANDONGO DISTRIC REFERRAL HOSPITAL.

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DECLARATION

I **Ruth Wanjala** hereby declare that this research submitted for the award of Bachelor of Medicine and surgery is my original work and has never been presented in any form for any award.

RUTH WANJALA …… ……

(Researcher student) Signature Date

APPROVAL

This research report titled; ‘Prevalence and factors associated with premature births in Uganda: A case study of Kiryandongo Hospital’ was done under my supervision.

Sign……date……

DR MULWANA JOHNIE

ACKNOWLEDGEMENT

This work would not have been accomplished without the provision and grace of the Almighty God.To Him be the glory and honour, now and forever.

I sincerely thank my parents for the sacrifices they have made all through my life to see me come this far. I am forever grateful for their love and support.

I am greatly indebted to my supervisors. Dr Mulwana Johnie. The guidance, insight, supervision and support were instrumental in the completion of this work.

I am grateful to my classmates and all my colleagues for the support and encouragement during the programme. God bless you all.

DEDICATION

This research is dedicated to all preterm babies- past, present and future and their mothers.

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ABBREVIATIONS

ANC -Antenatal Clinic

APH -Antepartum Hemorrhage

BMI -Body Mass Index

C/S -Caesarean Section

GA -Gestational Age

HIV -Human Immunodeficiency Virus

IUGR -Intrauterine Growth Restriction

LBW -Low Birth Weight

LMP -Last Monthly Period

MDG -Millennium Development Goal

MOH -Ministry of Health

MUAC -Mid upper arm circumference

NBU -Newborn Unit

NEC -Necrotizing Enterocolitis

NICU -Neonatal Intensive Care Unit

PIH -Pregnancy Induced Hypertension

PLBW -Preterm Low Birth Weight

PROM -Premature Rupture of Membranes

PPROM -Preterm Premature Rupture of Membranes

RDS -Respiratory Distress Syndrome

SGA -Small for Gestational Age

UTI -Urinary Tract Infection

WHO -World Health Organization

DEFINITION OF TERMS

Preterm birth: All births before 37 completed weeks of gestation or fewer than 259 days since the first day of a woman's last menstrual period.

Gestational age: The post-conception age of the baby based on menstrual dates and confirmed by clinical assessment using the Finnstrom score.

Low Birth Weight: Birth weight less than 2500 grams

Inter-pregnancy interval: The duration between one pregnancy and the next. This is calculated to the nearest month as the period between the date of the previous delivery and the date of the last menstrual period (LMP) for the current pregnancy.

Parity: The total number of times a woman has been pregnant regardless of the outcome.

Spontaneous preterm birth: Spontaneous onset of labor or labor following premature rupture of membranes (PROM)) occurring before 37 completed weeks of gestation.

Induced preterm birth: Induction of labor or elective Caesarian section before 37 completed weeks of gestation

Obstetric wheel: A standard tool used to simplify calculation of gestation based on the LMP.
Anemia in Pregnancy: This is a hemoglobin level <10g/dl

ABSTRACT

Background: The World Health Organization (WHO) estimates the prevalence of preterm birth to be between 5 and 18% across 184 countries. Most countries lack reliable data on the burden of preterm birth. Of the estimated 3 million neonatal deaths occurring globally each year, about 1 million are directly related to prematurity. Despite this, few studies have been carried out locally to determine the prevalence of as well as factors associated with preterm delivery. This study therefore intended to identify the prevalence and factors associated with preterm births in Kiryandongo Hospital.

Methods: This study utilized a descriptive cross-sectional design on 126 mothers who delivered at Kiryandongo Hospital and their newborns in the last six months before the study. Collected data was entered and analyzed using STATA analytic package version 11. Both chi square and binary logistic regression were applied to identify risk factors for preterm births.

Results: The prevalence of preterm births was found to be 18.3%. The risk factors were prolonged PROM (AOR=5.315;95%CI=2.320-12.195), pregnancy induced hypertension (AOR 7.085; 95%CI=3.686-16.525) and APH (AOR=4.264;95%CI=1.517-11.96).

Conclusion: Based on the above findings, prolonged PROM, PIH and APH were the major risk factors for preterm births. Risk factors identified in this study should be included in future risk prediction models for preterm births.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND INFORMATION

Preterm is defined by WHO as all births before 37 weeks of pregnancy are completed or fewer than 259 days since the first day of a woman's last menstrual period. Preterm birth is the single most important determinant of adverse infant outcome in terms of survival and quality of life. Of the estimated 130million born each year globally, approximately 15million are born preterm every year. That is more than 1in 10 babies. Approximately 1 million children die each year due to complications of preterm births. (liu L et al 2016). Prematurity is a major determinant of neonatal mortality and morbidity as well as significant contributor to long term adverse health outcome. Infants who are preterm are particularly vulnerable to complications due to impaired respiration, difficulty in feeding, poor body temperature regulation and high risk of infections.

Complications of preterm birth are the single largest direct cause of neonatal deaths and the second most common cause of under-5 deaths after pneumonia. Prematurity is a major hindrance to the attainment of the MDG-4 target given its contribution to neonatal mortality. To accelerate achievement of this millennium goal, there is need to reduce preterm birth. (march of dimes WHO 2012)

Preterm babies suffer increased morbidity from conditions such as RDS, NEC, retinopathy of prematurity, anemia of prematurity, neonatal jaundice, sepsis and feeding difficulties among others. Long term complications such as cerebral palsy, intellectual impairment, chronic lung disease, and vision and hearing loss also occur exerting a high toll on individuals born preterm, their families and the communities in which they live. Preterm birth has a significant cost implication due to the initial hospital stay, neonatal intensive care and ongoing long-term complex health needs occasioned by the resultant disabilities. (sigal s et al 2008). South Asia and sub-Saharan Africa account for half the world's births, more than 60% of the world's preterm babies and over 80% of the world's 1.1 million deaths due to complications related to preterm birth. The survival chances of the 15 million babies born preterm each year vary significantly

depending on where they are born. The risk of neonatal death due to complications of preterm birth is at least 12 times higher for an African baby than for a European baby. For example, over 90% of extremely preterm babies (<28 weeks) born in low-income countries die within the first few days of life while only less than 10% of babies of this gestation die in high-income settings. (blencow h et al 2012).

Significant progress has been made in the care of premature infants but not in reducing the prevalence of preterm birth which is generally on the rise. Most countries lack reliable data on preterm birth. In 2014, only 65 countries had reliable trend data and all but three showed an increase in preterm birth rates over the past 20 years. This may be due to better measurement and changes in health such as increases in maternal age and underlying maternal health problems such as diabetes and high blood pressure; use of assisted reproductive technologies which has increased rates of multiple pregnancies and changes in obstetric practices such as more Caesarean births before term. (Goldenberg RL et al 2008).

1.1 STATEMENT OF THE PROBLEM

According to WHO an estimated 15million babies are born too early every year. That is more than 1 in 10 babies. Almost 1million children die each year due to complications of preterm births. Many survivors face a lifetime of disabilities, including learning disabilities, visual and hearing problems. (lancet 2016).

Globally, prematurity is the leading cause of death in children under the age of 5 and in almost all countries with reliable data, preterm birth rates are increasing.

Inequalities in survival rates around the world are stark. In low-income settings, half of the babies born at or below 32weeks die due to lack of feasible cost effective care, such as warmth, breastfeeding support, and basic care for infections and breathing difficulties.

Preterm birth is a global problem with WHO estimating prevalence to range between 5-18% across 184 countries. Nigeria, Brazil, India and United States of America are among the top ten

countries with the highest number. Of the 11 countries with the preterm birth rates of over 15% all but two are in sub Saharan Africa. (March of dimes WHO 2012) Shubhada a et al in India found a prevalence rate of 15% while Feresu SA and others in a study in Zimbabwe found a preterm birth rate of 16.8%. A study by van den broek NR et al in Malawi reported a prevalence of 16.3%. According to WHO Uganda ranks 13 out of 184 countries for highest number of babies born prematurely and 11th for number of deaths from complications of preterm birth. UBOS (2011). However, there is paucity of literature and data on the prevalence and factors associated with preterm births in Kiryandongo, Uganda

The study therefore seeks to find out the prevalence and factors leading to preterm births in Kiryandongo District, Western Uganda.

1.1 STUDY OBJECTIVES

1.1.1 GENERAL OBJECTIVE

To access the prevalence and factors associated with premature births at Kiryandongo Hospital

1.1.2 SPECIFIC OBJECTIVES

To determine the effects of maternal social demographic factors on preterm birth

To determine the effects of obstetric risk factors on preterm birth

1.2 RESEARCH QUESTIONS

1 What are the major social demographic risks factors influencing the rate of preterm at Kiryandongo Hospital?

2 What are the major obstetrics risk factors influencing the rate of preterm births at Kiryandongo Hospital?

1.3 JUSTIFICATION OR SIGNIFICANCE OF THE STUDY

Preterm birth is a global problem. WHO estimates the prevalence to range between 5 and 18%. However, most developing countries like Uganda lack essential and reliable data on preterm birth relying largely from estimates of delivery records. Despite tremendous improvement in

health care, prevention of preterm births has remained largely unaddressed. Kiryandongo hospital is a major hospital in Kiryandongo district that handles many high risk pregnancies whose outcome include preterm delivery yet few studies have been done to determine the burden of and factors associated with preterm births. Prematurity has long been identified as the single most important cause of neonatal mortality.

The lack of data on the problem of preterm birth locally and the fact that reduction and prevention of prematurity requires a better understanding of the likely mechanisms as well as the factors associated with preterm birth made the study very important. The findings of this study will contribute to the body of knowledge regarding factors associated with preterm birth and help policy makers to formulate relevant and practical measures to tackle this problem.

1.4 STUDY SCOPE

1.6.1 Geographical scope

The study will focus on factors affecting preterm births in Kiryandongo Hospital. This survey will show data on socio demographic and obstetric factors. Kiryandongo is located in the Western part of Uganda and about 225 kilometers from the National Capital city-Kampala. Kiryandongo is boarded by Nwoya District to the north, Oyam District to the northeast, Apac District to the east, and Masindi District to the south and west. It covers an area of 3,624.1 km^2 and its 1,160 meters above sea level. Most of the residents are Banyoro and Alur, and lunyoro is the common language spoken. Majority of the people are farmers growing cassava and maize as their major food crop.

Kiryandongo hospital offers a number of services including; OPD, inpatient, Ophthalmology, X-ray, ultra sound, Orthopedics, health promotion and education, occupational therapy, HIV care and treatment, Maternal and child health, environmental health, special clinics among others.

1.6.2 Content scope

Dependent Variables

The main dependable variable in the study is preterm births.

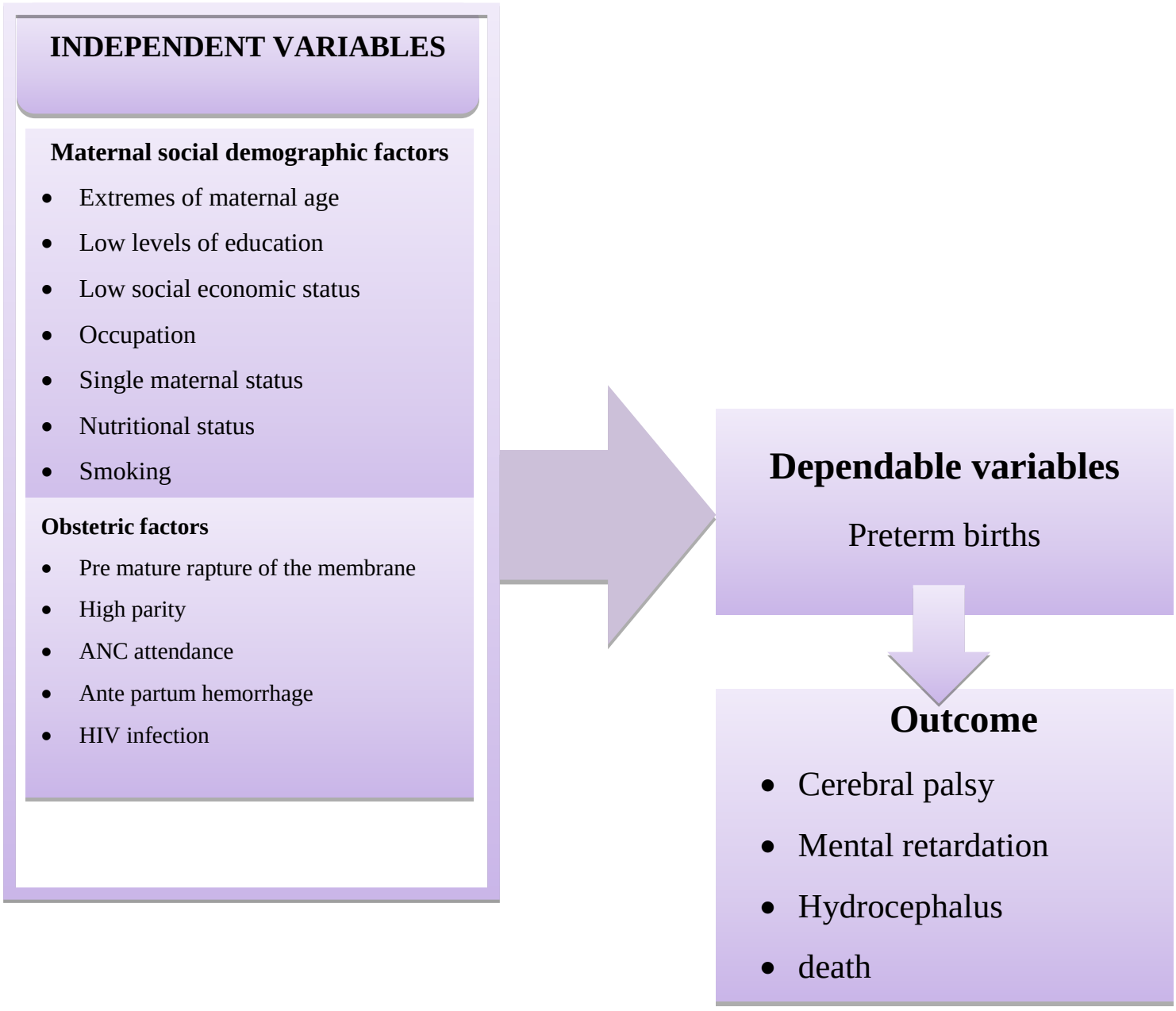
Independent Variable

The independent variables are divided into socio demographic factors and obstetric factors. The maternal social demographic factors include; extreme of maternal age, low level of education, low social economic status, single maternal status, nutritional status, smoking and alcohol abuse. The obstetric factors include; premature rapture of the membranes, high parity, ANC attendance, ante partum hemorrhage and HIV infection.

1.6.3 Time scope

The study will look into details of records from August 2018 to February 2019

CONCEPTUAL FRAMEWORK



As shown in the conceptual model the two concepts of the study maternal socio demographic risk factors and maternal obstetrics risk factors have been found to be related to or predictive of preterm birth.

Many maternal socio-demographic factors have been found to be related to preterm birth. For example, extremes of maternal age, low levels of education, low social economic status, occupation and single maternal status.

Some of the obstetric factors found to be related to preterm births include; pre mature rapture of the membrane, high parity, ANC attendance, ante partum hemorrhage and HIV infection.

Premature births can lead to adverse outcome like; cerebral palsy, mental retardation, hydrocephalus and death.

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

Preterm birth is defined by WHO as all births before 37 completed weeks of gestation or fewer than 259 days since the first day of a woman's last menstrual period. Preterm birth can be further sub-categorized as late preterm delivery (34 to 36 completed weeks gestation), moderately preterm (32 to 33 weeks), very preterm (28 to 31 weeks), and extremely preterm (less than 28weeks). (March of dimes/WHO 2012)

About 5% of preterm births occur at a gestation less than 28 weeks, 15% at 28–31weeks, 20% at 32–33 weeks and 60–70% at 34–36 weeks. (The lancet 2014).

In November 17, 2018, -world prematurity day, new global estimates show that in 2014, approximately 10.6% of all live births globally were preterm. Published in the journal The Lancet Global health, and co-authored by WHO and HRP staff, the study underlines the crucial need to safe guard the health and well-being of all women and girls and their babies throughout life, including access to high quality and respectful healthcare services.

The new estimates show that preterm births during 2014 ranged from 13.4% in North Africa to 8.7% in Europe. The authors state that Asian and sub Saharan African countries accounted for 78.9% live births and 81.1% of preterm births globally in 2014.

In Uganda, preterm births contribute directly to 25% of all neonatal deaths. Uganda is the 28th country worldwide with the highest preterm birth rates estimated at 13.6 per 1000 live births. (UBOS, 2011).

2.1 CAUSES AND RISK FACTORS AFFECTING PREMATURE BIRTHS.

Preterm birth has a variety of causes. It is classified into two broad subtypes:

(1) Spontaneous preterm birth- Spontaneous onset of labor or following preterm premature rupture of membranes (PPROM).

(2) Induced/Iatrogenic preterm birth- Induction of labor or elective caesarian birth before 37completed weeks of gestation due to maternal or fetal indications.

About 30–35% of preterm births are indicated while 40–45% and 25–30% follow spontaneous preterm labour and PPROM respectively. Spontaneous pre-term birth is most commonly caused by pre-term labour in Caucasians, and PPROM in black women indicating the existence of potentially different causative mechanisms.

Spontaneous preterm birth is thought to be initiated by multiple mechanisms including infections or inflammation, utero placental ischemia or hemorrhage and uterine over distension. Although no precise cause can be identified in about half of the cases, several factors are thought to interact to cause a transition from uterine quiescence toward preterm labour or PPROM. Socio demographic and obstetric factors have been sought to explain preterm birth and although they do not necessarily imply causation, identifying at-risk women will help initiate risk specific interventions. Some of the factors which are associated with preterm birth are previous preterm birth, multiple gestation, maternal age and parity, interpregnancy interval, ANC attendance, maternal nutritional status, APH, PIH, maternal infections, fetal gender, and congenital anomalies among others. (kusanovic J, et al 2010)

2.1.1 MATERNAL SOCIO-DEMOGRAPHIC FACTORS

The socio-demographic factors which are associated with preterm birth include extremes of maternal age, low level of education, low socioeconomic status and occupation, single marital status, nutritional status, smoking and alcohol use. The mechanisms by which the maternal demographic characteristics are related to preterm birth are unknown. Lopez A et al in the United Kingdom found that maternal age more than 39 years and prenatal smoking were significantly associated with preterm delivery. In Pakistan, Irshad Mohammed and colleagues in a study of 205 preterm births found that about 25% of the mothers were aged 35 years and above. Shrestha et al in a study of 164 preterms admitted in a NICU in Nepal found that 35% of mothers who delivered prematurely were teenagers. (shrestha s et al 2010)

Sebayang et al in Lombok, Indonesia, analysed data from the Supplementation with Multiple Micronutrient Intervention Trial (SUMMIT), a double-blind cluster-randomized controlled trial of a cohort of 14,040 singleton births to examine determinants of preterm birth, LBW and SGA. The results showed that women with high school education (≥ 10 years of education) had 36% lower odds of having preterm birth (OR 0.64), compared with women with no primary education while maternal age was not significantly associated with preterm birth. In the same study,

maternal MUAC <23.5cm was significantly associated with the 3 adverse pregnancy outcomes 5 which is similar to the findings of a study by Kalanda BF in a rural district in Malawi, that found that low maternal MUAC (<23cm) was significantly associated with LBW, preterm birth and intrauterine growth restriction. A study of 200 preterm and 200 term infants by Jandaghi et al in Iran showed that 74% of preterm births occurred among women from a low socioeconomic background but maternal occupation was not associated with preterm birth. Ohmi and others in a retrospective study of 1,194 infants in Japan noted that the risk of preterm birth was significantly increased if mothers smoked during any trimester of pregnancy. Parazzini et al in Italy in a case control study demonstrated that moderate prenatal alcohol consumption (>3 drinks per day) was associated with a significant risk of preterm birth. (sebayang s et al 2012)

Studies in Africa have shown conflicting results in as far as socio-demographic factors and their association with preterm birth is concerned. In a study of 185 preterm babies done at Ilorin Teaching Hospital, Nigeria, in which about 52% of preterm births were early preterms (<34weeks gestation), maternal age >35 years was significantly associated with premature birth but marital status was not. (Olugbenga A et al 2010). In the same country, S.J. Etuk and colleagues in a study of 217 cases and a similar number of controls, found that being unmarried was strongly associated with preterm delivery while maternal age (<20 or ≥20 years) and level of education (< 0r ≥ standard6) were not. In a retrospective study of 1,626 HIV infected women in Lagos, Nigeria, (Ezechi et al 2012) found that being unmarried increased the likelihood of preterm birth but maternal age did not. In east Africa studies have also been done. (Bayingana et al 2010) in a case control study of 200 subjects in Rwanda found that maternal age, level of education, smoking and alcohol use in pregnancy as well as UTI, had no correlation with preterm delivery or LBW. A study in Kilimanjaro Christian Medical Centre, Tanzania by J. E. Siza and others involving 460 LBW babies (91% of whom were preterm), showed that women who had no formal education were 4 times more likely to deliver preterm babies.

In Uganda, a study by Elizabeth Ayebare, Gorrette Nalwadda and Peter Ntuyo, showed that nonattendance to ANC clinic and height less than 1.5 meters were associated with preterm births while unemployment was a protective factor.

2.1.2 Obstetric Risk Factors:

Various pregnancy-related factors have been associated with preterm birth. These include PROM, parity, ANC attendance, previous preterm birth, PIH, APH, interpregnancy interval, anemia in pregnancy, UTI and HIV infection. A study of 315 preterm babies in India by (Shubhada A et al 2013) found that previous history of preterm delivery and recurrent maternal UTI were significantly associated with preterm birth, while PIH and APH were not. In this study, 36.8% of cases were idiopathic, 59% underwent Caesarean section and about 50% occurred in those whose parity was more than two. In a comparative cross-sectional study in the Qom province of Iran in 2008, Jandaghi and Khalajinia found that history of previous preterm birth, maternal anemia, PROM, placental abruptio and UTI were significantly associated with premature birth while PIH was not. On controlling for confounding using logistic regression models, results showed that placental abruption (OR=8), previous preterm delivery (OR =3.48), PROM (OR=3.78) and anaemia (OR= 2.8) remained significant. Among singleton deliveries in a tertiary hospital in the United Kingdom, Lopez A. et al found that history of previous preterm birth was significantly associated with preterm birth while anemia (Hemoglobin level <10.5 g/dl) and parity were not. In a study of 164 preterm babies admitted in NICU, (Shrestha et al 2010) in Nepal found that 52% of mothers had inadequate antenatal care (<3visits), 23% had APH while PIH and multiple pregnancies accounted for 13% each. In the same study, maternal UTI occurred in 3% of cases and was not significantly associated with preterm birth unlike the findings of (Shahira et al 2007) in Egypt which showed that UTI in pregnancy had a significant association with preterm birth and LBW. In a study in a tertiary hospital in Pakistan, (Irshad Mohammed et al 2012) found that 61% of cases were associated with PROM, 30% had previous preterm birth, 31% had previous pregnancy loss, 36% had APH and 4% had a history of burning micturition**.** In a study of second births in Scotland among mothers who conceived within 5 years of the first birth, Gordon et al found that about 5% had an interpregnancy interval of less than 6 months. Compared with those with an interval of 18-23 months, these women as well as those with intervals of 24-59 months had significantly higher risk of severe (<32 weeks gestation) preterm birth. These findings are comparable to those of a meta-analysis of 67 studies on birth spacing and perinatal outcomes done by Agustin Conde and colleagues in 2006 that showed that interpregnancy intervals shorter than 18 months and longer than 59 months were associated with increased risk of preterm birth, LBW and SGA. (Shahira R et al 2011) Studies in Nigeria had

shown that high parity, PROM, maternal UTI, previous preterm delivery, APH, PIH, multiple gestation and anaemia were significant determinants of preterm birth. However one study in the same West African country, showed that parity (0 or ≥1) and interpregnancy interval (<2 or ≥2 years), PROM and PIH were not associated with preterm delivery. In another study in Nigeria, APH was not associated with preterm birth. In a study in South Africa, Ndirangu J and others found that maternal HIV was associated with SGA but not preterm birth. In Rwanda, Bayingana et al found that previous preterm birth was strongly associated with preterm delivery of LBW (about 4-fold increase in risk) but no correlation between maternal UTI and early delivery was found. In Tanzania, JE Siza et al found that mothers who had antenatal anemia and those who did not attend ANC were more likely to deliver preterm and LBW babies as were those who were HIV positive whose risk was 2 times higher. Jenny Cole and others in Dar es Salaam, Tanzania, found no significant association between HIV status and preterm birth but noted that symptomatic HIV positive mothers were more likely to deliver prematurely compared to HIV-uninfected mothers. (Siza JE et al 2008). In a study in a referral hospital in Kenya, Mwangi Irungu found that about a third of cases of preterm birth were associated with PROM, 26% did not attend ANC, 50% were primiparas while multiple gestations, PIH and APH accounted for about 16.5, 8.5 and 8 percent respectively.

In Uganda, a study by Elizabeth Ayebare, Gorrette Nalwadda and Peter Ntuyo, showed that PPROM, APH, preeclampsia and eclampsia were associated with preterm births.

2.2.3 Fetal Factors

Fetal gender has been associated with preterm birth. It has been long noticed that female fetuses have a better perinatal survival than male fetuses. Male fetuses are at an increased risk of being born preterm when compared to female fetuses in both singleton and twin pregnancies and generally males have poorer perinatal outcomes. The mechanisms for this observation remain unclear. A study done by (Zeitlin et al 2008) showed that males were more likely to be born prematurely regardless of the type of labor. In the SUMMIT study, there was no association between infant sex and premature delivery while(Ezechi et al 2012) in Nigeria found that female babies accounted for 55% of preterm births.

CHAPTER 3

METHODOLOGY

3.0 Introduction

Research methodology is the procedure used to collect organize and analyze data. It includes research design, study population, sample size, sampling technique, data collection method, data collection tools, data collection procedure, quality control, data analysis and ethical considerations.

3.1 Study Design

The study utilized a hospital based descriptive cross-sectional study.

3.2 Study Population

The study population comprised of all mothers who delivered at Kiryandongo hospital and their newborns.

3.2.1 Inclusion criteria

All mothers who had live births at Kiryandongo Hospital and their newborn babies will be recruited into the study.

3.2.2 Exclusion criteria

All mothers who did not deliver at Kiryandongo hospital, those who had stillbirths and those who did not give consent and their babies will be excluded from the study.

3.3 Sample Size Calculation

The sample size was calculated using Fishers' formula as follows:

n = Z2p(1-p)/ d2

Where,

n = desired samples size

Z = standard normal deviation, which corresponds to the 95%

Confidence Level (1.96)

p = proportion in the target population that is estimated to be preterm babies. A value of 15% will be used

d = degree of accuracy desired set at 0.05

n = 1.96^2(0.15)(1-0.15)/0.05^2=44

sample size = 126

3.4Sampling techniques

This was a systematic random sampling method. Using the average number of deliveries recorded monthly in Kiryandongo Hospital between August 2018 and February 2019.

3.5 Data collection method

Data was collected using a pretested questionnaire, administered to the eligible mothers in the maternity and newborn units. Medical records specifically the antenatal record and mothers' admission files were retrieved to provide additional information which was entered in the standardized questionnaire as required.

3.6 Data collection tools and procedures

Self-administered questionnaires with open and closed-ended questions were used for data collection.

3.7Quality control

Data was entered daily into a pre-programmed computer and crosschecked to ensure the validity of collected data. The research assistants were trained and provided with a guide for the study with definitions of the terminologies used to ensure uniform interpretation.

3.8 Data analysis

Data was analyzed using STATA analytical package version 11. Descriptive statistics was reported to describe the variables and inferential statistics was used to establish associations between prematurity and the various risk factors using a chi-square analysis while a multivariate logistic regression was used to determine the factors independently associated with preterm birth.

3.9 Ethical considerations

A letter was obtained from the faculty of clinical medicine and dentistry, Kampala International University-Western Campus, addressing the medical super intendant of Kiryandongo hospital to grant me permission to access patient's record.

CHAPTER 4

Results

4.1 Description of participants

4.1.1 Characteristics of mothers:

The mean maternal age was 25 +/- 5 with majority (86%) being aged 20 years and above. 75% of the mothers were married and 58% had attained post primary level of education. About 98% of the mothers had singleton deliveries and 82% delivered at term.

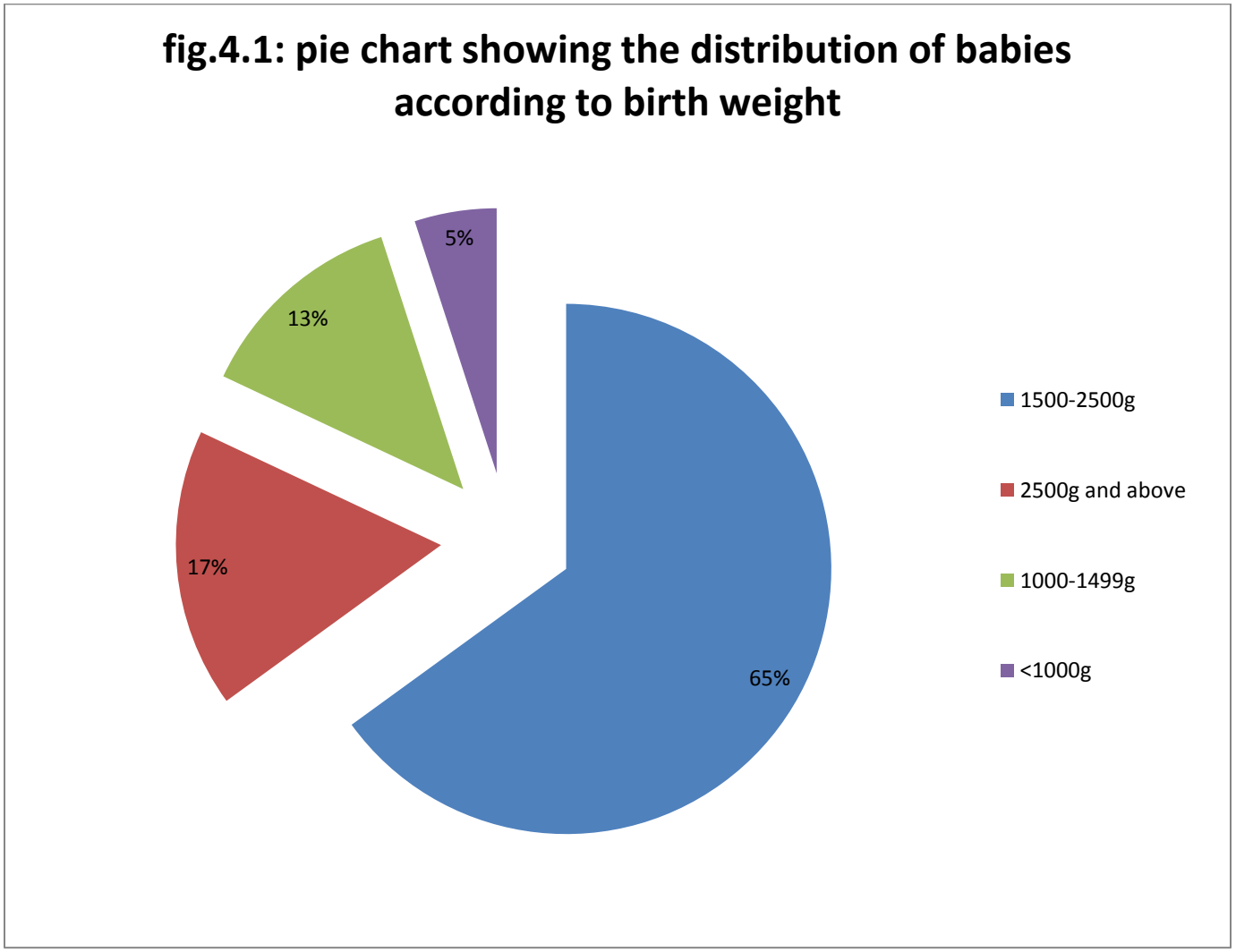
Table 4.1: Characteristics of the Mothers.

	Frequency (n=126)	Percentage (%)
Age in (years)		
<20	18	14
>20	106	86
Marital status		
Married	98	25
Unmarried	28	75
Level of education		
primary	35	42
post primary	91	58
Type of pregnancy		
Singleton	124	98
Multiple	2	2
Gestational age		
Term	103	82
Preterm	23	18

4.1.2 Neonatal Characteristics

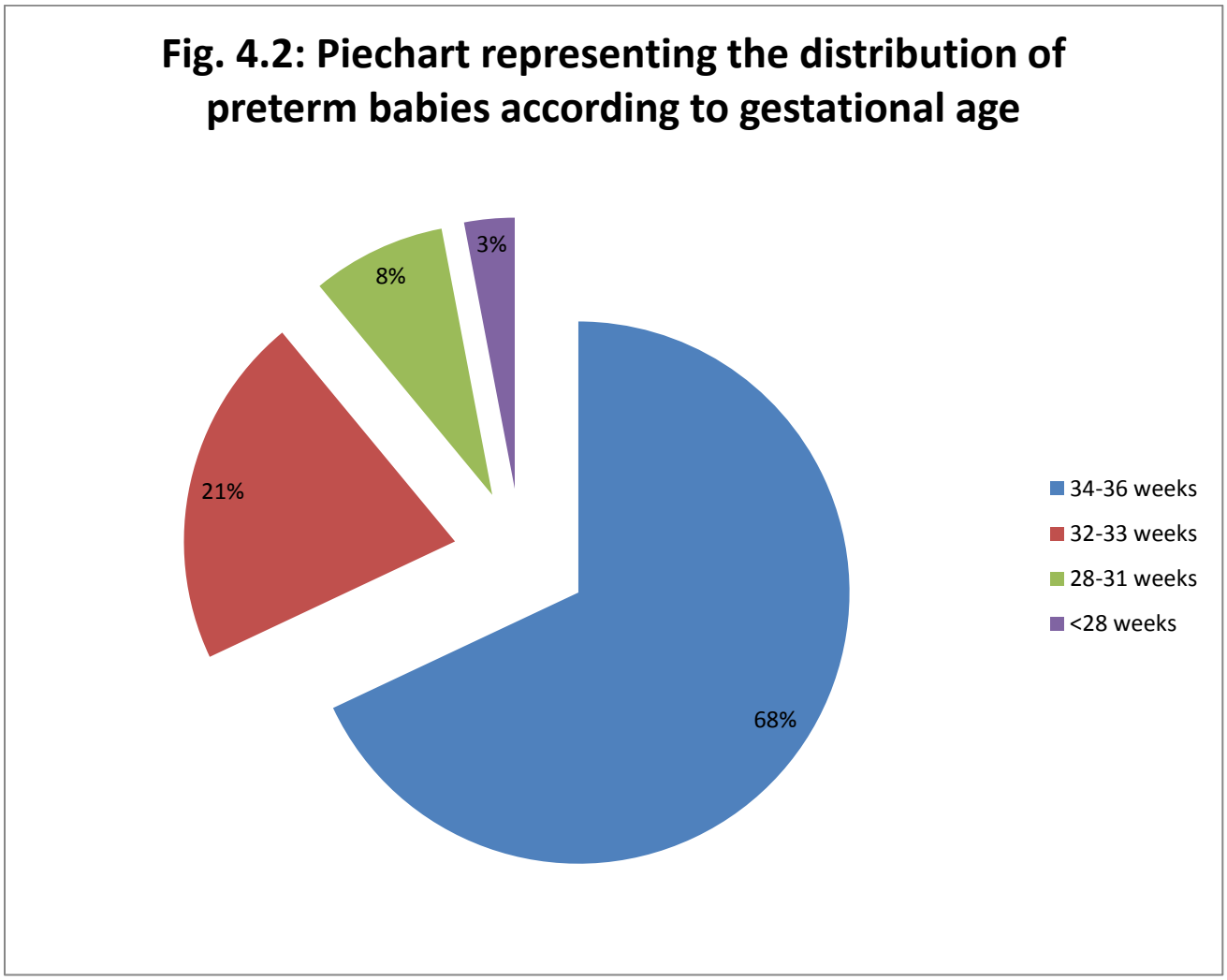
4.1.2.1 Birth Weight

The mean weight for the term and preterm groups was 3100 +/-500 grams and 2000+/-500 grams respectively. About 65% of the preterm babies had a birth weight of 1500-2500 grams while 4% had a weight <1000 grams. This is shown in figure below.



4.1.2.2 Gestational Age

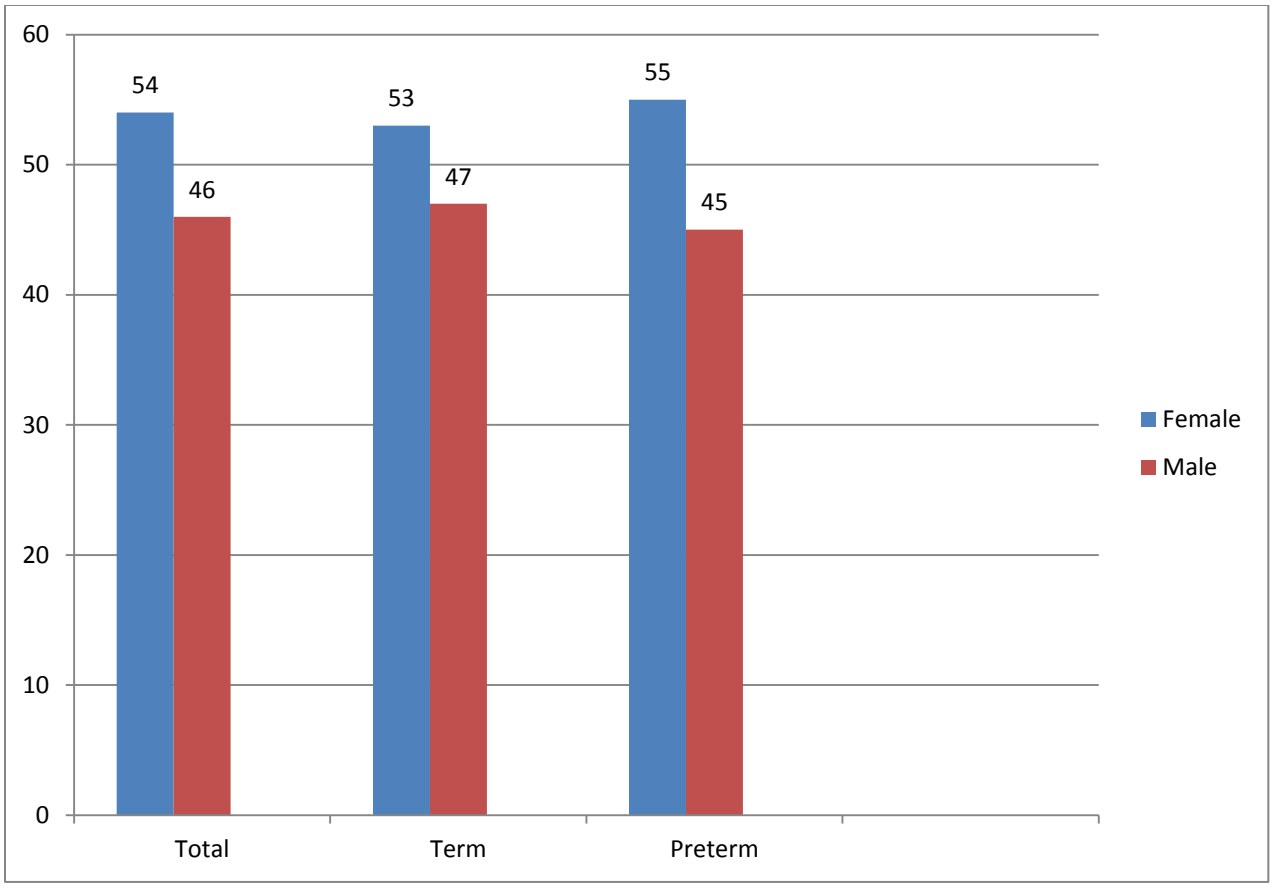
The mean gestation was 39 +/-2weeks and 33+/-2week for term and preterm babies respectively. Of the preterm births, 68% were late preterm (34-36 weeks), 21% were moderate preterm (32-33weeks), 8% were severe preterm (28-31 weeks) and 3% were extreme preterm (<28 weeks) Figure 4.2 illustrates the distribution of preterm babies according to gestation.



4.1.2.3 Sex of the Babies

Of all babies delivered, 46% were male and 54% were female respectively. Female and males were 53% and 47% of term and 45% and 55% of preterm babies respectively.

Fig 4.3: Bar graph showing the distribution of babies according to sex



4.2 Prevalence of Preterm Birth

A total of 126 live births were enrolled into the study of which 23 were preterm giving a Prevalence of 18.3%.

4.3 Socio-Demographic Factors

About 93% of both preterm and term mothers were aged less than 35 years. Maternal age 35 years or more was not associated with preterm birth (p=0.663). There was no difference between the preterm and term groups in terms of marital status (p=0.084), maternal level of education (p=0.081), smoking (p=0.635) and prenatal alcohol use (p=0.467). As shown in table 4.2 below, none of the socio-demographic factors was significantly associated with preterm birth in this study.

Table 4.2: Association between Preterm Birth and Socio-Demographic Characteristics

characteristics	Term n=106 (%)	Preterm n=23 (%)	OR(95% CI)	X2	P-value
Maternal age (years)					
35 and above	7 7%	1 4%	0.62	0.1895	0.663
<35	96 93%	22 96%			
Level of education					
Primary	32 31%	3 13%	0.32	3.045	0.081
Post-primary	71 69%	20 87%			
Marital status					
Married	77 75%	21 91%	3.55	2.979	0.084
Un married	26 25%	2 9%			
Smoking					
Yes	1 1%	0 0%	0	0.2251	0.635
No	102 99%	23 100%			
Alcohol in pregnancy					
Yes	5 5%	2 9%	1.86	0.529	0.467
No	98 95%	21 91%			

4.4 Previous Pregnancy Factors

Most mothers had a parity of less than four. Parity of 4 and above was significantly associated with preterm birth. Women with a parity of 4 or more were 4 times more likely to deliver preterm compared to those whose parity was < 4 (p= 0.042; OR 4.14). About 26% of mothers who delivered before term had a history of previous preterm delivery compared to 17% of those who delivered at term but this was not significant (p=0.692). Approximately 4% of mothers in the preterm group and 5% in the term group had an interpregnancy interval of <24 months but this was not statistically significant (p=0.918). The association between preterm birth and previous pregnancy characteristics is shown in Table 4.3

Table 4.3: Association between Preterm Birth and Previous Pregnancy Factors

characteristics	**Term N=103 (%)**	**Preterm N=23 (%)**	**OR**	**X2**	**P -value**
Parity					
>/=4	30 29.13%	2 8.7%	0.23	4.14	0.042
<4	73 70.07%	21 91.3%			
Previous preterm					
Yes	18 (17.48%)	6 26.09%	1.23	0.157	0.692
no	85 (82.52)	23 73.91%			
Interpregnancy interval(in months)					
<24	5 4.85%	1 4.35%	0.91	0.011	0.918
>/=24	98 95.15%	22 95.65%			

4.5 Antenatal Factors

The proportion of mothers who did not attend ANC in the term and preterm groups was 2.9% and 4.3% respectively and this was not significant (p=0.723). Mothers who had not had any antenatal care were 0.5 times more likely to deliver preterm (OR 0.63). About 20% of mothers in

term and 30% in preterm group had less than 3 antenatal visits but this was statistically insignificant (p=0.295). Approximately 8.7% of preterm mothers and 7.8% of term mothers were HIV positive. There was no association between HIV status and preterm delivery (p=0.882).

Table 4.4: Association between Preterm Birth and Antenatal Factors.

characteristics	**Term n=103 (%)**	**Preterm n=23 (%)**	**OR(95%CI)**	**X2**	**P value**
ANC attendance					
Yes	100 (97.1%)	22 (95.7%)	0.63	0.126	0.723
No	3 (2.9%)	1 (4.3%)			
Number of ANC visits					
<3	21 (20.4%)	7 (30.4%)	1.71	1.098	0.295
>3	82 (79.6%)	16 (69.6%)			
HIV status					
Sero positive	8 (7.8%)	2 (8.7%)	1.13	0.022	0.882
Sero negative	95 (92.2)	21 (91.3%)			

4.6 Delivery Factors

The Caesarean section (C/S) delivery rate was 12.7% among all participating mothers. About 35% of preterm deliveries were via C/S compared to 23% term babies who were delivered via C/S. Delivery via C/S had significant association with preterm birth (p=0.015). Women who delivered via C/S were nearly 0.5 times (OR 0.43) more likely to have preterm birth than those who delivered vaginally. About 12.6% and 17.4% of mothers in the term and preterm group respectively had induced labor. However, there was no association between onset of labour and preterm birth (p=0.545). The proportion of twin pregnancy among women who delivered at term and preterm was 1% and 4% respectively and this was not significant (p=0.241). Table 4:5 shows the association between preterm birth and delivery factors.

Table 4.5: Association between Preterm Birth and Delivery Factors

characteristics	Term n (%)	Preterm n (%)	OR(95%CI)	X2	P value
Mode of delivery					
C/S	24 (23.3%)	8 (34.8%)	0.43	5.975	0.015
Vaginal	79 (76.7%)	7 (65.2%)			
Onset of labour					
Induce	13 (12.6%)	4 (17.4%)	1.46	0.367	0.545
spontaneous	90 (87.4%)	19 (82.6%)			
Pregnancy outcome					
Twins	1 (1%)	1 (4.3%)	4.64	1.373	0.241
Singleton	102 (99%)	22 (95.7%)			

4.7 Obstetric Factors

About 26.1% and 6.8% of mothers in the preterm and term groups had PIH while 22.0% and 6% of mothers in the two groups had APH respectively. Mothers with PIH and those with APH had a 5- fold and 4-fold increase in risk of preterm birth (OR 5.04 and 4.48). Approximately 17.4% of mothers who had preterm delivery and 3.8% of those who delivered at term had a history of PROM for more than 18 hours while 56.5% of mothers in preterm group and 31.1% of those in the term group respectively reported having had UTI or burning sensation with micturition during pregnancy. As shown in table 4.6, all these factors were significantly associated with preterm birth ($p<0.05$

Table 4.6: Association between Preterm Birth and Obstetric Factors

characteristics	Term n=103 (%)	Preterm n=23 (%)	OR	X2	P value
Pre-eclampsia					

Yes	7 (6.8%)	6 (26.1)	5.04	7.562	0.006
No	96 (93.2)	17 (73.9)			
APH					
Yes	6 (5.82%)	5(21.7%)	4.48	5.976	0.015
No	97 (94.18%)	18 (78.3%)			
PROM					
Yes	4 (3.88%)	4 (17.4%)	5.26	5.68	0.017
No	98 (96.12)	19 (82.6%)			
History of UTI					
Yes	32 (31.1%)	13 (56.5%)	2.88	5.306	0.021
No	71 (68.9%)	10 (43.5%)			

4.8. Binary logistic regression analysis of risk factors of PPH

High parity, previous preterm birth, UTI in pregnancy, PIH, prolonged PROM and APH were found to be significantly associated with preterm birth. The risk of preterm birth increased 8-fold with PIH (OR 7.085), 5-fold if the mother had prolonged PROM (OR 5.319) and 4-fold with APH (OR 4.264). This is shown in table 4.7.

Table 4.7: Binary logistic Regression of Significant Factors

Variable	**AOR (95%)**	**P value**
Prolonged PROM	5.319(2.320-12.195)	<0.001
Pregnancy induced hypertension	7.805 (3.686-16.525)	<0.001
APH	4.264 (1.517-11.96)	<0.001

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 DISCUSSION OF THE FINDINGS

The preterm birth rate in the current study was found to be 18.3%. This is similar to the 15% reported by Shubhada et al 2013 in a Medical College Hospital in India and the 16.4% reported in a study in Harare Maternity Hospital in Zimbabwe Feresu S.A et al.It is also similar to the 16.8% reported by Nynke R et al in Malawi that involved secondary analysis of data from community based randomized placebo controlled trial for the prevention of preterm birth and WHO population based estimates of preterm birth that indicate that most countries with a prevalence of more than 15% are in sub-Saharan Africa. (Blencowe. H et al, 2010), March of dimes WHO 2012. Other studies olugbega A et al 2010, had shown that advanced maternal age and being unmarried were associated with prematurity but this was not demonstrated in the current study. Earlier studies had reported conflicting findings on the association between maternal education and preterm birth. oliver c Ezaci et al 2012. Education level was not associated with preterm delivery in the present study. This may be due increased access to basic education among the mothers in this study.

No association between smoking as well as alcohol use and preterm birth was found. This was similar to that of Bayingana et al in Rwanda. 2010. This may be largely because smoking and alcohol use by women is not prevalent in Africa due to cultural influences. Previous preterm delivery was not associated with preterm birth unlike what was found in other studies. Olugbenga A et al 2010. The current study demonstrated that mothers with a parity ≥4 were 4 times more likely to deliver prematurely. This finding is similar to that of previous studies which had shown that multiparous women were more likely to deliver preterm. olugbenga A et al 2010. High parity is likely to increase the risk of preterm delivery due to uterine changes such as myometrial stretching from previous pregnancies. Some of the mothers with high parity may also have had a bad obstetric history which may be due to unidentified factors that may persist to subsequent pregnancies.

Delivery via Caesarean Section was significantly associated with preterm birth but onset of labor was not. This was similar to the finding of Olugbenga et al in Nigeria. This may be due to obstetric complications such as PIH and APH which were the major causes of iatrogenic preterm birth in this study.

Twin gestation was not significantly associated with preterm birth in this study unlike findings of J Etuk et al.

ANC attendance as well as number of antenatal visits was not associated with preterm birth unlike the finding of Feresu A et al in Zimbabwe. This may have been due to the Focused Antenatal Care (FANC) approach in Uganda which has emphasized the need to have four targeted antenatal visits.

Maternal HIV status was not associated with preterm delivery in the current study. This finding was similar to that of J Ndirangu et al 2012 in South Africa. The burden of HIV/AIDS in these studies is comparable to that of the current study. It is possible that with increasing availability and use of antiretroviral drugs for prophylaxis and treatment of HIV in pregnancy, the impact of HIV on pregnancy outcomes may have been reduced.

UTI in pregnancy was associated with premature birth. This was similar to the findings of studies in Iran, Nigeria and Egypt. Khalajna Z et al 2012, Olubenga A et al 2010, Shahira R et al 2012. Due to morphological and functional changes that occur in pregnancy, stasis of urine favors UTI. Like other infections, UTI stimulates the production of cytokines which may induce preterm labor through release of prostaglandins. This study showed that prolonged ROM (>18 hours) was associated significantly with preterm birth, Olugbenga et al 2010 and Khalajinia et al 2012 had reported similar findings. PROM has been associated with chorioamnionitis which may be subclinical and this may cause preterm labour by inducing the release of inflammatory mediators.

Most previous studies had shown that PIH and APH were associated with preterm delivery while a few had not. Khalajinia Z et al 2012, Olugbenga A et al 2010. This study confirmed that the two factors have significant association with preterm birth. PIH may cause uteroplacental ischemia and thus predispose to poor pregnancy outcomes while significant APH often leads to delivery due to the risk it poses to the pregnant woman. In the current study, PIH and APH were the main causes of medically indicated preterm delivery.

5.2 CONCLUSIONS

• The preterm birth rate in Kiryandongo Hospital was 18.3%.

• Biological factors including high parity, previous preterm birth, PIH, APH, prolonged PPROM and UTI in pregnancy were all significantly associated with preterm birth.

• Socio-demographic factors were not associated with preterm delivery in this study.

• Only PIH, APH and prolonged PPROM remained significant on controlling for confounders.

5.3 RECOMMENDATIONS

• There is need to increase efforts in combating obstetric complications particularly PIH and APH. Research to elucidate mechanisms by which these factors contribute to preterm birth should be promoted.

• Health education on the risks posed by high parity should be emphasized to women of reproductive age and their communities and family planning promoted.

• Screening for UTI during the antenatal period should be done regularly and treatment offered promptly when needed.

• Mothers with antepartum bleeding and grand multiparity should receive intensified prenatal care given the risk of early preterm delivery.

5.4 LIMITATIONS OF THE STUDY

• Only mothers who had live births were interviewed and their babies assessed for gestational age. The study did not address factors associated with preterm stillbirth.

• UTI in pregnancy was based on mothers' self-report of symptoms and not on laboratory Confirmation and therefore over-reporting was likely.

• Some cases of incomplete or missing data especially on antenatal profile were encountered.

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APPENDIX

APPENDIX I: QUESTIONNAIRE

INSTRUCTIONS TO INTERVIEWERS

i. Ensure respondents to this questionnaire are the biological mothers of the child who delivered in Kiryandongo Hospital

ii. For questions with alternatives fill in the number bearing the response in the brackets provided at the end of each question as appropriate.

iii. Don't suggest responses for the respondent.

Study No..... **Date of interview**.....

SECTION A: DEMOGRAPHIC INFORMATION

1. Age of the mother (in years).....

2. Marital status. ( )

1= Single (never married). 3=Divorced/separated

2= Married. 4=Widowed.

3. Religion. ( )

1=Catholic. 3=Muslim

2=Protestant. 4 others (specify).....

4. Maternal level of education ( )

1=No formal education 4= Not completed Secondary

2= Not completed Primary 5=Completed Secondary

3= Completed Primary 6= College/university education

5. Maternal occupation. ( )

1= Formal employment 3=Subsistence farming/Casual work

2= Self employed/Business 4= House-wife 5=Student

6. Did you or your partner smoke tobacco during your pregnancy? ( )

1=None of us smoked 3=Only my partner smoked

2= I smoked but my partner did not 4= Both of us smoked

7. Did you use alcohol during the pregnancy? ( )

1=No 2= Yes but occasionally 3= Yes, I took frequently

SECTION B: OBSTETRIC AND NEONATAL INFORMATION

Part 1: Information from the mother

8. How many times have you been pregnant before? .....

9. When was your LMP? .....

10. When did you deliver your baby? (Dd/mm/yr).....

11. Gestation by dates.....(to the nearest week)

12. When was your previous delivery? (Dd/mm/yr).....

13. Interpregnancy interval (in months).....

14. Is your last baby before this one alive or dead? ( )
1=Alive 2=Dead 3=Never been pregnant before 4= Miscarriage

15. Were any of your other children born more than 1 month before the expected time?
1=Yes 2=No ( )

16. If the answer to question 15 is yes, how many times (.....) and at what gestation?.....(in weeks)

Part 2: Information from the antenatal card or mother's file

17. Mode of delivery ( )
1=SVD 2=Breech 3= C/S

18. Onset of labour ( )
1=Spontaneous 2= Induced labour or C/S due to medical indication

19. Pregnancy outcome ( )
1=Singleton 2=Twins or more

20. Birth weight (to the nearest 10 grams).....

21. Sex of the baby ( )
1=Male 2=Female

22. ANC attendance ( )
1=Yes 2=No

23. Number of times attended ANC? ( )
1=Once 2=2 times 3=3 or more times

24. HIV status ( )
1=Positive 2=Negative 3=Unknown status

25. Hemoglobin level (g/dl).....

26. Pregnancy induced hypertension or Eclampsia ( )
1=Yes 2=No

27. Antepartum haemorrhage ( )
1=Yes 2=No

28. History of drainage of liquor for more than 18 hours ( )
1=Yes 2=No

29. History of burning sensation during urination or UTI during the pregnancy?

( )
1=Yes 2=No

Part 3: Measurements:

30. Maternal left mid upper arm circumference (MUAC) .....cm (to the nearest 0.1cm)

31. Gestational age as estimated by clinical assessment in weeks..... (Based on **Finnstrom Score** chart)

APPENDIX II: CONSENT FORM FOR THE PARTICIPANTS

Inpatient number…….. Study number…….

Ward…… Date…….

Study title.
Prevalence and factors associated with preterm birth at Kiryandongo Hospital Kiryandongo Uganda.

Investigator:
Ruth Wanjala, Bachelors of medicine and surgery
Kampala International University Western Campus

Supervisor
1. Dr Jonnie Mulwana

Investigator's statement
We are asking you and your baby to participate in a research study. The purpose of this consent form is to give you information you will need to help you decide whether to participate in the study or not. You may ask questions on the risks and benefits of the study on your baby and yourself. **(Please read or listen to the information from this form carefully).**

Introduction
Preterm birth is defined as birth occurring before 37 completed weeks of gestation. About 15million babies are born into the world before the right time and over 1 million of these babies die each year and others develop long term complications that impair their growth. In addition, the numbers of such births is increasing worldwide. Preterm birth is associated with several factors which may be related to the mother or the baby. The purpose of this study is to determine the burden of preterm birth and the factors that are associated with this problem among women who deliver in Kiryandongo Hospital.

The benefits of the study
Your participation in this study will help us identify the factors associated with preterm delivery. This will help in developing measures to prevent preterm delivery so as to ensure as many babies as possible are born at term.

The risks of the study
Your baby will be examined and the tape measure used to take the circumference of your arm is not invasive and therefore no harm will be caused to you or your baby.

Information about confidentiality
All the information obtained will be held in strict confidentiality. No information of any kind will be released to any other person or agency without your permission expressed in writing. We will not publish or discuss in public anything that will identify you or your baby.

Participation
Participation is entirely voluntary and you may refuse or withdraw your consent at any stage without it influencing the care you and your baby are given in any way.

If you **AGREE** to take part in the study, please sign below.
Signed …… Date……
Name of Researcher/ Research Assistant……..
Signed…… Date……

APPENDIX III : Budget

Item	Amount
Stationary and supply	60000
Communication (airtime and data)	30000
Interviews and FDGs	80000
Survey material	100000
Data collection assistant	50000
Transport	30000
Total	350000

Appendix iv: Map of Uganda showing location of Kiryandongo district