DETERMINANTS OF PRETERM BIRTHS AMONG MOTHERS DELIVERING IN KIAMBU LEVEL FIVE HOSPITAL, KENYA

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Determinants of Preterm Births among Mothers Delivering in Kiambu Level Five Hospital, Kenya `

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DECLARATION

This thesis is my original work and has not been submitted for a degree in any University.

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This thesis has been submitted for examination with our approval as University supervisors

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DEDICATION

This work is dedicated to, my spouse Eluid Karugu, My daughter Racheal Karugu, Debra Karugu and my son Levi Gatambia and nurses in Kiambu level five maternity unit.

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I thank the almighty God for His grace, mercy and for seeing me through all the challenges faced during the study and project work. I will keep on trusting him all throughout my life.

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ABBREVIATIONS AND ACRONYMS

ANC	Antenatal Clinic
APH	Antepartum Hemorrhage
C/S	Caesarean Section
CDC	Centers for Disease Control and Prevention
CI	Confidence Interval
FBO	Faith Based Organizations
GA	Gestational Age
HIV	Human Immunodeficiency Virus
JKUATSoN	Jomo Kenyatta University of Agriculture and Technology School of Nursing
KNH	Kenyatta National Hospital
LMP	Last Monthly Period
MoH	Ministry of Health
MSL	Meconium Stained Liquor
NACOSTI	National Commission for Science, Technology & Innovation
NGO	Non-governmental Organizations
PIH	Pregnancy Induced Hypertension
PPROM	Preterm Pre-labour Rupture of Membranes
PROM	Pre-labour Rupture of Membranes

SDG	Standard Development Goal
SEM	Socio-Ecological Model
SME	Social-Ecological Model,
SPSS	Statistical Software for Social Science
SVD	Spontaneous Vertex Delivery
UNCF	United Nation Children Fund
WHO	World Health Organization

DEFINITION OF OPERATIONAL TERMS

Cases	Participant with the disease or outcome of interest
Controls	Participant without the disease or outcome of interest
Fetal factors	Refer to factors that affect baby before it's born
Gestational age	The post-conception age of the baby based on menstrual dates.
Induced preterm birth	Induction of labor or elective Caesarian section before 37 completed Weeks of gestation
LMP	Last menstrual period for the current pregnancy.
Maternal Obstetric factors	Refer to physical and psychological condition of the mother
Parity	The total number of times a woman has been pregnant regardless of the outcome.
Preterm birth	Birth before 37 completed weeks of gestation or fewer than 259 days since the first day of a woman's last menstrual period.
Socioeconomic factors	refers to the interaction between the social and economic habits of a group of people which include income, education, employment and house location
Spontaneous preterm birth	Spontaneous onset of labor or labor following premature rupture of membranes occurring before 37 completed weeks of gestation.

ABSTRACT

A preterm birth is one that occurs before 37 weeks of pregnancy, and it is a hazard for public health worldwide. Around 134,000 of Kenya's 1.5 million yearly births are preterm births. The Objective of this study was to identify factors linked to preterm deliveries among mothers giving birth at Kiambu Level 5 Hospital. Unmatched case-control design was employed in the research. The study was conducted in the maternity ward of Kiambu Level 5 Hospital. Mother-child pair at Kiambu level 5 hospital's maternity unit and new-born section made up the study population. For cases, the consecutive technique was utilized, and for controls, systematic random sampling was used. Structured questionnaires and data abstraction forms were used in data collection from the participants and from mother's card. Version 26 of the statistical program for social science was used to analyse the data. Frequencies and percentages were generated using descriptive analysis. Calculation of odds ratio and the statistical significance between the independent and dependent variables, binary and multivariable logistic regressions were utilized. Preterm births were substantially correlated with having given birth more than four times, history of low birth weight infants, stillbirths and fetal distress. Results showed that mothers who had given birth more than four times were seven times more likely to have preterm births than mothers who had only given birth once, (OR=7.04 (95%CI=1.66 - 29.82) P=0.008).Low birth weight babies increased a mother's likelihood of having a preterm baby by 16.1 times (95% CI: 4.68–55.41; OR: 16.11; P=0.001). Preterm births were 12.3 times more likely to occur for mothers who had previously had stillbirths compared to mothers who had not (OR=12.26 (95% CI=1.71 - 87.73, P=0.013)). Preterm delivery was 6.8 times more likely to occur for mothers of babies with fetal distress than for mothers of healthy babies (OR=6.82 (95%CI = 1.12 - 41.42, P=0.037)) The findings of the study indicate that there was an association between maternal and obstetric factors with preterm births at Kiambu level 5 hospital. The association common factors were :number of times a mother had been pregnant, history of having more than four births, history of having a low birth weight babies, history of still births, history of premature rupture of membrane, Fetal distress, premature onset labor, delivery through a cesarean section and attempted abortion. There is therefore need for proper management of antenatal mothers, and further studies are needed to determine factors influencing preterm births.

CHAPTER ONE

INTRODUCTION

1.1 Background

Preterm birth refers to the birth of an infant before gestation period of 37 weeks (Ohuma *et a*l., 2020). It is classified as an extreme preterm (<28 weeks), very preterm (28 < 32 weeks), moderate (32 < 34 weeks) and late preterm (34 < 37 (weeks) (WHO, 2023). There are several causes of preterm birth. The majority of preterm births occur naturally, but some are caused by illnesses like infections or other pregnancy-related issues that call for an early labor induction or cesarean delivery (WHO, 2023).With an estimated frequency ranging between 4% and 16%, preterm births are on the rise and the second biggest cause of under-5 mortality (WHO, 2024). The rate of under-5 mortality in 2020 varied by nation, from 2 to 115 deaths per 1000 live births. A child born in the nation with the highest mortality rate had a roughly 65-fold increased chance of dying before turning five.(WHO, 2020) Preterm newborns have a good survival rate in high-income nations, but this is not the case in low-income countries due to limited staffing, inadequate equipment, and poor management (WHO, 2024). Preterm baby survival rates are greater in high-income countries (9% frequency) than in developing ones (12% estimated frequency (Alamnesetal *et al*., 2021).This has been attributed to weak management, a labor shortage, and inadequate facilities.

An estimated 13.4 million babies were born too early in 2020 (WHO, 2023). Preterm delivery complications were one of the major causes of newborn morbidity and death in 2015 (Perin et al., 2022; Ohuma et al., 2020). Southern Asia and sub-Saharan Africa account for almost 65% of all preterm births worldwide. These two regions also have the greatest rates of preterm birth and the highest mortality risk for preterm babies(WHO, 2024) The risk of severe disease in the newborn period for preterm infants can be decreased by prenatal care treatments and prompt postpartum care (WHO, 2024). The prevalence rate in Rwanda was 17.3%, according to a study by Ownkwo *et al*., 2022, on variables related to preterm delivery in a rural district hospital. Several research, including those by Olack *et al*. (2021), Rutayisire et al.

(2023), and Alamneh (2022), have assessed factors associated with preterm births, including obstetric, socioeconomic, demographic factors and fetal distress. A study conducted in Tanzania (Ndeki *et al*., 2024) found that the prevalence of preterm delivery at Muhimbili National Hospital was 19.9%.In contrast to the global average of 18% Kenya has a higher rate of preterm births (18.3%), according to Wangura *et al*.', 2018) study.

Kenya is one of the countries with the highest percentage of preterm deliveries; of the 1,455,900 babies born in 2020, 127,500 were delivered before their due dates. WHO (2023). Prematurity is the second largest cause of neonatal death, after suffocation and trauma (31.6%) (WHO, 2024). In terms of the global rate of preterm births, Kenya is ranked 15th out of 188 countries (WHO, 2014). Preterm births are linked to a number of risk factors globally, including preterm births initiated by health care providers, socio demographic factors, maternal obstetric factors, stressful life events, sexual activity, gestational diabetes mellitus in women of short stature, living in rural areas, fetal distress and pregnancy complications (Abewa *et al*.,2021; Alamneh *et al.,* 2021,).

Prematurity has a financial impact on the family, the community, and the healthcare system. It causes maternal and parenting strain due to weight of care of the infant admitted in the hospital for along time. (Opiyo, Ng'ambwa, & Okwiri, 2020). Kenya is among the countries that do not have reliable information about the causes of preterm births. In order to reduce child mortality and morbidity it is critical to identify and address the contributing factors to preterm birth. Laelago et al. (2020). This will help us meet the sustainable development goal 3 which seeks to promote wellbeing at all ages and ensure healthy lives. Therefore, this study examined factors linked to preterm births at Kiambu level 5 hospital in Kenya.

1.2 Statement to the Problem

Preterm births are a growing global health problem with an estimated incidence ranging from 4% to 16% (WHO, 2024). Premature birth has been associated with poor neonatal outcomes, especially in developing countries where the care of severely and extremely preterm babies is insufficient Almost all of these babies

survive in high-income nations. (WHO, 2024). Preterm births account for about 134,000 of Kenya's 1.5 million annual births (Ministry of Health's Division of Family Health, 2018). Complications of preterm births, which led to about 1 million fatalities globally in 2015 (Liu *et al.*, 2020), are one of the causes of neonatal morbidity and mortality.

Due of the lengthy hospital stay associated with prematurity, the family, community, and healthcare system incur costs. Due to the burden of care associated with the disease, it also strains mothers and parents (Liu *et al*., 2020). Due to a lack of reliable and essential data on preterm deliveries, most developing countries, including Kenya, rely mostly on estimations from delivery records. (Laelago *et al*., 2020). Given that Kenya is one of the top 15 nations with the highest rate of preterm births, the causes must be established (WHO, 2014). Several countries have evaluated factors associated with preterm births including obstetric factors, socio-economics, demographic and fetal factors (Rao *et al*., 2014).

Preterm birth incidence rates were 6.2% higher in Kiambu level five hospital from January to December 2019 compared to nearby healthcare facilities (KL5H data, 2019). A total of 60 neonates died out of 1,703 births in December 2018 and January 2019 at Kiambu Level 5 Hospital, and 35 of these fatalities were preterm infants (Kenya Bureau of Statistics, 2019). As a referral hospital for local medical facilities, it manages a lot of high-risk pregnancies that might result in premature births. There is not much information available at Kiambu level 5 hospital about the causes of preterm births. Therefore, the purpose of this study is to evaluate the factors that contribute to preterm births in Kiambu level 5 hospital.

1.3 Justification

According to research conducted worldwide, preterm births are the second leading cause of death for children under the age of five and are on the increase globally. Finding and addressing the key factors as soon as possible can improve the outcome. The number of preterm births at Kiambu Level Five Hospital and other healthcare facilities may thus be reduced by recognizing and managing the factors related to them.

One of Kenya's "Big Four Agenda" objectives is to swiftly deliver universal health care. This might be substantially hampered by failure to avoid infant deaths associated with early deliveries. If the preterm births issue is promptly resolved, Kenya will be able to achieve Sustainable Development Goal 3, which aims to eliminate unnecessary deaths of babies and children under the age of five by 2030.

Since there are few published research on the variables that lead to preterm births at Kiambu Level 5 Hospital, this study is essential. Therefore, this study's results will help bridge the knowledge gap and assist policymakers in developing standards for prenatal care and improved pregnancy outcomes

1.4 Research Questions

1. What are the socio -economic factors contributing to preterm births among mothers delivering at Kiambu level five hospital?
2. What are the maternal obstetric causes of preterm births among women giving birth at Kiambu level five hospital?
3. What are the fetal factors contributing to preterm births among mothers delivering at Kiambu level five hospital?

1.5 Study Objectives

1.5.1 Broad Objective

To assess the determinants of preterm births among mothers delivering at Kiambu level five hospital, Kiambu County, Kenya.

1.5.2 Specific Objectives

1. To determine the socio- economic factors that contribute to preterm births among mothers delivering at Kiambu level five hospital.
2. To assess the maternal obstetric factors that contribute to preterm births among mothers delivering at Kiambu level five hospital.
3. To assess the Neonatal factors that contribute to preterm births among mothers delivering at Kiambu level five hospital.

1.6 Hypothesis

$H0_1$: There is no relationship between socio- economic characteristics and preterm births among mothers delivering at Kiambu level five hospital.

$H0_2$: There is no relationship between maternal obstetric characteristics and preterm births among mothers delivering at Kiambu level five hospital.

$H0_3$: There is no relationship between fetal characteristics and preterm births among mothers delivering at Kiambu level five hospital.

1.7 Theoretical Framework

The Social-Ecological Model, An ecological perspective on health promotion programs. The theoretical framework for this study is provided by the Socio-Ecological Model for Health Promotion, which places an emphasis on both individual and social environmental components intended to encourage health interventions. The Social Ecological Model encourages us to understand the wide range of factors that influence health outcomes rather than focusing just on individual behavior. Gramer *et al.* (2020). The model was developed by (McLeroy *et al*., 1988). In order to identify risk factors and behaviors, the model identified five levels of effect; it focuses on interventions at both the population- and individual-levels. This study will pinpoint the causes of the factors associated with preterm births at Kiambu level five hospital in order to offer the right care.

According to the Centers for Disease Control and Prevention, simultaneous action must be made at several levels of the model to avoid some risk factors (Glennet *et al*., 2020). Prevention, control, and intervention are most effective when the model is tackled from all levels since each level of health has various causes and determinants (WHO, 2018). The socio ecological frameworks model proposes that a number of variables at the intrapersonal, interpersonal, community, institutional, and policy levels have an effect on health outcomes.

Health practitioners examine the relationships between multiple pregnancies factors connected to preterm births to establish recommendations for interventions. The goal of the model is to identify factors that determine whether or not a woman becomes pregnant and starts going to prenatal care facilities. The social ecology model assists in understanding the factors that affect behavior and gives recommendations for developing programs that are effective in social environments. At the individual level, one's skills and expertise are discussed.

Knowing the risk factors can help the person better understand the issue and take precautionary action. It informs expecting mothers about the severity of the risk, the repercussions, and their susceptibility to the condition. People's views and decisions will change as a result of knowledge. The (SEM) model of health draws attention to the connections and interactions between several factors that affect health. The increase in factors connected to preterm births is the foundation of the study's premise.

Some of them include socioeconomic, maternal, obstetric, and fetal distress factors. Preventative measures can improve the outcome if the problem is discovered early on during prenatal care. In light of the fact that our analysis indicates a causal relationship between the risk factors and the result of preterm births, this model was suitable for the research we are conducted.

1.7 Conceptual Frame Work

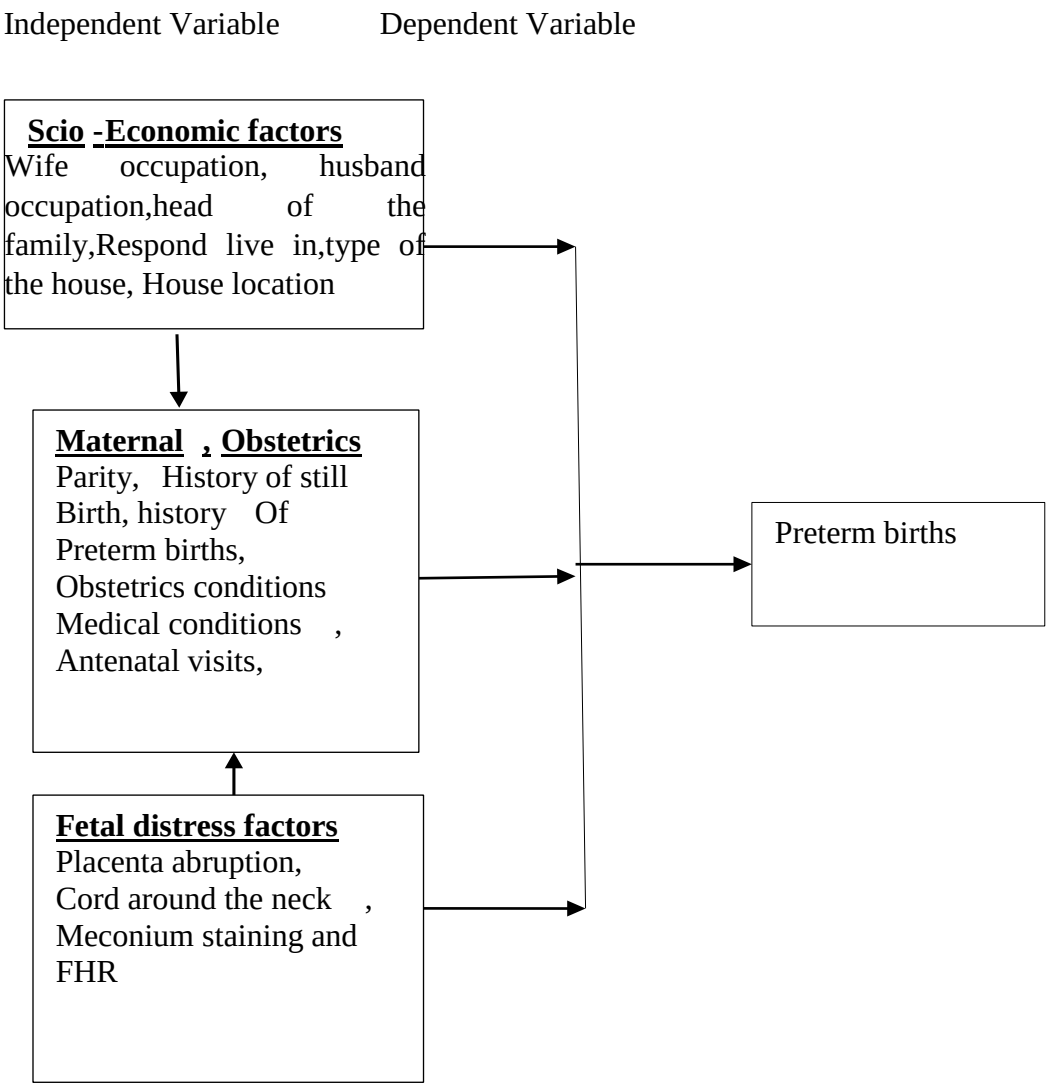

Figure 1.1: Conceptual Framework

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

When a baby is born before 37 complete weeks of pregnancy, it is considered preterm. World Health Organization (WHO, 2020). Extremely preterm births take place between weeks 28 and 32, and intermediate preterm births take place between weeks 32 and 37 of pregnancy (WHO, 2024). The technique used to calculate a pregnant woman's gestational age (GA) is crucial to take into account (Self *et al*., 2022; Boniha *et al.*, 2023).

15 million preterm babies are born each year throughout the world, and they commonly struggle (WHO, 2021). Estimated rates of preterm birth varied from 9.8% in 2000 to 10.6% in 2014. More than 60% of preterm births occur in South Asia and Africa, where the average income is 9% in high-income countries is 12% in lower-income ones, according to the (Alamneh et al., 2021).

2.2 Socio-Economic Factors Contributing to Preterm Birth

Socioeconomic factors refers to the interaction between the social and economic habits of a group of people which include income, education, employment and house location. There is evidence that the socioeconomic classes experience more preterm births than other groups. Numerous studies that examined socioeconomic concerns arrived to a variety of results. Etil *et al. (*2023); Alamneh *et al.* (2021) discovered that adverse working conditions characterized by hard labor and long working hours—were related to preterm birth in a study on mother socioeconomic variables. Other prior research Alamneh *et al*., (2021) found the following factors were linked to increased odds of preterm birth in women of reproductive age: being from eastern or southern Africa; living in a rural area; having multiple pregnancies; currently working; having a history of terminated pregnancies and prior cesarean section deliveries; prim parity; and having a short birth interval. Nevertheless, among women of reproductive age, a lower risk of preterm birth was linked to greater

wealth index, marriage, desired pregnancy, and four or more prenatal care visits. The study concluded that preterm birth rates among women in reproductive age continue to be a significant public health issue in Sub-Saharan Africa. There were several socioeconomic factors that affected preterm birth. Consequently, in order to avoid the immediate and long-term effects of preterm birth, it is preferable to take the high-risk populations into account during intervention. There is a strong association between maternal education and the occurrence of PTB, according to studies by (Samson *et al*., 2021; Ayele *et al*., 2023).Unfavorable working conditions, characterized by Manual labour and long working hours in particular, were associated with preterm birth among Swedish women in this study. Previous findings have also demonstrated a positive association of physical exertion related Work, long hours and/or shift work with poor pregnancy outcome (Kader *et al*., 2022). According to Etil et *al*. (2022), the frequency of preterm deliveries was 38.8%, and the study found that being employment woman, was a risk factors. To avoid preterm delivery, they advise frequently assessing pregnant women who are at high risk of doing so throughout prenatal care. A study by Deriba *et al*. (2021) found that factors that contributed to low birth weight included nutritional counseling, iron-folate supplements, extra meal intake, restriction of certain foods during pregnancy, mother's MUAC, maternal stature, maternal anemia status, pregnancy-related complications, and a history of alcohol consumption during pregnancy. The study concluded that intervention-targeted nutritional counseling, early detection and treatment of anemia, and behavioral change communication to pregnant women are required

A study done by Wakuma *et al*.(2020), discovered a statistically significant association between preterm birth and mothers who experienced anemia during the current pregnancy, developed pregnancy-induced hypertension, had only one ANC visit, prematurely ruptured their membranes, had a birth interval of less than two years, and did not receive dietary supplementation during the current pregnancy. In conclusion, antenatal care service providers should focus on moms who are at risk of these conditions in order to reduce the chance of preterm delivery. They should also send these mothers to senior specialists for early intervention. The present healthcare system ought to incorporate pregnancy-related services, such as counseling mothers

on the benefits of taking dietary supplements, keeping an eye on prenatal care, and postponing deliveries. Zainab et al. (2020) reported that maternal education level below secondary and caesarean section were most common. The study recommended more research work is required. The most prevalent factors, according to (Taha *et al.*, 2020), were caesarean section and mother education below the secondary level. The study concludes that further research in this field is required. Alamneh *et al*. (2021) study revealed that residing in a rural place, being under 1.5 meters tall, and skipping prenatal care appointments were risk factors for preterm births. The same variables were also looked at in this study.

2.3 Maternal Obstetric Factors Contributing to Preterm Birth

A pregnant woman runs the danger of miscarrying or giving birth to a very preterm child if maternal and obstetric risk factors are not properly recognized and addressed. These elements have differing effects on women. Several studies carried out in several countries have documented various risk factors, including those in hospital settings. Previous preterm births, frequent pregnancies without spacing, pregnancy complications, pregnancy-induced hypertension, vaginal bleeding, failure to keep prenatal appointments, and maternal obstetric factors like pre-labor, rupture of the membranes, hypertensive disorders, HIV positivity, and medical conditions have all been linked to preterm births (Ayele *et al*., 2023, Gurung *et al*.,2020 Laelago et al. (2020) conducted a pooled research study that found that PTB was associated with variables such as age, birth intervals less than 24 months, multiple pregnancies with fewer than four antenatal care visits, absence of pregnancy-induced hypertension, premature rupture of the membrane, history of PTB, and stillbirth or abortion. Low blood volume PTB, malaria, vaginal discharge, HIV infection, and urinary tract infection. The investigation concluded that a variety of factors impact PTB in East Africa. The study placed a strong emphasis on early detection of pregnant women at risk for preterm delivery and the provision of appropriate healthcare in order to reduce the prevalence of preterm births and its effects. According to a research by Nwankwo *et al*. (2022), the prevalence rate of preterm births was 17.5%, but Pusdikar *et al.* (2020) reported a 12.6% lower prevalence rate. Pre-labor membrane rupturing, antepartum hemorrhage, hypertensive disorders throughout pregnancy,

and HIV positivity were all included as contributory factors in both investigations. Consequently, addressing pregnant women at risk of premature birth may increase survival rates and minimize the decrease the prevalence rate of preterm births.

This was in contrast to a study conducted by Deriba *et al*. (2021), found that inadequate dietary counseling, inability to take iron-folate supplements, inadequate additional meal intake, and maternal height ≤155 cm, anemia related to pregnancy complications, and alcohol consumption during pregnancy were significantly linked to low birth weight. Determinants of low birth weight were found to include nutritional counseling, iron-folate supplements, extra meal intake, and restriction of certain foods during pregnancy, mother's MUAC, maternal stature, maternal anemia status, pregnancy-related complications, and a history of alcohol consumption during pregnancy. According to the study's findings, pregnant women must get intervention-targeted dietary advice, early anemia testing and treatment, and behavioral change messaging. The two studies suggested promoting PTB knowledge, utilizing contraceptives, receiving counseling to improve birth spacing, and receiving prenatal health education. The lowest possible preterm birth rate should be achieved.

According Dahman *et al*. (2020), The study found that preeclampsia, having a low birth weight baby, and the maternal were significant predictors of preterm birth; among mothers who gave birth at LRRH, the preterm delivery rate was 35.8%. The study recommended evaluating the current state of preparedness in the healthcare system to manage preterm birth situations in both the community and medical facilities. Premature membrane rupture, hypertensive disorders of pregnancy, and fetal distress, rural back ground anemia were revealed to be frequent risk factors for preterm delivery, according to research by Mohapatra et al., (2022). The research showed that women who were short, or who skipped prenatal care clinic visits had a higher risk of giving birth preterm. As a result, early detection and treatment of these high risk illnesses in pregnant women may result in a decrease in the number of preterm deliveries. According to a study published in 2020, by Mabrouk the prevalence of PTB in SSA ranged from 3.4% to 49.4%. Several PTB risk variables were found in this analysis. The most commonly reported risk variables (i.e., those included in at least ten studies included a history of preterm birth (PTB), underuse of

prenatal care less than four visits, premature rupture of the membrane, maternal age ,less than or equal to twenty or thirty-five years, interpregnancy gap, malaria, HIV, and hypertension during pregnancy. Premature babies were more likely to be hospitalized, had slower growth and development, and have higher rates of morbidity and death. In SSA, PTB load is very high.

2.4 Fetal Factors Contributing to Preterm Birth

Fetal distress is defined as a heart rate above120/min between uterine contractions, with or without meconium-stained. Neonatal and Respiratory distress syndrome, birth asphyxia, were significant risk factors for preterm delivery, per a study done by Mohpatra *et al*. (2020). The study suggests that improving the level of care given to pregnant women and early diagnosis and treatment of diseases or disorders in pregnant women may reduce the risk factors for preterm delivery. A study done by Aynalem *et al*. (2022) reported that the fetal distress was among the commonest risk factors contributing to preterm births. A study by Olack et al. (2021) found that birth asphyxia, infant infection, respiratory distress syndrome, and hypothermia were the leading causes of death. Low birth weight newborns and preterm neonates pass away at an early age for preventable causes. To address these concerns, improvements must be made to the present facility-based methods to intrapartum and immediate postpartum care, which focus on hypoxia, sepsis, respiratory distress syndrome, and hypothermia. According to a study by Abewa et al. (2021), respiratory distress syndrome deformity and preterm neonates with a gestational age of fewer than 32 weeks were statistically significant predictors of mortality

2.5 Summary of Literature Review

The two Sociodemographic risk factors that were most common were height and education. Other risk factors were provided in each study in a different way. Similar maternal obstetric risk factors have been discovered in several studies. Research has found that institutional factors are making cesarean sections more common in multiple pregnancies developing countries. Understanding the factors influencing preterm births in Kiambu County, Kenya, is crucial because studies done in other countries have produced differing findings. Regardless of whether they are

meconium-stained or not, contractions are considered to constitute fetal tissue. It is important to understand the variables related with preterm births in Kiambu County, Kenya, as research conducted in different nations have diverse results.

2.6 Research Gaps

With an estimated incidence of between 5 and 18%, preterm births are becoming an increasingly serious global health. Premature birth has been associated with poor newborn outcomes, especially in developing countries and care of severely and extremely preterm babies is insufficient where kiambu is not exempt. This study is crucial since there is a dearth of published research on the factors that contribute to preterm births at Kiambu Level 5 Hospital. The findings of this study will therefore aid in closing the knowledge gap and support policymakers in creating guidelines for prenatal care and better pregnancy outcomes.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Study Design

This was an unmatched case-control study in which is used to determine if an exposure is associated with an outcome. Unmatched case-controls a type of study design where unequal sampling rate are used or the exposure and unexposed. The cases were preterm babies with their mothers while the controls were term babies with their mothers. The design made it possible to ascertain if an exposure was related to a certain result.

3.2 Study Setting

The study was carried out in Kenya's Kiambu County's Level 5 hospital. It has a population of 2,417,735 and 2,449.20 Km^2 land area (KBS, 2019). Over 5 million people are served by the hospital, and the bulk of them are from the main catchment area, the Kiambu region. Numerous healthcare facilities, including Tier 4-Hospitals (13), Tier 3-Health Centers (24), and Tier 2-Dispensaries (70), are located close to Kiambu Level 5-Hospital (KCG, 2018). These institutions serve both urban and rural populations. In addition to serving its immediate catchment area, the hospital also receives referrals from several nearby government health clinics, faith based organizations (FBO), non-governmental organizations (NGOs) and private health care facilities. The hospital cares for a lot of high-risk pregnancies, which frequently result in premature deliveries. Due to the roughly 50 births it attends each day, including mothers who are referred by other hospitals, the maternity unit in Kiambu County is quite busy. Hospital has eight incubators at the intensive-care nursery in the newborn unit, with 16 preterm infants on average present at one time, which makes it quite busy. Many pre-term babies are referred to the facility from other hospitals and even homes while others are cases of abortion. Some are brought here on motorcycles and by the time they arrive, they have already developed complications. In the newborn unit, one incubator is shared by three babies, because

the unit receives more than it can handle. Kiambu has more than 898 deliveries on a regular month.

3.3 Study Population

The study population was baby-mother pairs at Kiambu level 5 hospital maternity and newborn unit.

3.4 Sample Size Determination

This was unmatched case- control study. The ratio of controls to cases was 3:1 which means for every one preterm there are three controls which allows more variable to be tested when the cases are few. This helps to establish a correlational or causal relationship between the variables of interest and helps avoid research bias. Sample size was determined using the formula for case control (Fleiss *et al*,.1981)

$$n = \left(\frac{r+1}{r}\right)\frac{(\bar{p})(1-\bar{p})(Z_{\beta} + Z_{\alpha/2})^2}{(p_1 - p_2)^2}$$

Where

n = total sample size,

Zα is based on a significance level of 5% (Zα = 1.96).

The Z1-β represents the normal deviation 80%: = 0.84.

P1 and p2 represent the proportion of event of interest (outcome) for group I and group II.

The current study is based on the prevalence percentage of a prior study by (Wangura *e*t *al*., 2018) titled "Prevalence and factors associated with preterm birth at Kenyatta National Hospital (KNH)" that shows the proportion of preterm birth to be 0.183 (18.3%) and takes age greater than 35 years as a risk for preterm birth. The proportion of those with the risk among the controls in this study (Wangura *et al*.,

2018) is (7.2%). Based on statistical power of 80% with a significance level of 5%, the calculations shall be as below.

P1 = 0.183, P2 = 0.072, r = 3

P= P1+P2/2)

P= 0.183+0.072/2 = 0.1275 n = (4/3) * (0.1275*0.8725)

(1.96+0.84) 2/ (0.183-0.072)2 n = 1.333(0.111)

*7.84/ (0.111) 2 n= 1.333*0.87024/0.012 n= 96.7

Cases = 97

Controls = 3x 97 = 291

3.5 Inclusion and Exclusion Criteria

3.5.1 Inclusion Criteria

Cases:

All women who gave birth to premature infants at Kiambu Level 5

Controls:

All mothers who had delivered term babies at Kiambu level five hospital.

3.5.2 Exclusion Criteria

Mothers who were mentally sick and unconscious

3.6 Sampling Procedures

In the Kiambu level 5 hospital maternity unit between March and May 2020, mothers who had term infants (controls) and preterm babies (cases) were included in the sampling frame. Consecutive approach was used to choose cases, and systematic random sampling was used to choose controls until the necessary sample size was reached with a 3:1 ratio of controls to cases. The formula (K= N/n=855/291=3) was used to obtain a sample interval (k) based on the number of term births (n=855) in December 2019 for controls.

Every day, the study assistants used the birth registry to find new subjects within 24 hours of delivery. The mothers who had given birth that day were listed in the daily register by the research assistant, who then located them and followed them to the postnatal wards where they were informed about the study and asked to join if they met the inclusion criteria. For the controls random systematic method was used and every third person in the control group was added to the study if she met the criteria and gave her consent to participate in the study. The cases were enrolled using a sequential procedure. This process was continued until the required number was acquired.

3.7 Data Collection Tool

The trained interviewer used structured questions and data extraction forms to collect the data. The survey was altered and adapted from the research (Wangura *et al*., 2018) at Kenyatta Referral Hospital (KNH) completed. The adjustments of the questioners were made because most of the female patients at Kiambu Level 5 Hospital came from rural regions, as opposed to KNH, where most of the female patients came from urban areas. There was therefore a possibility that numerous factors may be connected to preterm births. Questionnaires were used to collect information on socio demographic, maternal, obstetric, and fetal factors. Data extraction form was used to retrieve extra information from the files. The application's translation from English to Kiswahili and back again was done independently.

3.8 Pretesting

Pre-testing was carried out at the Thika level five hospital maternity unit since the study population there was comparable to that at the Kiambu level maternity unit. The pretest sample was drawn from 10% of the total sample. Pretesting was done to assess the study's viability and the rationale of the research questions, and the study was amended as needed as a result

3.9 Validity and Reliability

By pre-testing 10% of the structured questionnaires, the validity of the research materials was guaranteed. To guarantee clarity, accuracy, and inclusivity, the questions underwent analysis. To evaluate the data quality, the pre-testing data was cross-checked and examined. The questions were then modified as needed to assure the validity of the study instruments. The participants were provided assurances of confidentiality and that no victimization would be introduced as a result of their responses in order to assure the correctness of the study instruments. The reliability of the instrument was evaluated using Cronbach's alpha. Table 3.1 showed an average Cronbach's alpha of 0.82. All of the variables have Cronbach's alpha values over 0.7, which indicates good reliability, according to Taber (2018).

Table 3.1: Reliability Results

Variable	Number of items	Cronbach's alpha
Socio-demographic	4	0.88
Socio-economic factors	6	0.73
Maternal obstetric factors	26	0.87
Fetal factors	6	0.79
Average		0.82

3.10 Data Collection Procedure

Data was collected using data extraction forms and a questionnaire that the researcher administered. Each study participant who satisfied the inclusion criteria was given a detailed explanation of the study's objectives and procedures by the research assistant. Before taking part in the study, the participants had to complete an informed consent form in writing. The recruiters and questioners were filled out in person when there were no running clinical services. Surveys revealed that the mother's file and pregnancy record had more details so additional information were extracted from the mother's file and antenatal records as per questionnaires.

3.11 Data Management

The statistical software for social science (SPSS) version 26 was used to examine the data. To get frequencies and percentages, descriptive analysis was used to process the data. Odds ratio were calculated to forecast the associations between independent and dependent variables using binary and multivariate logistic regression. Multivariable logistic regression models were modified for factors that bivariate analysis determined to be significant at level of $P < 0.05$. Results were provided as tables and were judged statistically significant at a P-value of less than 0.05.

3.12 Ethical Considerations

The research ethics committee at Jomo Kenyatta University of Agriculture and Technology (JKUAT) gave the approval to conduct the study. (Reference number: JKU/2/4/896B). Permission to conduct the study was obtained by the National Commission for Science, Technology & Innovation (NACOSTI) (Reference number: NACCOSTI/P/21/9258). Kiambu Level 5 Hospital was asked for administrative authorization in order to conduct the research. After being informed of the study's objectives, all qualifying participants were given written informed consent forms. Participants in the study were allowed to participate willingly. To safeguard confidentiality and privacy, interviews were conducted in secret, and coding was used to hide the respondents' identities.

CHAPTER FOUR

RESULTS

4.1 Association between Preterm Birth and Socio Demographic Characteristics of the Respondents

A total of 388 mothers were recruited into the study with a response rate of 100%. Of these, 97 were cases with a mean age of 26.9 ± 6.4 years while 291controls had mean age of 26.3 ± 6.2 years. None of the four selected socio demographic factors was significantly associated to pre-term born baby, P>0.05. As shown in (Table 4.1).

Table 4.1: Association between Preterm Birth and Socio Demographic Characteristics of the Respondents

	Cases		Controls		95%CI			
Variables	**n/***	**%**	**n/***	**%**	**OR**	**Lower**	**Upper**	**P-value**
Age of the mother	35.0*		35.3*		1.02	0.98	1.05	0.434
Residence								
Urban	41	42.3%	151	51.9%	0.68	0.43	1.08	0.102
Rural	56	57.7%	140	48.1%	Ref			
Marital status of the respondent								
Single	16	16.5%	48	16.5%	Ref			
Married	80	82.5%	241	82.8%	1	0.54	1.85	0.99
Separated	0	0%	2	0.7%	UD	UD	UD	UD
Widowed	1	1.0%	0	0%	UD	UD	UD	UD
Religion of the respondent								
Catholic	42	43.3%	132	45.4%	0.32	0.02	5.2	0.422
Protestant	54	55.7%	158	54.3%	0.34	0.02	5.56	0.451
Muslim	1	1.0%	1	0.3%	Ref			
Highest level of education of the respondent								
Never gone to school	0	0%	1	0.3%	UD	UD	UD	UD
Primary school	28	28.9%	68	23.4%	0.82	0.23	2.96	0.766
Secondary school	52	53.6%	153	52.6%	0.68	0.2	2.35	0.542
College education	13	13.4%	61	21.0%	0.43	0.11	1.63	0.213
University education	4	4.1%	8	2.7%	Ref			

4.2 Socio-Economic Factors that Contribute to Preterm Births

Among the socio-economic factors that contribute to preterm births, only house location was significantly associated with preterm birth, P<0.05. Mothers whose houses were located in a slum were 2.47times more likely to give birth to a preterm baby compared to those whose house was not located in a slum (95%CI = 1.30 – 4.71, P = 0.006) %). (Table 4.2).

Table 4.2: Socio-Economic Factors that Contribute to Preterm Births

	Cases		Controls			95%CI		
Variables	**n=97**	**%**	**n=291**	**%**	**OR**	**Lower**	**Upper**	**P-value**
Occupation of the respondent								
Business	31	32.00%	83	28.50%	1.06	0.38	2.93	0.913
Employed	10	10.30%	26	8.90%	1.09	0.33	3.56	0.887
Housewife	32	33.00%	110	37.80%	0.82	0.3	2.26	0.708
Self employed	8	8.20%	17	5.80%	1.33	0.38	4.67	0.653
Student	9	9.30%	24	8.20%	1.06	0.32	3.55	0.921
Unemployed	1	1.00%	14	4.80%	0.2	0.02	1.89	0.161
Other (specify)	6	6.20%	17	5.80%	Ref			
Spouse occupation								
Business	44	52.40%	108	44.10%	Ref			
Employed	18	21.40%	69	28.20%	0.64	0.34	1.2	0.163
Self employed	16	19.00%	64	26.10%	0.61	0.32	1.18	0.141
Student	1	1.20%	0	0%	UD	UD	UD	UD
Unemployed	2	2.40%	0	0%	UD	UD	UD	UD
Other (specify)	3	3.60%	4	1.60%	1.84	0.4	8.57	0.407
Missing	13		46					
Head of the family								
Mother	16	16.70%	48	16.70%	1	0.54	1.86	1
Father	80	83.30%	240	83.30%	Ref			
Missing	1		3					
Respondent live in								
A rented house	53	55.20%	150	51.50%	1.16	0.73	1.84	0.533
My own house	43	44.80%	141	48.50%	Ref			
Missing	1		0					
Type of house of respondent								
Permanent house	73	75.30%	234	80.70%	0.73	0.42	1.26	0.254
Semi-permanent house	24	24.70%	56	19.30%	Ref			
Missing	0		1					
House location of the respondent								
In a slum	19	19.60%	26	9.00%	2.47	1.3	4.71	**0.006**
Not in a slum	78	80.40%	264	91.00%	Ref			
Missing	0		1					

4.3 Maternal Obstetric Factors Contributing to Preterm Births among the Study Participants.

Mothers who had history of their last baby dead were three times more likely to give birth to a preterm baby compared to those who had no history of their last baby dead which was estimated at 3.83 (95%CI=1.06–13.91.Mothers who had given birth before expected time were 3.58 times more likely to give birth to a preterm baby compared to those who did not give birth before expected date (OR= 9.253 [95%CI = 2.873– 29.804, P <0.001]. Mothers who had history of preterm birth once were 3.6 times more likely to give birth to a preterm baby compared to those who had history of preterm twice (OR=3.58, [95%CI=1.64–7.8], p value=0.001

Table 4.3: Maternal Obstetric Factors Contributing to Preterm Births among the Study Participants

	Cases		Controls			95%CI		
Variables	**n=97**	**%**	**n=291**	**%**	**OR**	**Lower**	**Upper**	**P-value**
History of heavy physical work during pregnancy								
Yes	45	46.40%	145	49.80%	0.87	0.55	1.38	0.558
No	52	53.60%	146	50.20%	Ref			
Hours spend working								
Working less than 8hrs a day	70	73.70%	203	69.80%	1.21	0.72	2.04	0.466
Working more than 8hrs a day	25	26.30%	88	30.20%	Ref			
Kind of work								
Manual work	86	88.70%	241	82.80%	1.62	0.81	3.26	0.174
Office work	11	11.30%	50	17.20%	Ref			
History of use of drug during pregnancy								
Yes	1	1.00%	3	1.00%	1	0.1	9.73	1
No	96	99.00%	288	99.00%	Ref			
Partner smoke during pregnancy								
Yes	10	11.10%	20	7.90%	1.46	0.66	3.26	0.352
No	80	88.90%	234	92.10%	Ref			
Missing	7		37					
Use alcohol during pregnancy								
Yes	1	1.00%	12	4.10%	0.24	0.03	1.89	0.176
No	96	99.00%	279	95.90%	Ref			
Times been pregnant								
Once	48	50.50%	182	63.00%	Ref			
Two to four times	34	35.80%	91	31.50%	1.42	0.85	2.35	0.178
Over four times	13	13.70%	16	5.50%	3.08	1.39	6.84	**0.006**
Missing	2		2					
Last baby alive or dead								
Alive	48	76.20%	141	81.50%	1.31	0.5	3.4	0.585
Dead	9	14.30%	9	5.20%	3.83	1.06	13.91	**0.041**
Miscarriage	6	9.50%	23	13.30%	Ref			
Missing	34		118					
Given birth before expected time								
Once	16	22.90%	14	7.70%	3.58	1.64	7.8	**0.001**
Twice	54	77.10%	169	92.30%	Ref			
Missing	27		108					

4.4 Maternal Obstetric Factors Contributing to Preterm Births among the Study Participants

Mothers who had history of premature rupture of membrane were 18.7 times more likely to give birth to a preterm baby compared to those who did not have (OR=18.72 [95%CI = 4.07– 86.12, P < 0.001]). Mothers who had history of bleeding during pregnancy were 5.6 times more likely to give birth to a preterm baby compared those who did not have (OR=5.60 [95%CI = 1.98– 15.80, P = 0.001]. Mothers who had history of still births were 3.7 times more likely to give birth to a preterm baby compared to those who did not have (OR= 3.71 [95%CI = 1.98– 10.39, P = 0.013]). Mothers who had history of preterm labor were 7.4 times more likely to give birth to a preterm baby compared to those who did not have (OR=7.37 [95%CI = 2.49– 21.79, P <0.001]).Mother who had history of delivering a low birth weight infant were 24 times more likely to give birth to a preterm baby compared to those who had no history of low birth weight 24.32(95%CI=10.72-55.19)

Table 4.4: Maternal Obstetric Factors Contributing to Preterm Births among the Study Participants

Variables	Cases n=97	%	Controls n=291	%	OR	95%CI Lower	Upper	P-value
History of low birth weight of previous births at what gestation								
Less than 28 weeks	3	18.80%	3	21.40%	0.7	0.11	4.54	0.708
28 to 32 weeks	3	18.80%	4	28.60%	0.53	0.09	3.12	0.478
32 to 37 weeks	10	62.50%	7	50.00%	Ref			
Sex of the baby								
Female	7	43.80%	6	42.90%	1.04	0.24	4.41	0.961
Male	9	56.20%	8	57.10%	Ref			
Low birth weight								
Yes	39	55.70%	9	4.90%	24.32	10.72	55.19	**<0.001**
No	31	44.30%	174	95.10%	Ref			
Missing	27		108					
History of abortion								
Yes	5	7.10%	18	9.80%	0.71	0.25	1.98	0.507
No	65	92.90%	165	90.20%	Ref			
Missing	27		108					
History of premature rupture of membrane								
Yes	12	17.10%	2	1.10%	18.72	4.07	86.12	**<0.001**
No	58	82.90%	181	98.90%	Ref			
Missing	27		108					
History of substance intake during pregnancy								
Yes	1	1.40%	4	2.20%	0.65	0.07	5.91	0.701
No	69	98.60%	179	97.80%	Ref			
Missing	27		108					
History of bleeding during pregnancy								
Yes	11	15.90%	6	3.30%	5.6	1.98	15.8	**0.001**
No	58	84.10%	177	96.70%	Ref			
Missing	28		108					
History of still birth								
Yes	9	12.90%	7	3.80%	3.71	1.33	10.39	**0.013**
No	61	87.10%	176	96.20%	Ref			
Missing	27		108					
History of preterm labor								
Yes	12	17.10%	5	2.70%	7.37	2.49	21.79	**<0.001**
No	58	82.90%	178	97.30%	Ref			
Missing	27		108					

4.5 Maternal Obstetric Factors Contributing to Preterm Births among the Study Participants

Mothers who had history of cesarean section were 2.8 times more likely to give birth to a preterm baby compared to those who had spontaneous vaginal delivery (OR=2.76, [95% CI=1.67– 4.56], p value=<0.001**).** In this study, mothers who attended antenatal clinic were 91% less likely to give birth to a preterm baby compared to those who did not attend antenatal clinic (OR=0.089 [95%CI = 0.024 – 0.330, P <0.001Mothers who had antepartum hemorrhage were 9.509 (95%CI = 2.951– 30.643, P <0.001) times more likely to give birth to a preterm baby compared to controls who had antepartum hemorrhage. Mothers who had attempted abortion were 4.17[95%CI = 1.12 – 18.99, P = 0.045] times more likely to give birth to a preterm baby compared to mothers who had not attempted abortion

Table 4.5: Maternal Obstetric Factors Contributing to Preterm Births among the Study Participants

Variables	Cases n=97	%	Controls n=291	%	OR	95%CI Lower	Upper	P-value
Type of delivery								
Breech	4	4.20%	6	2.10%	2.83	0.77	10.39	0.117
C/s	39	40.60%	60	20.60%	2.76	1.67	4.56	**<0.001**
Svd	53	55.20%	225	77.30%	Ref			
Missing	1		0					
Pregnancy outcome								
Singleton	83	22.4%	288	77.6%	0.067	0.019	0.239	**<0.001**
Twins or more	13	81.3%	3	18.8%	Ref			
Missing	1		0					
Attend antenatal clinic								
Yes	85	22.8%	287	77.2%	0.089	0.024	0.330	**<0.001**
No	10	76.9%	3	23.1%	Ref			
Missing	2		1					
How many times								
< 4	59	25.9%	169	74.1%	1.459	0.878	2.424	0.145
>4	28	19.3%	117	80.7%	Ref			
Missing	10		5					
HIV status checked								
Yes	93	24.4%	288	75.6%	0.969	0.100	9.426	0.978
No	1	25.0%	3	75.0%	Ref			
Missing	3		0					
What was the status								
Negative	87	23.7%	280	76.3%	0.497	0.159	1.559	0.231
Positive	5	38.5%	8	61.5%	Ref			
Missing	5		3					
Hemoglobin level								
<11(g/dl)	29	28.2%	74	71.8%	1.598	0.943	2.708	0.081
>11(g/dl)	51	19.7%	208	80.3%	Ref			
Missing	17		9					
pregnancy induced hypertension or eclampsia								
Yes	17	63.0%	10	37.0%	6.047	2.663	13.729	**<0.001**
No	79	21.9%	281	78.1%	Ref			
Missing	1		0					
Antepartum hemorrhage								
Yes	11	73.3%	4	26.7%	9.509	2.951	30.643	**<0.001**
No	83	22.4%	287	77.6%	Ref			
Missing	3		0					
Attempt to abort								
Yes	4	4.20%	3	1.00%	4.17	1.12	18.99	0.045
No	92	95.80%	288	99.00%	REF			
Missing	1							

4.6 Maternal Obstetric Factors Contributing to Preterm Births among the Study Participants

Mothers who had oligohydramnios were 16.7 times more likely to give birth to a preterm baby compared to those who did not have (OR=16.744 [95%CI = 3.600– 77.884, P <0.001]). Mothers whose color of amniotic was fluid 2 were 94% less likely to give birth to a preterm baby compared to those whose color of amniotic was fluid (OR= 0.068 [95%CI = 0.005– 0.861, P = 0.038]). Mothers whose color of amniotic was fluid 1 were 90% less likely to give birth to a preterm baby compared to those whose color of amniotic was fluid 1 (OR=0.103 [95%CI = 0.017 – 0.642, P = 0.015]). Mothers who had history of burning sensation during urination were 3.9 times more likely to give birth to a preterm baby compared to those who did not have (OR=3.861 [95%CI = 2.353– 6.335, P <0.001].]. Mothers whose maternal height was ≤ 150 were 4.1 times more likely to give birth to a preterm baby compared to those whose maternal height was ≤ 150 (OR=4.059 [95%CI = 1.269– 12.977, P = 0.018]). Mothers who had pregnancy induced hypertension or eclampsia were 6 times more likely to give birth to a preterm baby compared to those who did not have (OR=6.047 [95%CI = 2.663– 13.729, P <0.001]).).

Table 4.6: Maternal Obstetric Factors Contributing to Preterm Births among the Study Participants

	Cases		Controls			95%CI		
Variables	**n=97**	**%**	**n=291**	**%**	**OR**	**Lower**	**Upper**	**P-value**
History of drainage of liquor								
Yes	17	35.4%	31	64.6%	1.828	0.961	3.478	0.066
No	78	23.1%	260	76.9%	Ref			
Missing	2		0					
History of burning sensation during urination								
Yes	46	45.1%	56	54.9%	3.861	2.353	6.335	**<0.001**
No	50	17.5%	235	82.5%	Ref			
Missing	1		0					
Placenta privea								
Yes	0	0.0%	1	100.0%	UD	UD	UD	1
No	96	24.9%	290	75.1%	Ref			
Missing	1		0					
Gestation diabetes								
Yes	0	0.0%	2	100.0%	UD	UD	UD	1
No	95	24.8%	288	75.2%	Ref			
Missing	2		1					
Premature rupture of membrane								
Yes	22	88.0%	3	12.0%	28.441	8.288	97.601	**<0.001**
No	74	20.5%	287	79.5%	Ref			
Missing	1		1					
Multiple pregnancy								
Yes	11	73.3%	4	26.7%	9.253	2.873	29.804	**<0.001**
No	85	22.9%	286	77.1%	Ref			
Missing	1		1					
Mother had oligohydramnios								
Yes	10	83.3%	2	16.7%	16.744	3.600	77.884	**<0.001**
No	86	23.0%	288	77.0%	Ref			
Missing	1		1					
Maternal height								
≤ 150	6	50.0%	6	50.0%	4.059	1.269	12.977	**0.018**
> 150	68	19.8%	276	80.2%	Ref			
Missing	23		9					
Color of amniotic fluid								
Clear	70	88.6%	221	83.7%	0.238	0.052	1.087	0.064
Fluid(1)	4	5.1%	29	10.8%	0.103	0.017	0.642	**0.015**
Fluid(2)	1	1.3%	11	4.2%	0.068	0.005	0.861	**0.038**
Fluid(3)	4	5.1%	3	1.1%	Ref			
Missing	18		27					
Size of cord								
Long	1	1.3%	1	0.4%	Ref			
Normal	73	96.1%	262	99.6%	0.279	0.017	4.509	0.368
Short	2	2.6%	0	0.0%	UD	UD	UD	1
Missing	21		28					

4.7 Fetal Factors Contributing to Preterm Births among the Study Participants

Mothers whose babies had fetal distress were 10.5 times more likely to give birth to a preterm baby compared to those whose babies did not have (OR=10.45 (95%CI = 3.99– 27.41, P <0.001)). Mothers whose baby did not have movement before delivery 10.4 times more likely to give birth to a preterm baby compared to those whose baby had (OR=10.42 (95%CI = 3.26– 33.33,P<0.001

Table 4.7: Association between Preterm Birth and Fetal Factors of the Respondents

	Cases		Controls			95%CI		
Variables	**n=97**	**%**	**n=291**	**%**	**OR**	**Lower**	**Upper**	**P-value**
Baby have fetal distress								
Yes	17	18.10%	6	2.10%	10.45	3.99	27.41	**<0.001**
No	77	81.90%	284	97.90%	Ref			
Missing	3		1					
Did the baby have birth defects								
Yes	92	94.8%	2	0.7%	1.243	0.237	6.517	0.797
No	5	5.2%	286	99.3%	Ref			
Missing	0		3					
Placental disorder								
Abruption placenta	4	80.00%	2	100%	Ref			
Cord pro lapse	1	20.00%	0	0%	UD	UD	UD	UD
Missing	93		289					
Use any drugs during pregnancy								
Yes	39	41.10%	187	64.30%	Ref			
No	56	58.90%	104	35.70%	2.58	1.61	4.15	**<0.001**
Missing	2		0					
Baby movement before delivery								
Yes	83	87.40%	287	98.60%	Ref			
No	12	12.60%	4	1.40%	10.42	3.26	33.33	**<0.001**
Missing	2		0					
Fetal heart before delivery								
60-120b/m	2	2.30%	2	0.70%	3.33	0.46	23.96	0.233
120-160b/m	86	97.70%	286	99.30%	Ref			
Missing	9		3					
Cord around the neck								
Yes	1	1.10%	2	0.70%	1.59	0.14	17.72	0.707
No	91	98.90%	289	99.30%	Ref			
Missing	5		0					
Abnormalities								
Yes	93	98.90%	290	99.70%	0.32	0.02	5.18	0.423
No	1	1.10%	1	0.30%	Ref			
Missing	3		0					

4.8 Multivariate Logistic Regression of Determinants of Pre-Term Birth

Risk factors identified to be significant at P<0.05 during bivariate analysis were adjusted in multivariable logistic regression model. Six independent determinants of preterm birth were retained in the final reduced model and presented in Table 4.5. Mothers who had given birth for more than four times were 7 times likely to give birth to a preterm baby than those who had given birth once (OR=7.04 (95%CI=1.66 – 29.82) P=0.008). Mothers who had a low birth weight baby were 16.1 times likely to give birth to a preterm baby than those who did not have (OR=16.11 (95%CI=4.68 –55.41) P=<0.001). Mothers with history of still births were 12.3 times likely to give birth to a preterm baby than those who did not have (OR=12.26(95%CI=1.71 – 87.73, P=0.013)). Mothers who had baby with fetal distress were 6.8 times likely to give birth to a preterm baby than those who did not have (OR=6.82(95%CI = 1.12 – 41.42, P=0.037)).

Table 4.8: Predictors of Pre-Term Birth

		95% CI		
Variables	**AOR**	**Lower**	**Upper**	**P-Value**
Times been pregnant Once				
	Ref			
Two to four times	1.13	0.40	3.19	**0.817**
Over four times	7.04	1.66	29.82	**0.008**
Low birth weight baby Yes				
	16.11	4.68	55.41	**<0.001**
No	Ref			
History of still births Yes				
	12.26	1.71	87.73	**0.013**
No	Ref			
Baby have fetal distress Yes				
	6.82	1.12	41.42	**0.037**
No	Ref			

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Discussion

5.1.1 Socio-Demographic Factors Contributing to Preterm Births among the Study Population

The study found that more preterm birth cases were found in urban areas. This was in line with research done in Beijing by (Zhang *et al*., 2012) that found preterm births were more common among women who lived in urban areas. If the pregnancy was undesirable, urban women would try an abortion, which could result in a preterm delivery. The results were at odds with those of (Nwankwo et al *et al*., 2022), who discovered that in Rwanda, women living in rural regions were more likely to give birth prematurely than those living in urban areas. According to Sendeku *et al*., (2021), women who live in rural regions are more likely to give birth prematurely than those who live in metropolitan settings. This is due to the fact that pregnant women who live in rural areas face a variety of risk factors, including eating an unbalanced diet, traveling far for health services, working extra jobs, having poor access to health care services, and living far from a hospital. All of these factors may increase the risk of preterm birth.

5.1.2 Socio- Economic Factors Contributing to Preterm Births among the Study Population

The study revealed that women who lived in slums had preterm births more frequently than other women who did not. This contradicted a study conducted in India by Mohapatra et al., 2020, which discovered that preterm births were not linked to the majority of mothers living in urban slums. Living in a slum and being from a lower socioeconomic level might prevent mothers from understanding the value of going to the doctor, and this can cause delays in getting to the hospital in time to prevent miscarriage.

5.1.3 Association between Preterm Birth and Maternal Obstetric Factors

The study revealed that mothers who had given birth more than four times were more likely to deliver preterm birth. This was with agreement with a study done by (Wakeyo *et al*., 2020), who also noted that mothers with high parity were 5 times more likely to have preterm birth compared with primi- gravida. The study done at Muhimbili National Hospital Tazania demonstrated that mothers with a parity of ≥4 were 3 times more likely to deliver prematurely (Ndeki *et al*. 2023). Further, Sifer *et al*. (2020) in South East Ethiopia reported that mothers with high parity were 4 times more likely to deliver preterm babies compared to primi-gravidas. Others studies done by (Rutayisire *et al*., 2023) reported similar findings. High parity is likely to increase the risk of preterm delivery due to uterine changes such as myometrium stretching from previous pregnancies. The finding of this study was inconsistent with the studies conducted in Northern Ethiopia and Tanzania by (Eti *et al*., 2023), (Rugaimukam *et al*., 2017). These findings contradicted with a study conducted by Bekele *et al.*, (2022) in Ethiopia, which indicated that on the other hand, preterm delivery was 2 times more likely among women who were pregnant for the first time. Others studies done by (Alamneh *et al*., 2021 and Pusdekar *et al*., 2020), which found the primiparous women had higher risk for preterm birth.

The results of this study showed a significant association between history of stillbirth and preterm births. The finding of this study was in agreement with other studies conducted in different countries (Adugna *et al*., 2022; Laelago *et al*., 2020 Adugna et al., 2022). The finding was however in contrast with study done in Southeast Ethiopia which found that history of stillbirth could not be considered as a risk factor for subsequent preterm birth delivery (Sifer *et al.,* 2020). These findings were in contrast with studies done by (Rutayire *et al*., (2023 that found that history of stillbirth could not be considered as a risk factor for subsequent preterm birth delivery. This might be due to the recurrence of stillbirth in some women who initiate preterm labor in the preceding pregnancy. This result suggests the need for stillbirth prevention to reduce the risk of future preterm birth.

This study revealed that history of preterm labor was a significant factor for preterm birth. This result was in line with studies conducted in Tanzania, Kenya and London. (Rugaimukam *et al*., 2017; Muchie *et al*., 2020). These findings contradicted a study carried out in Ethiopia which indicated that mothers who had history of preterm delivery were less likely to deliver preterm birth (Bui *et al*., 2016).

The results of the current study showed that caesarean sections were more frequently used to deliver preterm babies. This result was consistent with research from Nigeria (Reddy *et al*., 2022, Gugusheff *et al*., 2021), which showed that Caesarean section delivery was substantially linked to preterm birth. Although the study did not specify what the indication of the c/s was, it did show that this style of delivery had a high risk linked with premature births. This was in line with a study conducted in Palestinian by Sarhan and Anini (2015), which identified preterm delivery to be a major risk factor. Fetal discomfort or obstetric problems might be to blame for this. This analysis revealed the c/s's root cause. This should caution the service provider. This contradicted the findings of the other studies by Olack *et al.*, 2021, Eti *et al*., 2023. There are various ways in which a cesarean section can be linked to a subsequent premature birth. In contrast to this study, the majority of deliveries in the research by Mohapatra et al., 2020 in India were vaginal, with just roughly 36.64% occurring by Cesarean section (CS).Preterm labor may occur spontaneously if there is tissue disturbance, altered uterine microenvironment, or cervix injury at the moment of cesarean section.

Preterm birth risk was 4 times higher in mothers with a history of attempted abortions than in mothers without such a history. This result was consistent with research carried out in several nations.(Wakeyo et al. 2020). Due to the surgical evacuation of the uterus after an abortion, which artificially extends the cervix, the risk of preterm delivery is increased (Gabriel *et al*., 2016; and Vander Haar, *et al*., 2022). Due to damage of the cervix, this puts such moms at risk for premature delivery in subsequent pregnancies. The study found that trying to abort carried a considerable risk. Preterm births are known to rise with abortion; this might be because to uterine lining removal or dilatation and evacuation of the uterus. The occurrence of preterm delivery among the local population was also found to be

influenced by previous preterm births. This conclusion is consistent with previous research (Regasa *et al*., 2021; Eti *et al*., 2023), which established that a prior history of preterm birth increases the chance of experiencing future preterm deliveries. A research by Laelogo *et al*., 2020 and study by Ndeki *et al*., 2023 indicated that past preterm births increase the chance of a subsequent preterm delivery.

Premature rupture of membrane (PPROM) was discovered to be a substantial risk factor, according to the study. Even though in this study the history of ruptured membranes was removed from the final simplified model as a predictor of preterm birth. This was found to be similar to a research conducted in western Ethiopia (Abadigetal *et al*., 2021). These investigations by (Laelago *et al*., 2020, Sendeku *et al*., 2021, and Robison *et al*., 2022) showed that premature membrane rupture was one of the predictors. Similar to research on preterm membrane rupture, which has been shown to be strongly associated with preterm delivery (Sureshbabu *et al*., 2022; Adugna *et al*., 2022; Rutayisire *et al*., 2023, Reddy *et al*., 2022)., Mohpatra *et al.*, 2020) research in south India, Argaw *et al.*, 2021) research in Ethiopia, This could be because endogenous prostaglandins released after membrane rupture cause the uterus to contract, which in turn causes premature birth [Sendekual.,2021]This suggests that women who have experienced PROM in the pas t should receive extra attention and care during their pregnancy.

A major risk factor for preterm delivery in this study was a history of urinary tract infection (UTI) during pregnancy that caused a burning sensation when urinating. Compared to moms without a history of UTI, those who had one were more than 3.8 times likely to deliver a baby prematurely. During multivariate analysis, this component was not chosen. This outcome concurs with or backs up earlier findings from Ethiopia. Regasa *et al*.2021,Laelago et al.,2020 Rutayisire et al.,2023, Sendeku *et al*.,2021. Infection in the urinary system stimulates the generation of prostaglandins, which in turn causes stimulation of uterine contractions, premature rupture of the membranes, and preterm delivery (Shaikh, Mehmood, & Shaikh,. 2010; *Alijah an et al*., 2014). Urinary system infections trigger the synthesis of prostaglandins, which in turn trigger uterine contractions, premature membrane rupture, and preterm delivery (Cunningham et al., 2010). Early detection and

appropriate treatment of UTI can avoid preterm birth. The prenatal advice should also emphasize preventive practices like maintaining personal cleanliness and consuming enough fluids.

Although it constituted a risk factor, vaginal bleeding was not taken into account in the multivariate regression. Although it was one of the criteria, it was in agreement with the findings of a study conducted by (Ndeki *et al*., 2014). Because it is a sign of catastrophic pregnancy-related repercussions in the majority of instances, it may result in fetal or maternal crises that result in an artificially induced premature delivery.

Significant correlation between multiple pregnancies and preterm delivery was shown by the study. Mothers who had multiple pregnancies had a 9.3 times greater likelihood of giving birth to a preterm birth. Even if multivariate analysis did not choose it .The results matched those of (Alamneh *et al*., 2021 and Reddy *et al*., 2022, Ndeki *et al*.,2023) investigation Ethiopia in South America, according to, Sendeku *et al*., 2022 Laelago *et al*.,2020), this study demonstrated that an increased risk of preterm delivery is linked to an increased number of pregnancies. This was at odds with research conducted in Kenya by Olack *et al*. in 2021in Kenya. This might be as a result of the uterine over-distension brought on by recurrent pregnancy, which raises the gap junction of the myometrium muscles and stimulates the oxytocin receptors. Not to mention, it can trigger uterine contractions that result in early birth. (Buxton, 2010).

In this study, pregnancy-related hypertension was a risk factor, although multivariate did not select it. This study was in line with a study conducted in India in 2021 by Sureshbabu et al., which found that 5.4% of women who had preterm labor experienced PIH. As with patients with PIH, early detection and appropriate treatment of pregnancy-induced hypertension are crucial. Uncontrolled PIH may also be a sign of early intervention.

5.1.4 Fetal Factors Contributing to Preterm Births among the Study Population

This study found that fetal distress played a major role in the preterm birth rate. This was consistent with study conducted in Ethiopia, where preterm delivery was almost four times more significantly connected to fetal distress (Tibebu *et al*., 2023). Further research in Kenyan rural communities was conducted by Olack et al., 2021, and Ashraf et al., 2020, who generated a report that was comparable. In Indonesia, by (Opitasari *et al*., 2014). In preterm births, fetal distress newborns may be medically referred to as emergency births, in which case an immediate decision to deliver is necessary. In contrast, a research conducted by Muchie et al. (2020) revealed no link between fetal distress and preterm delivery. Premature lungs are primarily responsible for fetal distress in preterm delivery. If fetal distress or a technique must be started to deliver the baby as soon as feasible in order to preserve the life of the mother or the infant when fetal distress arises or a pregnant woman is at risk of any obstetric complications. This does not matter which trimester the pregnancy is in, despite the causes. Contrary to a study conducted in Southern India by Outram (2019), Short women are more likely to have a small pelvis, which can cause obstructed labor, and intrauterine growth restriction is also more likely, which can cause fetal distress. Because surfactant keeps the lungs from becoming atelectic and preserves alveolar stability, a preterm newborn is more likely to have birth asphyxia. Hypoxemia in the fetus may result from reduced blood flow from the mother's placenta as a result of this. Fetal distress can result from this syndrome. (Sendeku et al., 2021) and (Laelago et al., 2020) both agreed with this. In comparison to mothers whose last baby was alive, those whose last baby died had a 3.83 times higher chance of giving birth to a preterm child. This result was in conflict with research by (Wagura et al., 2018 and Ahumada et al. 2016).

5.2 Limitation

Recall bias could have occurred since some of the individuals couldn't recall what had happened during prior pregnancies. Due to the institution-based nature of the study, its findings might not be representative of the general population broader public.

5.3 Conclusion

Because the etiology of preterm birth is complex and depends on the geographic and demographic characteristics of the population under study, findings from one study site may not translate to another. The results of this study showed that factors that could predict preterm birth included of residing in a slum was significant during binary regression but not after multivariate analysis, history of number of times mother has been pregnant, prior history of low birth weight history of still birth and fetal distress, were found to be predictive factors of preterm birth in this study.

5.4 Recommendations

The antenatal visits to all pregnant mothers which offer special chances for early problem diagnosis and treatment. They also have a big influence on women's reproductive health, mostly through early identification and treatment of obstetric problems and prenatal care. Therefore, ANC visits should be strengthened and appropriate counseling should be provided at each visit in order to prevent missed opportunities and address reproductive health issues, including family planning, which promotes healthy birth spacing. Prenatal care professionals should give these high-risk women special consideration if they have a history of multiple pregnancies, low birth weight, stillbirths, or fetal distress. Early identification and management are crucial.

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APPENDICES

Appendix I: Informed Consent - English

Patient information and informed

consent Title of Study:

DETERMINANTS OF PRETERM BIRTHS AMONG MOTHERS DELIVERING INKIAMBU LEVEL FIVE HOSPITAL, KENYA `

Principal Investigator

Margaret Karugu

Supervisors

Prof.. Sherry Oluchina

Prof. Gideon Kikuvi

Introduction

Inpatient number……. Study number…….

Ward…… Date…….

My name is _____ from Jomo Kenyatta University Institute. I am here to gather information from you that will help us to assess causes of preterm births in Kiambu level five hospital.

Purpose of the study

Preterm delivery is defined as giving birth before 37 weeks. Preterm births are a major cause of prenatal issues and deaths all over the world. The estimated 15 million preterm births each year result in over 1 million deaths, while the others experience long-term problems that hinder their development. Additionally, these

births are becoming more commonplace around the globe. Preterm births are associated to a number of factors, some of which may be related to the mother or the child. The purpose of this study is to pinpoint the factors that are associated with this problem in women who give birth at Kiambu Level 5 Hospital. The results from this study will fill the knowledge gap and guide the policy makers in formulating guidelines on antenatal care and to improve pregnancy outcome.

Study procedures.

After signing a written consent form, all moms who gave birth to eligible children during the study's time frame and their birth will be asked to participate. It has been determined that you are one of them. I'll enquire about your pregnancy and ask you some questions. Then I will evaluate your child; if I find any problems, the institution will handle them. I'll also show you how to check on your child every day

Possible risks

Conducting the interview when the person is stable will reduce any discomfort, and the method is secure..

Participation

Your participation is fully optional, and you are free to decline or withdraw your permission at any time without having any impact on the care you or your child receives.

Confidentiality

Your responses will all be treated in strict confidence. Your identify won't be revealed to anybody else or in any publicly available reports or publications.

Right to refuse or withdraw:

You should be aware that your participation in this survey is entirely optional. While your participation in this survey would be greatly appreciated, you are free

to decline. You won't suffer any consequences if you decline; you'll still get all the care and treatment you need at the hospital as normal, and you won't forfeit any benefits to which you're legally entitled at the clinic. Even if you decide to take part in this survey, you have the option to leave at any time and without providing a reason.

For any questions

Any inquiries you may have regarding the study may be directed to the research assistants. Every query you have is an excellent query. Call Margaret Karugu, the principal investigator, at 0722417408 if you have any questions that come to mind later.

If you have any queries about your participation rights, you should get in touch with;The

Secretary, at JKUAT's Institutional Ethics Review Committee unit P.O. Box 62 000 – 00200 NAIROBI, KENYA, Telephone: 067-587000
Email**:** Ethics JKUAT <ethics@jkuat.ac.ke>

Consent statement for study

By signing below, I agree that:

I have read and understand the information sheet and consent form for this study.

I have had the chance to ask questions and they were answered to my satisfaction.

I have been given the time to talk about the information with others and to decide whether or not to take part.

I will receive a signed and dated copy of this consent form on the day of my signing it.

I voluntarily agree to take part in this study and have the right to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.

. Printed Name of Participant

Signature of Participant Date and Time

Printed Name of Investigator/Delegate

Signature of Investigator/Delegate Date and Time

By signing the below, I hereby verify that written informed consent was obtained by the above participant. The participant has been informed about the risks and the benefits of the research, understands such risks and benefits and is able to give consent to participation, without coercion, undue influence or inappropriate incentives.

Printed Name of Witness

*Signature of Witness Date and Time

Appendix II: Viambatisho: Kiswahili

Idhini

Habari kwa mgonjwa na idhini

Kichwa cha Utafiti:

Uamuzi wa Uzazi wa mapema kati ya akina mama wanohudhuria Hospitali ya Kiambu Kiwango cha Tano (5), Kaunti ya Kiambu Kenya:

Mchunguzi Mkuu

Margaret Karugu

Wasimamizi

Dkt Sherry Oluchina

Profesa Gideon Kikuvi

Utangulizi

Nambari ya mgonjwa …… .. Nambari ya utafiti …….

Wadi …… Tarehe …….

Jina langu ni _____ kutoka Taasisi ya Chuo Kikuu cha Jomo Kenyatta. Niko hapa kukusanya habari kutoka kwako ambayo itatusaidia kutathmini sababu za watoto kuzaliwa mapema katika hospitali ya kiwango cha tano ya Kiambu.

Kusudi la utafiti

Uzazi wa mapema huelezewa kama kuzaa kabla ya kuadhimisha wiki 37. Uzazi wa mapema ni sababu kuu ya shida za kuzaa na vifo ulimwenguni. Karibu watoto

milioni 15 wanazaliwa ulimwenguni kabla ya wakati sahihi na zaidi ya milioni 1 ya watoto hawa hufa kila mwaka na wengine hupata shida za muda mrefu ambazo huharibu ukuaji wao. Kwa kuongezea, idadi ya watoto wanaozaliwa inaongezeka ulimwenguni. Kuzaliwa mapema huhusishwa na sababu kadhaa ambazo zinaweza kuhusishwa na mama au mtoto. Madhumuni ya utafiti huu ni kujua sababu ambazo zinahusishwa na shida hii kati ya wanawake wanaojifungua katika hospitali ya kiwango cha tano (5) ya Kiambu. Matokeo kutoka kwa utafiti huu yatajaza pengo la maarifa na kuwaongoza watunga sera katika kuandaa miongozo juu ya utunzaji wa wajawazito na kuboresha matokeo ya ujauzito.

Taratibu za kutafiti.

Mama wote ambao watakuwa wamejifungua kati ya kipindi cha utafiti na watoto wao waliozaliwa wanaostahiki wataombwa kushiriki baada ya kutoa fomu ya idhini iliyoandikwa. Umetambuliwa kuwa mmoja wao. Nitakuuliza maswali yanayohusiana na ujauzito wako. Baada ya hapa nitamchunguza mtoto wako, vinginevyo nikigundua shida yoyote taasisi itajali. Pia nitakufundisha jinsi ya kumchunguza mtoto wako kila siku.

Ushiriki

Kushiriki ni kwa hiari kabisa na unaweza kukataa au kuondoa idhini yako wakati wowote bila kuathiri utunzaji unaopewa na mtoto wako kwa njia yoyote.

Siri

Malibu yore utakayotoa yatashughulikiwa kwa siri. Utambulisho wako hautafunuliwa katika ripoti yoyote ya umma, jarida au machapisho au kwa vyama vingine.

Haki ya kukataa au kujiondoa:

Ni muhimu kwako kuelewa kuwa ushiriki wako katika utafiti huu ni wa hiari kabisa. Tutashukuru sana ikiwa utakubali kushiriki katika utafiti huu, lakini jisikie huru kukataa.

Ukikataa, hakutakuwa na matokeo kwako na utapokea matunzo na matibabu yote unayohitaji katika kituo cha afya kama kawaida na pia hautapoteza faida yoyote ambayo unayostahiki katika kliniki. Ikiwa unachagua kushiriki katika utafiti huu, bado unaweza kujiondoa kutoka kwa utafiti huo kwa hatua yoyote bila kutoa ufafanuzi wowote kuhusu kujitoa kwako.

Hatari/Athari zinazowezekana

Utaratibu ni salama usumbufu wowote utapunguzwa.

Mshiriki: Ikiwa wakati wa utafiti huu una maswali yoyote kuhusu hali ya utafiti huu unapaswa kuwasiliana na Mchunguzi Mkuu, Margaret Karugu-nambari ya simu ya 0722417408

Taarifa ya idhini.

Kwa kusaini hapa chini, ninakubali kwamba:

Nimesoma na kuelewa karatasi ya habari na fomu ya idhini ya utafiti huu.

Nimepata nafasi ya kuuliza maswali na yakajibiwa hadi nikaridhika.

Nimepewa muda wa kuzungumza juu ya habari hiyo na wengine na kuamua ikiwa nitashiriki au la.

Nitapokea nakala iliyo tiwa saini na tarehe siku ya kuitia saini.

Ninakubali kwa hiari kushiriki katika utafiti huu na nina haki ya kujiondoa wakati wowote, bila kutoa sababu yoyote, bila huduma yangu ya matibabu au haki za kisheria kuathiriwa...

Jina la Mshiriki

Saini ya Mshiriki Tarehe na wakati/saa

Chapa ya jina La mchunguzi au Mjumbe

Saini ya mchunguzi/ mjumbe Tarehe na wakati/saa

Kwa kutia saini hapa chini, ninathibitisha kwamba idhini iliyoandikwa ya habari ilipatikana na mshiriki hapo juu. Mshiriki amejulishwa juu ya hatari na faida za utafiti, anaelewa hatari kama hizo na faida na anaweza kutoa idhini ya kushiriki, bila kulazimishwa, ushawishi usiofaa au motisha isiyofaa.

*Chapa jina La Shahidi

*Saini ya Mshahidi …… Tarehe na Saa …… …… …… ……

A Confidentiality Agreement

This agreement is between the principal investigator name ……. and research assistance name …… …… … … ….

For data collection on behave of the principal for this project title: Determinants of Preterm births among Mothers Attending Kiambu Level V Hospital Kiambu County Kenya: To collect data as per questionnaire provided and instructed by the principal investigator**.**

Identifiable information to which I have access to be accessible from outside unless specifically instructed I agree to keep all the research information shared with me confidential. I will not discuss or share the research information with anyone other than with the Researcher principal. I keep all research information secure while it is in my possession. I will return all research information to the Researcher principal when I have completed the research tasks or upon request, whichever is earlier. I will destroy all research information regarding this research project that is not returnable to the Researcher principal after consulting with the research principal. I will comply with the instructions of the Researcher about requirements to physically and/or electronically secure records (including password protection, file/folder encryption, and/or use of secure electronic transfer

of records through file sharing, use of virtual private networks, etc.). I will not allow any personally otherwise in writing by the Researcher.

Research assistant staff:

Name…… Signature……

Date……

I agree to:

Provide detailed direction and instruction on my expectations for maintaining the confidentiality of research information so that research assistant staff can comply with the above terms.

Principal Investigator

Name……signature……. (Date) …… …… … ….

Appendix III: Questionnaire

Instructions to interviewers

Must ensure that respondents are the mothers who have delivered in Kiambu level five hospital.

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

For the questions without alternative fill the information given by the respondents in the space given.

The interviewer should not suggest responses for the respondent.

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

SECTION A: DEMOGRAPHIC INFORMATION

Patient Study ID: …….……

Date Registered: ……../……../……

Sex: Female Age ……. (yrs.)

Patient cell phones no …… Other telephone …….

Type of delivery: SVD …. Induction …… C/S

1 .Residence ( )

a .Urban

b. Rural

2. Are you married? ( )

a Single

b Married.

3. Which Religion do you attend? ( )

a Catholic.

b. Muslim

c Protestant.

4.Highest Level of education ( )

a. Never gone to school

b. Primary

c. Secondary

d. College education

e. University

Socio- economic factors

1. What is your occupation? ( )

a. Unemployed

b .Employed

c. Casual work

2. Is your spouse working? ( )

a. Self-employed

b. Employed

c .Unemployed

3. Who is the head of the family ( )

a. Father

b. Mother

4. Where do you live in? ( )

a. In a rented house

b. Your own house

5. What type of house are you living in? ( )

a. Permanent

b .Semi- Permanente

6. Where is it located? ( )

a. slum area

B.Not in slum

Maternal obstetric factors

1. Did you do heavy physical work during pregnancy period

    a. Yes
    b. No,

2 .How many hours did you spend working per day during pregnancy period? ( )

a. Working > 8 h per day
b. < 8hours per day

2. Type of work ( )

a. Manual
b. Office work

4. Did use drugs during pregnancy? ( )

a. Yes
b. No

5. Did your partner smoke tobacco during your pregnancy period? ( )

a. Yes
b. No

6. Did you use alcohol during the pregnancy period? ( )

a. Yes
b. No

7. What is your parity? ( )

a. Para 1
b. Para 2-4
c. Para.≥ 4

8. Is your last baby before this one alive or dead? ( )

a. Alive
b. Dead

9. History of giving birth before the expected time? ( )

a. Yes
b. No

10. History of low birth weight of previous births at what gestation? (In weeks) (……)

a. <28 week
b. 28 to 32 weeks

c. 32to 37 weeks

11. What was the sex? ( )

a. Female
b. Male

12. History of low birth weight ( )

a. Yes
b. No

13. History of abortion ( )

a. NO
b. Yes

14. History of Pre-mature rupture of membrane ( )

a. NO
b. Yes

15. History of Substance intake during pregnancy

a. NO
b. Yes

16. History of bleeding during pregnancies ( )

a. NO
b. Yes

17. History of the still birth ( )

a. NO
b. Yes

18. History of preterm labor ( )

a. NO
b. Yes

19.What was the type of delivery? ( )

a. SVD
b. Induction
c. Caesarean

20. What was the pregnancy outcome? ( )

a. Twins or more
b. Singleton

21. How many times have you been pregnant ( )

c. < 4
d. >4

22. Pregnancy induced hypertension or Eclampsia ( )

a. Yes
b. No

23. Antepartum hemorrhage ( )

a. Yes
b. No

24. History of drainage of liquor for more than 18 hours? ( )

a. Yes
b. No

25. History of burning sensation during urination or UTI during the pregnancy? ( )

a. Yes
b. No

26. History of placenta privea? ( )

a. Yes
b. No

27. Gestational diabetes ( )

a. Yes
b. No

28. Did you have premature rupture of membranes? ( )

a. Yes
b. No

29. Did the mother had multiple pregnancy? ( )

a. Yes
b. No

30. Where their arguments/fights with the husband/partner? ( )

1) Yes
2) No

31. How did the labor start? ( )

1. Elective
2. Induction

32Histoy of attempting abortion

1. Yes
2. No

33. History of attending ANC

Appendix IV: Data Extraction Form

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

2. Did the mother attend antenatal clinic? ( )

   1. Yes

   2. No

   3. Unknown status

3. Was there placental disorders like? ( )

   1. Abruption placentae
   2. Cord prolapse
   3. Ruptured vasa Previa

4. During pregnancy did you use any drugs? ( )

   1. Yes
   2. No

5 Where you experiencing baby movement before delivery?

   1. Yes
   2. No

6. What was the color of the amniotic fluid (M S L) grading? ( )

   1. Grade 1
   2. Grade2
   3. Grade3

7. What was maternal height? ( )

   4. ≤ 150

5. > 150

8. Did mother had oligohydramnios? ( )

1. Yes
2. No

9. What was the hemoglobin level (g/dl) during the pregnancy?

a. <11(g/dl)
b. >11(g/dl

10. Was the HIV status checked ( )

a. Yes
b. No

11. What was the results?

a. Positive
b. Negative

Fetal factors

1. Did the baby had fetal distress? ( )
2. Yes
3. No

2. Did the baby have birth defects? ( )

1. Yes
2. No

3. What was the fetal heart before delivery?

1. 60-120b/m
2. 120-160b/m
3. >160b/m

4. Did the baby had cord around the neck

1. Yes
2. No

5. was there abnormalities? ( )

1. True knot
2. False knot

Normal

6. What was the size of the cord?

1. Short
2. Long

Appendix V: County Clearance to Conduct Research

COUNTY GOVERNMENT OF KIAMBU

Alcorrespondence should be addressed to HEAD
HRD_HEALTH
Email mndiritu@gmail.com
mkwasa@live.com
Tel. Nos: 0721641516
0721974633

HEALTH RESEARCH AND DEVELOPMENT UNIT
P. O. BOX 2340-00900
KIAMBU

Ref. No. Date 08th March 2021

DEPARTMENT OF HEALTH SERVICES

TO WHOM IT MAY CONCERN

RE: CLEARANCE TO CONDUCT RESEARCH IN KIAMBU COUNTY

Kindly note that we have received a request by Ms. Margaret Nthoki Karugu of Jomo Kenyatta University of Agriculture and Technology to carry out research in Kiambu County, the research topic being on "Determinants Of Preterm Births Among Mothers attending Kiambu Level 5 Hospital, Kiambu County, Kenya"

We have duly inspected her documents and found that she has been cleared by NACOSTI to carry out the research for a period ending 02nd March 2022. She thus does not need any further clearance with another regulatory body in order to conduct research within the county of Kiambu.

However, it is incumbent upon the institution where she is carrying out research to ensure that she receives adequate supervision during the process of conducting the research. This note also accords her the duty to provide a feedback on her research to the county at the conclusion of her research.

DR. MWANCHA KWASA
COUNTY CLINICAL RESEARCH OFFICER
KIAMBU COUNTY

Appendix VI: NACOSTI Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **907692**

Date of Issue: **02/March/2021**

RESEARCH LICENSE

This is to Certify that Ms.. Margaret Nthoki Karugu of Jomo Kenyatta University of Agriculture and Technology, has been licensed to conduct research in Kiambu on the topic: DETERMINANTS OF PRETERM BIRTHS AMONG MOTHERS ATTENDING KIAMBU LEVEL FIVE HOSPITAL KIAMBU COUNTY, KENYA ` for the period ending : 02/March/2022.

License No: **NACOSTI/P/21/9258**

907692

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

CONDITIONS

The License is valid for the proposed research, location and specified period

The License any rights thereunder are non-transferable

The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research

Excavation, filming and collection of specimens are subject to further necessary clearence from relevant Government Agencies

The License does not give authority to tranfer research materials

NACOSTI may monitor and evaluate the licensed research project

The Licensee shall submit one hard copy and upload a soft copy of their final report (thesis) within one year of completion of the research

NACOSTI reserves the right to modify the conditions of the License including cancellation without prior notice

National Commission for Science, Technology and Innovation off Waiyaki Way, Upper Kabete,

P. O. Box 30623, 00100 Nairobi, KENYA

Land line: 020 4007000, 020 2241349, 020 3310571, 020 8001077

Mobile: 0713 788 787 / 0735 404 245

Appendix VII: Ethical Clearance

JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY
P.O BOX 62000(00200) NAIROBI, Tel:(067) 5870001-4
(Office of the Deputy Vice Chancellor, Research Production and Extension Division)

JKUAT INSTITUTIONAL ETHICS REVIEW COMMITTEE

REF: JKU/2/4/8968 Date: 8th February 2021

To: Ms. Margaret Nthoki Karugu,
School of Nursing, JKUAT

Dear Ms. Karugu,

RE: DETERMINANTS OF PRETERM BIRTHS AMONG MOTHERS ATTENDING KIAMBU LEVEL FIVE HOSPITAL KIAMBU COUNTY, KENYA

This is to inform you that JKUAT Institutional Ethics Review Committee has reviewed and approved your above research proposal. Your application approval number is **JKU/IERC/02316/0063**. The approval period is **8th February 2021** to **7th February 2022**.

This approval is subject to compliance with the following requirements;

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

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely

Dr Patrick Mburugu
Chair, JKUAT IERC

INSTITUTIONAL ETHICS REVIEW COMMITTEE
08 FEB 2021
APPROVED
P.O. BOX 62000-00200
NAIROBI
JKUAT

JKUAT is ISO 9001:2015 and ISO 14001:2015 certified
Setting Trends in Higher Education, Research, Innovation and Entrepreneurship

Appendix VIII: Publication

***Conclusion*: There is therefore need for proper management of antenatal mothers. Further studies to determine factors influencing preterm births.**

INTRODUCTION

Preterm birth refers to a birth of an infant before gestation period of 37 weeks [1]. It is classified as an extreme preterm (<28 weeks), very preterm (28 < 32 wks), moderate (32 < 34 wks) and late preterm (34 < 37 (wks) [2]. Preterm birth can occur without any cause or it can be a provider initiated [3]. Preterm births are on increase and are the second leading cause of under-5 deaths with estimated prevalence ranging between 5% and 18% [3]. In high-income countries, preterm babies survival is high, with prevalence of 9% compared to developing countries with prevalence estimated at 12%. This has been attributed to inadequate equipment, lack of adequate staff and poor management [3,5, 6,7]. Approximately 15 million babies are born preterm annually worldwide. The prevalence rate of 11% children die due to preterm birth before 5 years globally [4]. In 2015, complications of preterm births were among the causes of neonatal morbidity and mortality [2, 4]. More than 60% of preterm births occur in Africa and South Asia, in the lower-income countries [9]. Preterm babies are predisposed to serious illness during the neonatal period; this can be reduced through interventions provided during antenatal care and immediately after birth [8].

In Kenya 193, 000 babies are born before gestation period of 37 weeks and 13,300 of them died due to preterm complications [10]. Prematurity was the second main cause of neonatal death with (24.6%) after asphyxia and trauma (31.6%) [11,12]. Kenya was among countries in the world with the highest number of preterm births and ranked 15th out of 188 countries [11]. Several countries have assessed risk factors associated with preterm births globally established different factors which includes: provider-initiation, socio-demographic factors, medical and maternal obstetric factors, stressful life events, sexual activity, gestational diabetes mellitus among women of short stature, living in rural, and complications during pregnancy [5,8,9,12]. Prematurity has a cost implication to the family, community and health system due to prolonged stay in the hospital [13, 14]. It also causes maternal and parenting strain due to weight of care associated with the condition [14]. Kenya is among the countries that lack reliable data on contributing factors of preterm births[15, 16]. In order to achieve the sustainable development goal 3 target on time, urgent efforts are needed to identify preterm births contributing factors, and address them to reduce neonatal deaths, child morbidity and mortality [15, 16].

In Kiambu level 5 hospital, statistics from January to December 2019 showed a prevalence rate of preterm births 6.2% higher compared to the surrounding health facilities [29]. In December 2018 and January 2019 Kiambu level 5 hospital had 1,703 deliveries and 60 neonates died out of which 35 were preterm babies [29]. Being a referral hospital for nearby health centers, Kiambu level 5 hospital handles many high-risk pregnancies whose outcome includes preterm deliveries. The associated factors identified need to be addressed early to improve the outcome and reduce the incidence of preterm births. This study therefore assessed determinants associated with preterm births at Kiambu level 5 hospital.

MATERIALS AND METHODS

Study design

This was an unmatched case-control study in which the cases were preterm babies with their mothers while the controls were term babies with their mothers. The design helped to determine if an exposure was associated with an outcome.

Study Setting

The study was conducted at Kiambu level 5 hospital in Kiambu County Kenya. It covers an area of 2,449.20 Km^2 and had a population of 2,417,735 in 2019 [28]. The hospital serves over 5 million people and majority of patients come from Kiambu region which is the main catchment area. Kiambu level 5 hospital is surrounded by many health facilities such as: Tier 4-Hospitals (13), Tier 3-Health Centers (24), and Tier 2 Dispensaries (70) with urban and rural population [29]. The hospital not only serves their catchment areas but also receives referral patients from many peripheral government health centers, faith based organizations, non-governmental organizations and private health care facilities. The hospital handles many high-risk pregnancies whose outcomes often include preterm births. It conducts approximately 50 deliveries including referral mothers daily making the maternity ward very busy in Kiambu county. The newborn unit is also busy and has only eight incubators with a capacity of 40 babies. Kiambu newborn unit admits more neonates beyond its capacity hence leading to the sharing of cots. Kiambu normally have more than 898 deliveries in a month.

Study Population

The study population was baby-mother pairs at Kiambu level 5 hospital maternity and newborn unit. The study cases involved mothers with preterm babies whereas controls involved mothers with term babies. The study excluded mothers with mental problem, unconscious and unwilling to participate.

Sampling Procedures

Sampling frame was composed of mothers with preterm births (cases) and term babies (controls) who delivered and were registered in delivery book, between March and May 2020 in kiambu level 5 hospital maternity unit. Consecutive method was adopted to select cases and systematic random sampling for controls until the required sample size was achieved at the ratio of 3:1 between controls and cases. Term births of December 2019 was adopted with the formula K= N/n=855/291=3. In arriving at the sampling interval (k). N stands for total number of term babies and n was the sample size for term babies. Systematic random sampling method was applied to recruit every third subject where the criteria was met. The research assistants recruited the participants on a daily basis using the birth register. All cases and controls were identified and traced to the postnatal wards or newborn unit within 24 hours of giving birth.

Data Collection Procedure

The research assistant explained aims and the procedures involved in the study to all participants who met inclusion criteria. The participants were requested to sign a written informed consent form to participate in the study. The recruitment and the filling of the questioners were done face to face when no clinical services were going on. Additional information was extracted from the mother's file and antenatal records as per questionnaires.

Data collection tool

The trained interviewer used semi-structured questionnaires and data extraction forms collected data. The questionnaires were adapted and modified from the study done by Wangura *et al.*, 2018 at Kenyatta Referral

hospital [23]. The modifications were done because most mothers attending Kiambu level 5 hospital were from rural setting, while from KNH level six hospital were from urban setting. Therefore, possibility of different factors associated with preterm births. The questionnaires collected data on socio-demographic, maternal obstetric and fetal distress factors. An independent translator translated the tool into Kiswahili then back to English.

Data Management

Data was analyzed using statistical package for social science version 26. It was subjected to descriptive analysis to generate frequencies distributions and percentages. Binary logistic regression and Multivariate logistic regression were used to calculate odd ratios for the prediction of the relationships between dependent and independent variables. Factors identified to be significant at level of P<0.05 during bivariate analysis were adjusted in multivariable logistic regression models. A P-value of less than, was considered statistically significant and results were presented in form of tables.

Ethical considerations

The collection of data for this study was approved by Jomo Kenyatta University of Agriculture and technology research ethical committee JKU/2/4/896B. Permission to conduct the study was obtained from National Commission for Science Technology & Innovation Ref License No.NACCOSTI/P/21/9258. Administrative authority was sought for from Kiambu level 5 hospital to conduct the research. A written informed consent forms were obtained from all eligible participants after explaining the purposes and the objectives of the study. The participants were allowed to participate in the study voluntary without interfering with their management care. To ensure confidentiality and privacy, interviews were conducted privately and coding was used as a disguise to conceal the respondents' identity.

RESULTS

Socio demographic characteristics of the study respondents

A total of 388 women were recruited into the study with a response rate of 100%. Of these, 97 were cases with a mean age of 26.9 ± 6.4 years while 291 had mean age of 26.3 ± 6.2 years. More than a half of the cases (56; 57.7%) lived in urban areas compared to the controls (140; 48.1%) .Majority of cases (80; 82.5%) and controls (241; 82.8%) indicated that they were married. Likewise, majority of cases (54; 55.7%) and controls (158; 54.3%) were Protestants. With respect to highest education level of the respondents, slightly more than half of cases (52; 53.6%) and controls (153; 52.6%) indicated to have completed secondary school education (Table 1).

Table 1

Socio- demographic characteristics of the study respondents

	Cases		Controls		Total	
	n=97	%	n=291	%	n=388	%
Residence						
Rural	41	42.3%	151	51.9%	192	49.5%
Urban	56	57.7%	140	48.1%	196	50.5%
Marital status of the respondent						
Single	16	16.5%	48	16.5%	64	16.5%
Married	80	82.5%	241	82.8%	321	82.7%
Separated	0	0%	2	0.7%	2	0.5%
Widowed	1	1.0%	0	0%	1	0.3%
Religion of the respondent						
Catholic	42	43.3%	132	45.4%	174	44.8%
Protestant	54	55.7%	158	54.3%	212	54.6%
Muslim	1	1.0%	1	0.3%	2	0.5%
Highest level of education of the respondent						
Never gone to school	0	0%	1	0.3%	1	0.3%
Primary school	28	28.9%	68	23.4%	96	24.7%
Secondary school	52	53.6%	153	52.6%	205	52.8%
College education	13	13.4%	61	21.0%	74	19.1%
University education	4	4.1%	8	2.7%	12	3.1%

Maternal Factors Influencing Preterm Births

In this study mothers who had history of more than four pregnancies were 3.1 times more likely to have a preterm delivery compared to those who had a history of one pregnancy (OR=3.08 [95%CI=1.39–6.84]. Mothers who had history of their last baby dead were three times more likely to give birth to a preterm baby compared to those who had no history of their last baby dead which was estimated at 3.83 [95%CI=1.06–13.91]. Mothers who had history of ceserean section were 2.8 times more likely to give birth to a preterm baby compared to those who had no history of C/S estimated at 2.76 [95% CI=1.67–4.56]. Mothers who had history of preterm birth once were 3.6 times more likely to give birth to a preterm baby compared to those who had not given birth before expected time once CI=1.67–4.56]. Mothers who had history of their babies having fetal distress were 10.5 times more likely to give birth to a preterm baby compared to those had no history of fetal distress10.45 [95% CI =3.99– 27.41] (Table2)

Table 2

Maternal factors associated with preterm births

	Cases		Controls			95%CI		
Variables	n=97	%	n=291	%	OR	Lower	Upper	P-value
Heavy physical work during pregnancy								
Yes	45	46.40%	145	49.80%	0.87	0.55	1.38	0.538
No	52	53.60%	146	50.20%	Ref			
Hours spent working per day								
Working less than 8hrs a day	70	73.70%	203	69.80%	1.21	0.72	2.04	0.466
Working more than 8hrs a day	25	26.30%	88	30.20%	Ref			
Nature of work								
Manual work	86	88.70%	241	82.80%	1.62	0.81	3.26	0.174
Office work	11	11.30%	50	17.20%	Ref			
History of smoking during pregnancy								
Yes	1	1.00%	3	1.00%	1	0.1	9.73	1
No	96	99.00%	288	99.00%	Ref			
Partner smoking during pregnancy								
Yes	10	11.10%	20	7.90%	1.46	0.66	3.26	0.352
No	80	88.90%	234	92.10%	Ref			
Use of alcohol during pregnancy								
Yes	1	1.00%	12	4.10%	0.24	0.03	1.89	0.176
No	96	99.00%	279	95.90%	Ref			
Parity								
Once	48	50.50%	182	63.00%	Ref			
Two to four times	34	35.80%	91	31.50%	1.42	0.85	2.35	0.178
Over four times	13	13.70%	16	5.50%	3.08	1.39	6.84	0.006
Missing	2		2					
Outcome of last pregnancy								
Alive	48	76.20%	141	81.50%	1.31	0.5	3.4	0.585
Dead	9	14.30%	9	5.20%	3.83	1.06	13.91	0.041
Miscarriage	6	9.50%	23	13.30%	Ref			
Missing	34		118					
Histoy of preterm delivery								
Once	16	22.90%	14	7.70%	3.58	1.64	7.8	0.001
Twice	54	77.10%	169	92.30%	Ref			
Missing	27		108					
Type of delivery								
Breech	4	4.20%	6	2.10%	2.83	0.77	10.39	0.117
C/s	39	40.60%	60	20.60%	2.76	1.67	4.56	<0.001
Svd	53	55.20%	225	77.30%	Ref			
Missing	1		0					

History of fetal distress								
Yes	17	18.10%	6	2.10%	10.45	3.99	27.41	<0.001
No	77	81.90%	284	97.90%	Ref			
Missing	3		1					

Maternal Obstetric Factors

Mothers who had a history of delivery of a low birth weight infant were 24 times more likely to give birth to a preterm baby compared to those who had no history of a low birth weight24.32 [95%CI=10.72–55.19].Mothers who had history of premature rupture of membrane 18 times more likely to give birth to a preterm baby compared to those who had history of premature rupture of membrane 18.72[95%CI=4.07–86.12].Mothers who had history of bleeding during pregnancy were 5 times more likely to give birth to a preterm baby compared to those who had no history of bleeding during pregnancy 5.60 [95% CI=1.98–15.80]. Mothers who had history of still births were times more likely to give birth to a preterm baby compared to those who had no history of still births 3.71 [95% CI =1.98–10.39]. Mothers who had history of preterm labor were7 times more likely to give birth to a preterm baby compared to controls who had no history of preterm labor 7.37 [95% CI=2.49–21.79] (Table 3.)

Table 3

Association between preterm birth and maternal obstetric factors

	Cases		Controls			95%CI		
Variables	n=97	%	n=291	%	OR	Lower	Upper	P-value
Gestation at delivery								
Less than 28 weeks	3	18.80%	3	21.40%	0.7	0.11	4.54	0.708
28 to 32 weeks	3	18.80%	4	28.60%	0.53	0.09	3.12	0.478
32 to 37 weeks	10	62.50%	7	50.00%	Ref			
Sex of the baby								
Female	7	43.80%	6	42.90%	1.04	0.24	4.41	0.961
Male	9	56.20%	8	57.10%	Ref			
Low birth weight of infants								
Yes	39	55.70%	9	4.90%	24.32	10.72	55.19	<0.001
No	31	44.30%	174	95.10%	Ref			
Missing	27		108					
History of abortion								
Yes	5	7.10%	18	9.80%	0.71	0.25	1.98	0.507
No	65	92.90%	165	90.20%	Ref			
Missing	27		108					
History of premature rupture of membrane								
Yes	12	17.10%	2	1.10%	18.72	4.07	86.12	<0.001
No	58	82.90%	181	98.90%	Ref			
Missing	27		108					
History of substance intake during pregnancy								
Yes	1	1.40%	4	2.20%	0.65	0.07	5.91	0.701
No	69	98.60%	179	97.80%	Ref			
Missing	27		108					

History of fetal distress								
Yes	17	18.10%	6	2.10%	10.45	3.99	27.41	<0.001
No	77	81.90%	284	97.90%	Ref			
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No	69	98.60%	179	97.80%	Ref			
Missing	27		108					

History of bleeding during pregnancy								
Yes	11	15.90%	6	3.30%	5.6	1.98	15.8	0.001
No	58	84.10%	177	96.70%	Ref			
Missing	28		108					
History of still birth								
Yes	9	12.90%	7	3.80%	3.71	1.33	10.39	0.013
No	61	87.10%	176	96.20%	Ref			
Missing	27		108					
History of preterm labor								
Yes	12	17.10%	5	2.70%	7.37	2.49	21.79	<0.001
No	58	82.90%	178	97.30%	Ref			
Missing	27		108					

DISCUSSION

The study revealed that mothers who had given birth more than four times were more likely to deliver preterm birth. This was similar to the study done in Nigeria which found that mothers with a parity ≥4 were 4 times more likely to deliver preterm baby[20]. High parity is likely to increase the risk of preterm delivery due to uterine changes such as myometrium stretching from previous pregnancies[23]. The finding of this study was inconsistent with the studies conducted in Northern Ethiopia and Tanzania[1,18]. Mothers who had history of attempted abortion had a 4 times increased risk of preterm birth than those who had no attempted abortion. This finding is similar to the studies conducted from different countries[17,19]. Abortion increases the risk of preterm birth due to surgical evacuation of the uterus, which mechanically stretches the cervix[24,25]. This predisposes such mothers to preterm birth in consecutive pregnancies due to injury to the cervix. This study indicated that there was a significant association between history of stillbirth and preterm births. The finding of this study was in agreement with other studies conducted in different countries[21,23]. The finding was however in contrast with study done in South East Ethiopia which found that history of stillbirth could not be considered as a risk factor for subsequent preterm birth delivery[26]. This might be due to the recurrence of stillbirth in some women who initiate preterm labor in the preceding pregnancy. This result suggests the need for stillbirth prevention to reduce the risk of future preterm birth.

This study revealed that history of preterm labor was a significant factor for preterm birth. This result was in line with studies conducted in Tanzania, Kenya and London.[18,19]. These findings contradicted a study carried out in Ethiopia which indicated that mothers who had history of preterm delivery were less likely to deliver preterm birth[25]. According to this study, fetal distress was another significant risk factor associated with preterm births. This was consistent with studies carried out in Ethiopia where fetal distress was about four times more significantly associated with preterm compared to term births [27]. When fetal distress occurs or a pregnant mother is at risk, a method must be initiated to deliver the baby out as quickly as possible to save the life of the baby or mother. This does not matter which trimester the pregnancy is at despite the causes. The present study revealed that there was greater increase in preterm births through a caesarean section. This finding agreed with studies done in Nigeria [19]. This should alert service provider to be careful before booking

mothers for cesarean section and a study to be done in Kiambu hospital to know the commonest indications for cesarean section.

Limitations of the study

This study was recall bias, the researcher assumed that the information given was true and the mothers were able to give full information. To normalize the bias, the trained officer was able to cross – check the data with medical records.

CONCLUSION AND RECOMMENDATIONS

The findings of the study indicate that there was an association between maternal and obstetric factors with preterm births at Kiambu level 5 hospital. The association common factors were :number of times a mother had been pregnant, history of having more than four births, history of having a low birth weight babies, history of still births, history of premature rupture of membrane, Fetal distress, premature onset labor, delivery through a cesarean section and attempted abortion. There is therefore need for proper management of antenatal mothers,and further studies are needed to determine factors influencing preterm births.

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