PREVALENCE AND RISK FACTORS OF PRETERM BIRTHS AT BANADIR HOSPITAL IN MOGADISHU-SOMALIA:- A CROSS-SECTIONAL STUDY

Principal investigator:
Dr. Mohamed Yousef Hussien
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Department of Paediatrics and Child Health

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DECLARATION

I declare that this dissertation is my original work, drafted under the guidance of my supervisors and has not been published or presented for a degree in any other institution. The references were cited appropriately.

Signature:  **Date:** 24/06/2023

Dr. Mohamed Yousef Hussien

SUPERVISOR APPROVAL

The dissertation has been submitted for examination with the approval from the following University supervisors:

Professor Grace Irimu, MBChB, M.Med (Paed) (UoN), PhD

Associate Professor and Chair, Department of Paediatrics and Child Health, Faculty of Health Sciences, University of Nairobi.

Signature: **Date:** 15th July, 2023

Dr. Florence Murila, MBChB, MMed(paed), CTM, C. Neonatology

Senior Lecturer, Department of Pediatrics and Child Health, Faculty of Health Sciences, University of Nairobi.

Signature: **Date:** 16th July, 2023

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OPERATIONAL DEFINITION

Anemia in pregnancy: is a hemoglobin level <10g/dl and categorized in the study as

Classification of severity of anemia: Mild (9– 10 gm/dL), Moderate (7 – 8.9 gm/dL) and Severe (<7 gm/dL) (1).

Ballard score: is a commonly used technique of gestational age assessment and is based on the neonate's physical and neuromuscular maturity (2). (Appendix III)

Gestational age: refers to the length of pregnancy after the first day of the last menstrual period (LMP) and is usually expressed in weeks and days and confirmed physically by using Ballard score system.

Mid-Upper Arm Circumference (MUAC): is the circumference of the left upper arm, measured at the mid-point between the tip of the shoulder and the tip of the elbow and used for the assessment of nutritional status of the mother in this study. In this study, all mothers with MUAC less than 23cm at the left mid upper arm were considered to have malnutrition. MUAC cut off was <23cm in this study (3).

Miscarriage: Pregnancy loss before 24 weeks gestational age (4).

Preterm birth: is defined by WHO as all births before 37 completed weeks of gestation (5). Classification of prematurity: Extreme preterm birth are those babies less than 28 weeks of gestational age, Very preterm birth (28 to 32 weeks of gestational age) and moderate to late preterm birth (32 to 37 weeks of gestational age) whereas the term babies are those more than 37 weeks completed gestational age (6).

Spontaneous preterm birth: is commencement of labor with intact or pre-labor rapture of membrane and birth before 37 weeks of gestation

Induced preterm birth: medically induced labor as a cesarean section or labor induction at <37 weeks of gestation.

Maternal stress exposure: was defined as: having a psychiatric diagnosis according to medical records (depression, anxiety, fear of childbirth, psychosis, phobia and/) or if the patient's medical record revealed self-reported stress. Self-reported maternal stress could be due to the pregnancy

itself, previous traumatic experiences from pregnancy and childbirth fear of congenital defects in the unborn child or injury, Lack of social support or a problematic relationship between the woman and her partner.

Hypertensive disorders of pregnancy: refer to a group of conditions that involve high blood pressure during pregnancy (Preeclampsia, Eclampsia, chronic hypertension, super-imposed preeclampsia and gestational hypertension) (7).

MUAC-non-stretchable WFP tape - is a type of measuring tape that is commonly used to measure MUAC. It is called "non-stretchable" because it is made of a material that does not stretch, which ensures that the measurement is accurate and reliable and does not change with pregnancy.

Preterm Premature Rupture of Membranes: was defined as rupture of membranes more than 1 hour prior to onset of contractions, and prior to 37 weeks' gestation (8).

Antepartum hemorrhage: refers to vaginal bleeding that occurs after the 24th week of pregnancy but before the onset of labor (9).

Parity: refers to the number of times a woman has given birth to a baby who has reached the gestational age of viability (typically 24 weeks) (10).

Internal displaced people: is someone who is forced to leave their home but who remains within their country's borders.

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ABBREVIATIONS AND ACRONYMS

ANC	Antenatal Care
APH	Ante-partum hemorrhage
IDP	Internally Displaced Persons
IQR	Interquartile Range
LBW	Low Birthweight
LMP	Last Menstrual Period
HB	Hemoglobin level
HDP	Hypertensive Disorder of Pregnancy
MUAC	Mid-Upper Circumference
PIH	Pregnancy Induced Hypertension
PPROM	Preterm Premature Rupture of Membrane
SDG	Sustainable Development Goals
WHO	World Health Organization
WFP	World Food Programme

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ABSTRACT

Background: Preterm birth has important implications for child mortality and morbidity and is a prerequisite for achieving the global target for under-five mortality reduction. Prematurity complications are the second-most significant cause of neonatal mortality in Somalia. However, the prevalence and underlying associated risk factors of preterm birth have not been studied, which prompted the need for this study in Somalia.

Study objectives: To determine the prevalence and associated risk factors of preterm births at Banadir Hospital in Mogadishu, Somalia.

Methodology: This was a hospital-based cross-sectional study design conducted at Banadir Hospital in Mogadishu-Somalia between 21st august to 18th of September 2022.A consecutive sampling technique was used to recruit 260 mother-baby dyads into the study using a structured questionnaire. The prevalence with the 95% Confidence interval was calculated for preterm births. Bivariate and multivariable analyses were performed using logistic regression analysis to determine factors associated with preterm birth. Significance was evaluated at P-value < 0.05.

Results: A total of 260 live births were enrolled in the study. The prevalence of preterm births was 10.4% (n =27), 95%CI: 7.0 % - 14.8%. Among the 27 preterm births, 21(77.8%) were moderate to late preterm (32weeks-<37weeks), and 6(22.2%) were very preterm in this study. Multivariable analysis revealed that family size of >3 family members (AOR =0.06, 95%CI:0.01 – 0.39, p =0.003), husband smoking cigarette (AOR =6.01,95%CI:1.56 -23.13, p=0.009), cooking in the living room with charcoal and firewood (AOR =0.17, 95%CI: 0.06 – 0.50, p=0.001), presence of hypertensive disorder in pregnancy(HDP) (AOR=8.70, 95%CI:1.83 – 41.36, p =0.007) and multiple pregnancy (AOR=5.02, 95%CI:2.13 – 19.19, p<0.001) were significantly associated with preterm births.

Conclusion: The prevalence of preterm birth in Somalia was 10.4% in this study. Hypertensive disorders in pregnancy, a, husband smoking cigarette, family size, cooking in the living room with charcoal and firewood and multiple pregnancy were the significant associated factors with preterm birth. Early detection and management of those factors could reduce the risk of premature births, except multiple gestations, which is naturally un-preventable.

Key words: Prevalence of preterm births, risk factors of preterm birth, moderate to late preterm birth, Somalia, Banadir hospital

CHAPTER ONE: INTRODUCTION

1.1. Background

Preterm Birth is defined by the World Health Organization (WHO) as all births occurring before 37 completed weeks of gestation (5). It is a major health issue associated with high morbidity and mortality globally among neonates (11). Globally, 15 million babies are born with preterm birth yearly worldwide, equivalent to one in ten babies giving a global preterm birth rate of around 11% (12). The preterm birth rate varies from 5-to 18% in 184 countries. Preterm birth prevalence is significantly higher in Africa and South Asia, accounting for 60 percent of global annual preterm birth (13). On average, 12 percent of babies in low-income settings are born prematurely, compared to nine percent in higher-income settings (14). An estimated one million die annually due to complications of preterm birth. Among these deaths, less than 10% occur in High Income countries (HIC) and more than 75% of them in Sub-Saharan region (5). Preterm infants have an increased likelihood of mortality compared to term infants in low and middle-income countries (LMICs) (15). The increased risk of death is mainly associated with respiratory distress and neonatal infections (16).

Preterm birth is sub-categorized into three groups based on weeks of the gestational age, including extreme preterm birth (24 to 28 weeks), very preterm birth ((28 to 31 weeks), moderately preterm ((32 to 33 weeks), and later preterm birth (34 to 36 weeks). An estimated 60–70% of preterm births are late preterm births, 20% are moderate preterm, 15% are very preterm, and 5% are extreme preterm birth (17). There is a variable application for the lower cut-off of preterm birth from 20 to 28 weeks of gestational age (18). This study's cut-off for extreme preterm birth was between 24 and 28 weeks. More than 70% of preterm babies can survive with cost effective care during childbirth and postnatal period such as essential newborn care, antenatal steroid for pregnant

mothers at risk for PTB, frequent breastfeeding or expressed breast milk, kangaroo mother care and antibiotics for treating infection (6).

Preterm birth occurs for varied reasons. Approximately 70% of preterm births occur spontaneously, while around 30% are induced or provider-initiated preterm birth (14).

Prematurity is the major cause of neonatal mortality and is currently the second leading cause of mortality behind pneumonia in children under five years (19). Further, preterm delivery complications are considered the single most significant cause of neonatal death, occurring in around 35% of the world's 3.1 million annually (20). In addition, preterm babies are at an increased risk of respiratory, gastrointestinal, bone, and mineral complications, hearing impairment, and retinopathy (21).

In Somalia, prematurity is the second leading cause of neonatal death, accounting for 21 to 23 percent of neonatal mortality (22). In Somalia, the prevalence of preterm birth rate was estimated at12% in 2010 (23) by a global estimate of preterm birth. Still, no actual studies are available in the country that addresses the prevalence and the underlying risk factors associated with preterm birth due to long conflict. Therefore, it is essential to address the burden of preterm birth in order to achieve the Sustainable Development Goal 3.2 target of ending preventable deaths of newborns and reducing the neonatal mortality rate to equal to or less than 12 per 1000 live birth by 2030 (24).

CHAPTER TWO: LITERATURE REVIEW

This section provided a review of past studies on preterm births based on the study objectives. Literature has been obtained from PubMed, Cochrane Library, Google Scholar and Hinari. The literature has been categorized as per the study objectives.

2.1. The prevalence of preterm deliveries

Preterm birth is categorized into two main groups: spontaneous preterm birth and induced/iatrogenic preterm birth. Determining the true prevalence of Preterm Birth (PTB) globally has been difficult due to the lack of reliable data in many countries, especially low-income countries. Nevertheless, the estimated global preterm birth is approximately 11%, and the number is rising in countries with reliable data (5). However, there are disparities in the prevalence rate of PTB between countries and even within countries ranging from 5-to 18% (25).

A study conducted by Da Cost in investigating global preterm birth in top 10 countries with highest rate of preterm births revealed the prevalence of preterm birth as showed in Table 1. These findings have shown that eight in ten countries with the highest prevalence rate of PTB are in sub-Saharan Africa, showing the burden of preterm birth in Africa (14).

Countries	**Prevalence**
Africa	
Malawi	18.1%
Comoros	16.7%
Congo	16.7%
Zimbabwe	16.6%
Equatorial Guinea	16.5%
Mozambique	16.4%
Gabon	16.3%
Mauritania	15.4%
Asia	

Pakistan	15.8%
Indonesia	15.5%

Source (14).In Asia, the prevalence of preterm birth varies between 9% and 15% (26), (27). A hospital-based descriptive study conducted in Thailand by Kinpoon *et al*.in 2021 found that the prevalence of preterm births was 10.8% (28). Additionally, a systematic review and meta-analysis study by Thangjam *et al*. in India, which included 18 hospital-based research studies on the prevalence of preterm birth found an overall prevalence of preterm births in 15% (29). Another systematic review and meta-analysis conducted in Iran involving 14 hospital-based studies by Vakilian *et al*. with total sample size of 156,461 established a pooled prevalence rate of preterm delivery of 9.2% (26).

In Latin America, a retrospective study conducted in Brazil utilizing a national population-based sample of 23,940 women by Do Carmo Leal *et al*., found that the prevalence of preterm births was 11.5% (30). In Europe, a seven-year retrospective study in a single Centre population in Italy showed a prevalence of preterm births of 7.8 % (31). Another cross-sectional study conducted in Spain by Hidalgo-Lopezosa *et al*. revealed that the prevalence of preterm birth was 6.7%.

Similarly, variable preterm birth rates have been found in the African setting. A systematic review conducted by Muchie *et al*. involving 22 observational studies conducted in Ethiopia found an overall pooled prevalence of preterm birth rate in Ethiopia of 10.48% (32). A cross-sectional study conducted in Kenya in 2014 at Kenyatta National Hospital revealed that the prevalence of preterm birth was 18.3% (33). Similarly, another study in Kenya found that the prevalence of preterm births was 18.6% (34). A retrospective cohort study by Irimu *et al.* in Kenya investigating neonatal mortality in 16 Kenyan county hospitals found that 30% of the inborn newborns admitted to the

newborn units of these hospitals were preterm, with 41,667 inborn neonates admitted in the newborn units (35).

In Zambia, a hospital-based cross-sectional study conducted by Mwansa *et al*. in 2020 revealed that the prevalence of spontaneous preterm birth was 7.7% (36). The prevalence of PTB in this study was based only on spontaneous preterm birth while the present study assessed both spontaneous and induced preterm birth. In Nigeria, the prevalence of preterm births in a tertiary hospital-based retrospective study conducted in the South East region by Iyoke *et al*. in 2014 was 16.9%. This study focused on perinatal mortality associated with preterm birth (37). A hospital-based unmatched case-control study conducted in Tanzania by Temu *et al*. in 2016 found the prevalence of preterm birth of 14.2% (38).

In conclusion, the findings from literature have showed varied prevalence of preterm births making it difficult to compare preterm births across countries and across time. There was higher prevalence of preterm births in Sub-Saharan Africa, Asia with lowest prevalence observed in high income countries (HIC). The differences have been attributed to study setting, quality of data and country development where majority of the studies have been hospital based and few population-based studies. The differences were also associated with varied definition of abortion and livebirths.

2.2. Causes of preterm births

Preterm birth is categorized into two main groups: spontaneous preterm birth and induced/iatrogenic preterm birth. Spontaneous preterm birth occurs following premature rupture of membrane(PROM), while induced preterm birth occurs before 37 weeks due to maternal (preeclampsia, abruption- placentae) and fetal indications such as fetal distress(39).

Premature rupture of the membranes has been one of the leading causes of preterm births. A study conducted by Reeti Rajan *et al*., in a tertiary care-based prospective study done in India in 2016, established that Premature Preterm Rupture of Membrane (PPROM) accounted for 19% of preterm deliveries (40). Approximately 30% of preterm births are induced, while around 40% occur spontaneously, and 30% result from PPROM. The cause of PPROM is mainly unknown, although research has shown that genetic, mechanical, environmental, and inflammatory variables have been identified as major causes. The risk of PPROM is increased by preterm uterine contractions or mechanical distension of the fetal membranes. In addition, both the loss of fetal membranes integrity and the triggering of uterine contractions are caused by inflammatory mediators such as intra-amniotic infections (41).

Preterm labor can be caused by various factors, including infection or inflammation such as infection of amniotic cavity. Other causes include vaginal bleeding and uterine over-distension, and stress. However, it is understood that there is no definite cause for more than half of the preterm births (26). However, there have been maternal and fetal factors that are associated with preterm births. Maternal age, lack of antenatal care, multiple gestation, parity, short inter-pregnancy interval, poor maternal nutritional status, antepartum hemorrhage (APH), pregnancy-induced hypertension(PIH), maternal infections, fetal gender, and congenital anomalies have been found to be significantly associated with preterm births (42,43).

There are multiple causes of preterm birth, but they vary based on country development (Table 1). Many preterm births remain un-explained.

Table 1: Summary table of causes of Preterm Births extracted from Blencowe et al. (2013)

	High-income countries	**Low-income countries**
Causes	Advanced maternal age (≥ 35 years old)	Adolescent pregnancy
	Increased use of fertility drug	Infection/HIV/Malaria
	Multiple pregnancies	Pregnancy-induced hypertension, APH
	Medical unnecessary induction	Premature rupture of membrane

Source (20) (Blencowe *et al*. (2013)

2.2.1. Maternal demographic and socio-economic characteristics

Prematurity has been identified to be associated with diverse factors such as extreme age, marital status, nutritional status, occupation, and low socio-economic status of mothers. A case-control study in Cyprus by Stylianou-Riga *et al*. published in 2018 found an association between advanced maternal age, prolonged working hours, and maternal stress with preterm birth (44). The study focused on maternal socio-economic factors and risk factors of premature birth with no consideration of obstetric factors that are likely associated with preterm birth. Another study conducted in Spain focused on socio-demographic factors associated with preterm birth and low birth weight. It revealed that maternal age less than 19 years, being an immigrant, educational level less than secondary level, and living in large cities were significantly associated with preterm birth (45).

A seven-year retrospective study conducted in Italy by Granese et al. in 2019 found that there was a significant association between being unmarried, underweight, or obese and preterm birth (31). In Brazil, a national population-based study conducted by Do Carmo Leal *et al*. found that maternal age of less than 20 years, and low level of education were associated with preterm birth (30). Additionally, national population-based retrospective study in Qatar state by Salama *et a*l

published in 2021 found that being employed, assisted conception, lack of antenatal visit, and delivery at a tertiary hospital had an increased likelihood of preterm birth (46).

In Africa, a cross-sectional study in Lusaka University teaching hospital, Zambia, by Mwansa *et al*. in 2020 found that being single, having a low education level, having a low family income, and occasional alcohol drinking were significantly associated with preterm birth (36). An unmatched case-control study by Temu *et al*. in Tanzania found that living without a partner, having no formal education, heavy physical work during pregnancy, and being a peasant or businesswoman were associated with preterm birth (38). A case-control study conducted at Mulago hospital in Uganda by E Ayebare *et al*. found that maternal height of less than 1.5 meters, rural residence and failure to attend ANC were associated with preterm birth. Maternal unemployment among the participants was a protective factor against preterm birth(aOR= 0.36, 95%(CI: 0.15-0.86) (47).

A systematic review and meta-analysis conducted in Ethiopia showed that rural residence (AOR = 2.34, 95% CI: 1.35–4.05) was associated with an increased likelihood of preterm birth (32). However, some studies have not found any significant association between maternal demographic characteristics and preterm births. (48) (34) (49). A study conducted by Wagura *et al*. in Kenya revealed no significant association between preterm birth and maternal employment status, alcohol use, marital status, and level of education (48).

A similar study in Kakamega county teaching hospital in Kenya by Midecha in 2019 found that no education or education level up to a primary level, the inter-pregnancy interval at or below 2yrs were the main factors associated with preterm birth. Still, most of the maternal socio-demographic factors were not associated with preterm (34). comparable findings were obtained by Sathees *et al*. in a hospital-based descriptive study conducted in Sri Lanka, which found no significant

association between maternal socio-demographic and economic factors with preterm deliveries(49).

In summary, maternal demographic factors have been identified as important risk factors for preterm birth. These factors include, maternal age, education and socio-economic status, marital status, lifestyle factors such as use of drugs and cooking using firewood and maternal stress. However, some of the studies did not identify any association between maternal characteristics and preterm births which is majorly due to nature of the study and study setting (high income countries or low- and middle-income countries).

2.2.2. Obstetric characteristics

Obstetric characteristics have been considered the common causes of preterm births among women. Granese *et al*., in a seven-year retrospective study conducted in Italy, revealed that prematurity was significantly associated with the presence of uterine anomalies, presence of vaginal or urinary infections, poli or oligohydramnios, maternal diabetes, hypertension and short cervical length (31). A case-control study of 6705 live births in three maternal hospitals in Ardabil, Iran by R Alijahan *et al*., found that risk factors associated with preterm birth included hypertension during pregnancy, urinary tract infection, low diastolic pressure, and vaginal bleeding (50). A study conducted in Brazil by Do Carmo Leal *et al*. showed that previous preterm birth, multiple pregnancy, abruptio placentae, and urinary tract infection were the risk factors associated with spontaneous preterm birth (30).

A hospital-based study in Uganda showed that women with premature rupture of membrane, antepartum hemorrhage, hypertension during pregnancy, and lack of antenatal visit had a high risk of preterm births (38). Wagura et al., in a study conducted in Kenya, found that parity of ≥ 4,

previous preterm birth, multiple gestations, pregnancy-induced hypertension, APH, premature preterm rupture of the membrane, as well as urinary tract infection were associated with preterm birth. The findings showed that mothers who had APH were four times more likely to have preterm birth (AOR=4.26, 95%CI:1.52 – 11.99). Other significant factors identified included hypertensive disorders of pregnancy (AOR=7.82, 95%CI:3.69 – 16.53) and prolonged PROM (AOR=5.32, 95%CI:2.32 – 12.19)(17).

Similarly, in another study conducted at Kenyatta National Hospital by Okube and Sambu in 2017 investigating prevalence and risk factors for preterm births, it was found that mothers in the age group of 31 years and above(AOR = 2.81; 95% CI = 1.24 - 5.87), respondents with history of abortion (AOR = 3.54; 95% CI = 1.18 - 10.41), mothers who had history of preterm birth (AOR = 5.8; 95% CI = 1.18 - 10.30), hypertensive mothers (AOR = 2.04; 95% CI = 1.14 - 3.64), urinary tract infection during pregnancy (AOR = 4.62; 95% CI = 1.56 - 4.67) and mothers with history alcohol consumption during pregnancy (AOR = 2.56; 95% CI = 0.68 - 9.64) were significantly associated with preterm births (51).

A systematic review and meta-analysis conducted in Ethiopia by Muchie *et al*. investigating the epidemiology of preterm birth revealed that being anaemic (AOR = 2.59, 95% CI: 1.85–3.64), < 4 antenatal care visits (AOR = 2.34, 95%CI: 1.73–3.33), pregnancy induced hypertension (AOR = 3.49, 95% CI: 2.45–4.97), pre-labour rapture of membrane (AOR = 4.42, 95% CI: 2.28–8.57), antepartum hemorrhage (AOR = 5.02, 95% CI: 2.90–8.68), multiple pregnancies (AOR = 3.89, 95% CI: 2.52–5.99), past adverse birth outcomes (AOR = 3.24, 95% CI: 2.53–4.15) and chronic illness (AOR = 4.89, 95%CI: 3.12–7.66) were associated with increased likelihood of

preterm birth (32). The findings observed in this systematic review and meta-analysis are based on various studies conducted in different settings.

The findings from a study conducted in Ethiopia by Muhumed *et al*. in 2021 found that having a history of abortion [(AOR=5.01, 95% CI: (1.86– 13.45)], having hypertensive disorder of pregnancy [(AOR=3.32, 95% CI: (1.08– 10.20)], being female sex [(AOR=8.32, 95% CI: (4.56– 17.05)], and being low birth weight of new-born [(AOR=3.80, 95% CI: (1.55– 9.82)] were found to be significantly associated with preterm birth(43). Furthermore, a systematic review including eighteen studies showed that, presence of maternal anemia in pregnancy was associated with preterm birth (aOR =1.56 [95% CI: 1.25-1.95]) (52).

A similar study in Tanzania by Temu *et al* in 2016 found that preterm delivery was associated with factors such as caesarian section mode of delivery, multiple pregnancy, presence of urinary tract infection, induced vaginal delivery and placentae abruptio (38). A study done by Midecha ,in Kenya found that inter-pregnancy interval at or below 2yrs and history of pregnancy induced hypertension (PIH) were factors associated with preterm birth (34).

In summary, obstetric factors have been found to have a significant influence on preterm births. The commonly identified obstetric factors associated with preterm birth as established from literature include, previous history of preterm birth, presence of hypertensive disorders in pregnancy, antepartum hemorrhage, history of abortion and presence of urinary tract infection during pregnancy.

2.2.3. Fetal characteristics

Male gender has been associated with preterm birth as studies show. Female fetuses have a better perinatal survival outcome than male fetuses. According to the global action report on preterm birth for 2012, 55% of all preterm babies were male preterm babies (11). In a cohort study conducted in North America, found that male fetus was more likely than females to be delivered at 33 to 36 weeks gestation. (53). A similar national cohort study in the Netherlands including1,736,615 singleton deliveries, established a higher risk of preterm birth in male fetuses than females (54). The study investigated fetal factors in a woman with spontaneous preterm birth. A study conducted by Gunther *et al*. about the impact of smoking and fetal gender on preterm birth, published in 2021 by Cambridge university press, found that male gender and smoking during pregnancy were independently associated with increased occurrence of preterm birth (55). A study conducted by Zeitlin *et al*., demonstrated that the likelihood of preterm birth was higher in male fetuses (OR: 1.11, 95%CI: 1.09–1.24). According to this study when the time of conception is known using last menstrual period and ultrasound measure, the proportion of male deliveries decreases with increasing gestation. This male excess in preterm birth appears to be strongest for spontaneous preterm births (56). However, in another study conducted in Nigeria by Ezechi et al., female babies accounted for around 55% of preterm births (57). These findings are comparable to a recent study conducted by Muhumed et al. in 2021 which found that being female sex (aOR = 8.32, 95%CI:2.31 – 20.11) and being low birth weight (aOR =3.8, 95%CI:1.21 – 10.31) was significantly associated with preterm births (55).

Another hospital-based study in Ethiopia found visible physical neonatal congenital anomaly (AOR=10.4) was statistically associated with preterm delivery (49). Similar findings were found by Abu Hamad *et al*. that the presence of congenital anomaly was associated with increased risk of preterm birth (50).

In summary most studies did not investigate the association between fetal factors and preterm births. However, few studies have showed a significant association between fetal factors and preterm births. Gender has been significantly identified as a factor associated with preterm birth with literature showing varied results with regards to whether preterm birth is higher in male or female patients.

2.3. Study Justification

Globally prematurity is one of the leading causes of neonatal and under five mortality (55). Preterm birth complications are considered the single largest cause of neonatal deaths, responsible for 35% of the world's 3.1 million deaths of newborns annually (32). Somalia is one of the countries with a high neonatal mortality rate ,at 37 deaths per 1000 live births in 2019 (52) as a result of the existing instability in the country for three decades that led to the collapse of the health system in Somalia. Among these deaths, 23% of them are due to complications related to prematurity (53). In addition, to the health challenges in Low- and Middle-Income Countries (LMICs) reproductive health services have not been fully advanced to control most of the common preventable adverse outcomes such as preterm births.

The burden of preterm birth must be addressed quickly in order to speed up the achievement of SDGs target 3.2 of ending preventable deaths of newborn and reducing the neonatal mortality rate to equal or less than 12 per 1000 live birth by 2030. The lack of data on the problem of preterm birth in Somalia and the fact that reducing and preventing neonatal mortality necessitates a better understanding of the causes linked to prematurity made this study critical. The findings from this study are crucial in helping the Ministry of Health of Somalia plan preventive measures to reduce factors associated with preterm birth and resource allocation to better plan and support care with cost-effective interventions for premature deliveries so as to reduce the neonatal mortality rate.

2.4. Conceptual framework

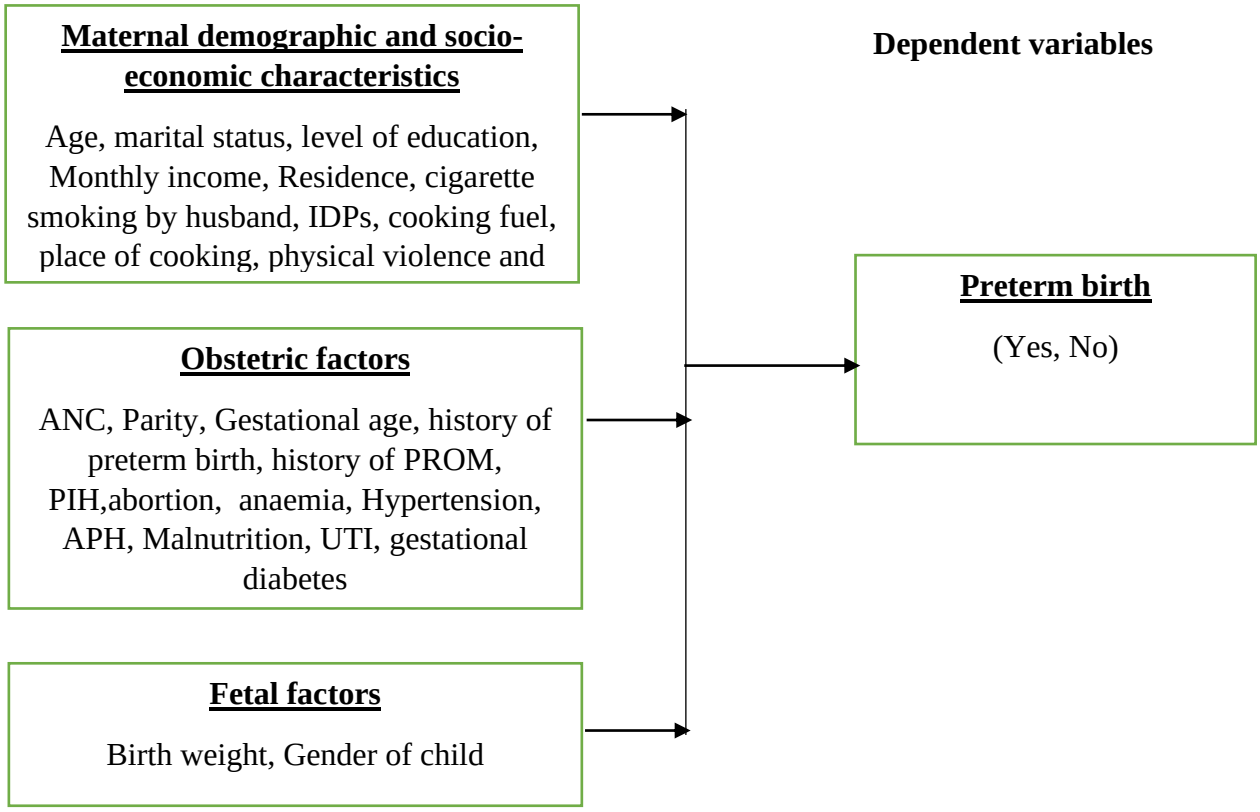
2.4.1. Conceptual framework Narration

Risk factors of interest or independent variables were socio-demographic factors such as age of the mother, marital status, educational status, residence, internally displaced people (IDPs), occupational status of the mother and husband, nutritional status of the mother, socio-economic status based on monthly income, and cigarette smoking. In addition, medical and

Obstetric factors included parity, inter-pregnancy space, number of antenatal visits, PIH, preeclampsia or eclampsia, diabetes, APH, UTI, anemia, previous preterm birth and maternal stress during pregnancy and family dispute, and neonatal factors included Gender and birth weight.

2.4.2. Conceptual Framework Figure

Independent variables



2.5. Research Questions

1. What is the prevalence of preterm birth at Banadir Hospital in Mogadishu-Somalia?
2. What are the risk factors associated with preterm birth at Banadir Hospital in Mogadishu-Somalia?

2.6. Objectives of the study

2.6.1. Primary objective

To determine the prevalence of preterm birth at Banadir hospital in Mogadishu-Somalia

2.6.2. Secondary Objectives

- To determine risk factors associated with preterm birth at Banadir hospital in Mogadishu.

CHAPTER THREE: METHODOLOGY

3.1. Study Design

This study was a hospital based cross-sectional study.

3.2. Study site

The study was conducted at Banadir Hospital, an exclusive mother-and-child hospital and the largest national referral and teaching hospital located in Wadajir District in Mogadishu. Mogadishu is the capital city of Somalia, and its current metro area population in 2021 was 2,388,000. The country was in conflict for nearly three decades, which led to the health system's collapse. The hospital was built in 1977 and gives free service to Mogadishu mothers and children, mostly low- and middle-income people and those referred from other regions in Somalia. The hospital is under the Ministry of Health of Somalia, with support from some international non-governmental organizations. It has three departments: pediatric, maternity, and laboratory. The maternity department offers free treatment services for pregnant women's medical and surgical conditions, including free antenatal care (ANC), where pregnant mothers receive free routine tests such as a hemoglobin test, blood group test, HIV test, hepatitis B test, syphilis test, malaria rapid test, and urine test for protein and infection. The ANC policy of the Ministry of Health of Somalia stipulates that all mothers attend at least four ANC visits, although the policy stipulates up to eight visits and recommends that every pregnant woman start the first ANC visit before 16 weeks of gestation. Deworming tablets (Albendazole) are also issued to pregnant women after the first trimester. Blood pressure measurement and mid-upper arm circumference (MUAC) for maternal nutritional assessment are also done. There is no routine obstetric ultrasound unless there is a complaint such as bleeding, lower abdominal pain, or pregnancy complications. All mothers have antenatal cards for follow-up visits (Appendix IV). An ANC consultation is performed by a medical doctor and midwife. The hospital has approximately 600 to 700

deliveries monthly and a bed capacity of 115 beds in the post-natal ward. There are 25 midwives employed in the maternity unit, as well as student nurses, four obstetrician specialists, and 14 resident doctors. Mothers remain in the postnatal ward for at least 12 hours for normal spontaneous vaginal deliveries before discharge. On admission, all mothers are manually registered in the maternity register book. The paediatric department has different wards, such as the new-born unit (NBU), general paediatric ward, malnutrition ward, isolation ward, and outpatient clinic.

3.3. Study population

The target population included all mothers who delivered live newborns at Banadir hospital during the study period and their newborns.

3.3.1. Inclusion criteria

All Mothers who had a live birth and their newborns at Banadir Hospital –Maternity Unit during the study period were recruited.

3.3.2. Exclusion criteria

All mothers who declined to give consent were excluded.

All mothers who delivered outside Banadir hospital.

3.4. Sample size and sampling

3.4.1. Sample size

Cross-sectional study sample size formula was used to determine the sample size:

$N = Z^2 P (1-P)/D^2$

Where;

N = Sample size required

Z = Standard normal value corresponding to 95% confidence interval is (1.96)

D = the degree of precision desired = 0.04 (4%) or margin of error (used 4% precision just to increase the sample size)

P =Estimated prevalence of preterm birth of 12.3% in Ethiopia Somali regional state published by Muhummed et al. in 2021(43) was used.

For my study:

Z: 1.96

P: prevalence preterm birth 12.3%=0.123

D: 4% =0.04

N: $(1.96)^2$ x0.123 (1-0.123)/ $(0.04)^2$=259»260

Therefore, a sample of 260 pairs of mother-baby dyads were sampled

3.4.2. Sampling technique

The study adopted a consecutive sampling technique. Once the mother met the inclusion criteria and consented to participate in the study, she was enrolled. This occurred consecutively until the sample size was attained in a one-month study period.

Based on the average number of deliveries recorded in Banadir Hospital three months prior to data collection which was 600 deliveries per month, daily 10 participants were recruited consecutively for one-month period until the sample size of 260 attained. 260 participants recruitment over 26days (as Friday is a holiday in Somalia) gives 10 participants to be recruited daily.

3.5. Data collection tool

The principal investigator utilized a structured administered questionnaire to collect data which included three main sections. Section 1 included demographic and socio-economic details; section 2 included obstetric details of the mother. Section 3 included fetal characteristics (Appendix II).

3.6. Data collection procedure

With the help of two research assistants, the principal investigator recruited mothers from the labour ward, postnatal wards, and newborn unit (NBU). This was done within 24 hours of delivery on a daily basis, except for Friday (holiday in Somalia). The first participant was selected based on the first name registered in the maternity register book from the day the research began. Everyday 10 participants were recruited. The names in the register book were consecutively identified until the desired sample size was achieved. The principal investigator or assistant approached mothers in the wards to seek informed written consent. Mothers below 18 years of age consented and assented (Appendix X assent form) to participate in the study. Only those who consented to the study were recruited. (Appendix I).

With the help of research assistants, mothers were asked questions as outlined in the structured questionnaire; extra information was retrieved from their files and ANC cards (Appendix IV).

The newborns were examined physically to determine their gestational age using New Ballard's score (appendix III) and weighed within 24hours of birth using a hospital digital weighing newborn scale which measures to the nearest 0.1g. The digital scale was calibrated every day before use to achieve accurate weighing results. Last menstrual period was also used for gestational age determination since obstetric ultrasound is not routinely used in ANC in Somalia. MUAC-non-stretchable World Food Programme (WFP) tape color code was used to determine mother's nutritional status.,

3.7. Measurements

3.7.1. Nutritional status of the mother

A research assistant used non-stretchable World Food Programme tape to measure Mid-Upper Arm Circumference (MUAC). The participant was required to bend the left arm and

their upper midpoint between the tips of the shoulder and the elbow olecranon process marked, then wrapped a measuring tape around the marked midpoint and recorded MUAC to the nearest 0.1cm (62). A cut off of MUAC <23cm was used in this study to determine nutritional status. In this study all mothers with MUAC less than 23cm were considered malnourished (2). MUAC is a rapid screening tool to monitor pregnancy nutritional status since it is not changed by pregnancy (62).

3.7.2. Gestational age estimation

Last menstrual period and New Ballard score (Appendix III) were calculated to determine the newborn's gestational age. Ballard score is a commonly used technique of gestational age assessment and is based on the neonate's physical and neuromuscular maturity (Appendix III). In this study, gestational age by dates was planned to be used in situations where there is a discrepancy between gestational age by dates and Ballard score, but no discrepancy found in this study. Studies have shown that gestational age by dates has been broadly used in low resource settings (63). Ballard score has also been found to underestimate gestational age more than the last menstrual period and is also affected by the condition of the patient such as birth asphyxia. In a study conducted in Gambia, it was found that postnatal assessment of gestational age by Ballard examination performed poorly compared with ultrasound and last menstrual period (63). Similarly, Rosenberg et al. in a study in Bangladesh found that gestational age by last menstrual monthly period was found to be more reliable (64).

3.8. Quality assurance and control bias

A sample of 10% of collected data was randomly selected and checked for completeness every day during the data collection process. A pretest of data collection tool was done including a 5% of the study sample at Banadir Hospital prior to actual data collection. In addition, the research assistants were trained to collect quality data under the guidance of the principal investigator.

3.9. Data entry and Storage

Data were collected using a research questionnaire tailored to the study's goals. The questionnaire was then uploaded to Google form (https://forms.gle/arGf5nUcTxL42w9Q6) for ease in data collection and entry. The Principal Investigator checked for completeness of the data entry process through randomly reviewing entries made into the system to ensure reliability of the entered data. After data entry, the dataset was exported for analysis. The STATA version 14 software was used for data analysis. The principal investigator stored the exported dataset for future reference and use as secondary data. This data was stored in a password-protected laptop and a cloud server as a backup. The researcher holds exclusive rights to access and sharing of the study dataset.

3.10. Study variables

3.10.1. Dependent Variables

Prevalence of preterm birth among mothers who delivered at Banadir Hospital in Mogadishu was the outcome.

The cut-offs for preterm birth was all live births between ≥ 24 weeks and <37 weeks of completed gestational age.

3.10.2. Independent Variables:

Independent variables in this study included socio-demographic factors (age of the mother, marital status, educational status, residence, IDPs, occupational status of mother and husband and nutritional status of the mother, socio-economic status based on monthly income, cigarette smoking and chewing of khat and family dispute), medical and Obstetric factors included (parity, inter-pregnancy space, number of antenatal visits, hypertensive disorders of pregnancy, diabetes, antepartum hemorrhage (APH), urinary tract infection (UTI), anemia using hemoglobin levels test recorded at admission during delivery for all mothers as the

policy of the hospital stipulate, previous preterm birth and emotional stress during pregnancy) and newborn factors(gender of newborn and birth weight). All were independent variables that were addressed in this study.

3.11. Recruitment of research assistants

The principal investigator recruited two research assistants: one intern doctor and one midwife working in Banadir Hospital. The principal investigator trained the research assistants to ensure accurate data collection. The research assistants were trained on the use of MUAC scale, Ballard's score and digital weighing scale, and obtaining consent and administering data collection tool.

3.12. Pilot test

A pilot test using 5% of the study sample was done in the same hospital, Banadir Hospital before commencement of actual data collection. The pilot test helped understanding the data collection tool and identified any challenges in the data collection process. All issues that were identified such as ambiguity in some of the questions were corrected prior to the start of the actual data collection process.

3.13. Data Analysis

STATA version 14 was used in data analysis. The confidence interval was assessed at 95%.

Demographic characteristics

Categorical and continuous variables were used in descriptive analysis. Frequencies and percentages were used to analyze categorical variables. The mean (Standard deviation (SD) and median (Interquartile range (IQR). was used to analyze continuous variables

Objective 1: To determine prevalence of preterm births

The prevalence of preterm birth was calculated as a frequency of preterm births over the total sample size of 260 with the 95% Confidence interval.

Objective 2: To determine maternal and neonatal factors associated with preterm birth

Bivariate analysis

A logistic regression was used to test for associations between maternal socio-demographics, clinical characteristics, obstetric risk factors, fetal factors and preterm births. Odds ratios were obtained to determine the extent of the association between independent and dependent variables.

Multivariate analysis

A multivariable logistic regression was conducted to determine risk factors associated with preterm births. In addition, adjusted odds ratio was calculated to determine independent factors associated with preterm births.

3.14. Ethical consideration

The study sought approval from KNH-UoN Ethics committee (P133/02/2022 – Appendix V) and Ministry of Health of Somalia (Appendix VII) which reviewed the ethical aspects of the study. Permission to conduct the study was obtained from Banadir hospital administration (Appendix VI). By using of serial numbers, the confidentiality, anonymity, and privacy were fully guaranteed throughout the study. Ensuring the security of the physical copy of documents, they were stored in a lockable cabinet and the data storage devices such as USB and external hard disk was done by imputation of a password known to the researcher only. This helped maintain confidentiality and security of data. Information collected remained confidential and was used exclusively for the study. Respondents were given unique serial number to ensure that they were not enrolled twice into the study and for confidentiality purposes.

The recruited participants into the study were required to sign consent to show their agreement with the study protocols and processes. Those who did not consent were excluded

from the study. All the Covid-19 prevention guidelines were observed to control cross infection among research assistants and participants. Strict confidentiality and anonymity were observed when collecting, storing, processing data, and handling the results.

3.15. Dissemination of results

The findings from the study were presented to the University of Nairobi, Department of Paediatrics and Child Health. The findings will also be presented to Banadir hospital and Ministry of Health of Somalia, division of planning and research and ethics department. In addition, an international peer reviewed journal will be used to publish the study findings to improve knowledge on the current status of reproductive health in Somalia.

CHAPTER FOUR: RESULTS

A total of 260 mothers who delivered a live birth and their new-borns were enrolled in this study over a one-month period commencing from August 21st, 2022, to September 18th, 2022; of which 254/260 (97%) were singleton deliveries. A total of 262 mothers were approached; two were excluded because one mother declined consent and the other mother delivered outside Banadir hospital (Figure 1).

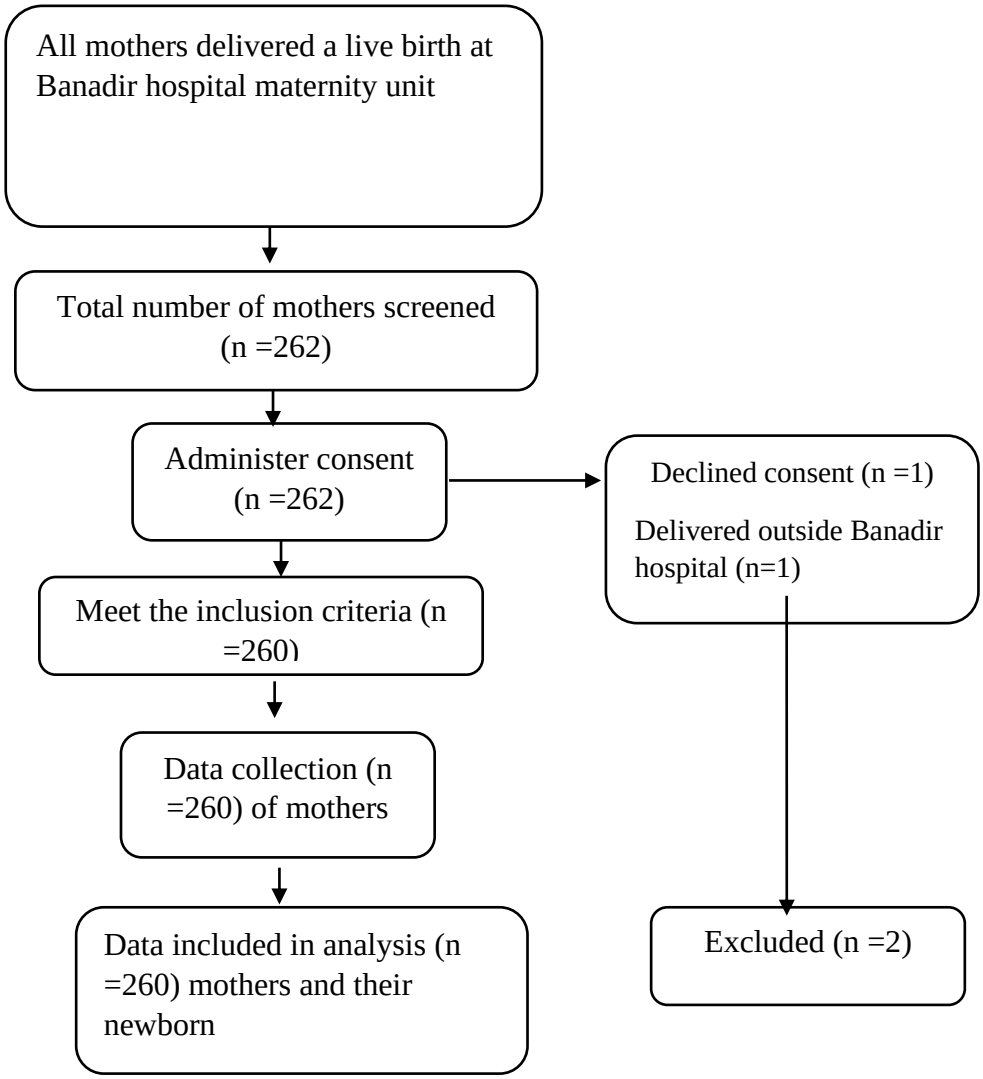


Figure 1: Flow chart showing recruitment process for study participants

4.1. Descriptive characteristics of Mothers included in the study population

4.1.1. Demographic and socio-economic characteristics of mothers in the study

The demographic and socio-economic characteristics of the study participants are shown in Table 2. The average maternal age was 26.1 (SD 6.6) years, with 192 (73.8%) aged between 19 and 35 years and 244 (93.8%) were married. The majority of the respondents, 244 (93.8%), were unable to read and write, and 209 (80.4%) of the participants were housewives. About two-thirds (174/260; 66.9%) had monthly family income between 101 and 200 USD per month. Most of the respondents, 230 (88.5%), were using charcoal as fuel for cooking, and 221 (85%) were cooking in the kitchen, 31(11.9%) of mothers had a husband who was a smoker.

Table 2:Demographic and socio-economic characteristics of mothers in the study

Maternal factors	Frequency	Percent
Age (Mean ±SD)	26.1(±6.6)	
15-18 years	42	16.2
19 - 35 years	192	73.8
35-42 years	26	10
Marital status*		
Married	244	93.8
Divorced/Separated	16	6.2
Maternal education level		
Unable to read and write	235	90.4
Completed primary	20	7.7
Secondary or higher	5	1.9
Maternal occupation		
Casual laborer/street seller	35	13.5
Formal employment	5	1.9
House-wife	209	80.4
Self-employment/Business	11	4.2
Family size (Mean ±SD) members	5.9(±2.8)	
<4 members	63	24.2
4- 7 members	122	46.9
More than 7 members	75	28.8
Physical violence during pregnancy		
Yes	19	7.3
No	241	92.7
Family dispute during pregnancy		
Yes	29	11.2
No	231	88.8
Monthly family income		
≤100 USD	18	6.9
101 - 200 USD	174	66.9
>200USD	68	26.2
Residence		
IDP Camps	12	4.6
Non-IDPs	248	95.4
Type of fuel used		
Charcoal	230	88.5
Firewood	22	8.5
Gas	8	3.1
Cooking with firewood and charcoal		
In the kitchen	221	85
In the living room	39	15
Husband factors (n= 260)		
Husband occupation		
Unemployed	3	1.2
Casual/street seller	139	53.5
Formal or private Employed	118	45.4
Husband smoke cigarette		
Yes	31	11.9
No	229	88.1
Smoke in the house (n =31)		
Yes	19	61.3
No	12	38.7

***Family size**: It is the total number of individuals within a household which include children, spouses and grandparents if present.*

***Marital status:** There were no mothers who did not have partners to take responsibility of their children.*

***IDP** – internally displaced people*

**Age group based on the risk of pregnancy: 15–18 years old (adolescents) and older than 35 years pregnant women are considered a high-risk pregnancy whereas 19-35 years low risk*

4.1.2. Obstetric factors of mothers included in the study population

4.1.2.1. Previous pregnancy characteristics of mothers included in the study

Most, 199/260 (76.5%) of the mothers in the study were multiparous. Among multiparous women, 176 (88.5%) had alive babies in their last previous pregnancy. Further, of the multiparous women, 23/199 (11.6%) had a history of preterm birth, and 30/260 (11.5%) of mothers had a history of miscarriage, 106(54.4%) of multiparous mothers had a pregnancy interval of 13-24 months, whereas 8.2% had a pregnancy interval of ≤ 12 months as shown in Table 3.

Table 3: Previous (last) pregnancy characteristics of mothers included in the study population

Previous pregnancy factors	Frequency (n =260)	Percentage
Parity		
Primiparous	61	23.5
Multiparous		
<4	88	44.2
≥4	111	55.8
Outcome of previous pregnancy		
Alive	176	88.4
Dead	23	11.6
History of preterm birth		
Yes	23	11.6
No	176	88.4
History of miscarriage*		
Yes	30	11.5
No	230	88.5
Previous caesarean section		
Yes	24	12.1
No	175	87.9
Pregnancy interval (Mean, SD)Months	27±13	
≤12 months	16	8.2
13 - 24 months	106	54.4
25 - 36 months	51	26.2
>36 months	22	11.3

SD: Standard deviation, CS: Caesarean section

**Miscarriage: pregnancy loss before 24 weeks' gestational age*

4.1.2.2. Index pregnancy characteristics of mothers in the study* (n=260)

In investigating index pregnancy characteristics, 11/260 (4.2%) of mothers had a history of hypertensive disorders in pregnancy (HDP), 13/(5.0%) had antepartum haemorrhage (APH), 120/260 (46.2%) had a history of urinary tract infections (UTI) based on self-reported symptoms such as burning micturition and dysuria, 20/(7.7%) had malaria infection tested on a rapid diagnostic test and blood slide, and 30/(11.5%) had a history of premature rupture of membrane (PROM). Further, 194/260 (74.6%) of the respondents stated that their respective pregnancies were planned, and 10/260 (3.8%) of the participants had no ANC attendance. Among those with fewer than four ANC visits, 228/260 (88%) had fewer than two ANC visits, and 221 (85%) of the mothers had been given iron-folic acid supplements. Among these, 184 (83.3%) were given iron and folic supplements starting in their 2^{nd} trimester. Further analysis showed that 120 (46.2%) had anaemia (HGB less than 10 g/dl) based on a full haemogram at the time of delivery. The results of HGB at admission and before transfusion HGB were retrieved from the patient's file. The majority, 241 (92.7%), had SVD, as shown in Table 4.

Table 4: Index pregnancy characteristics of mothers in the study* (n=260)

Index pregnancy factors	Frequency N= 260	Percentage
Presence of HDP	11	4.2
Presence of APH	13	5
History of UTI	120	46.2
Malaria infection	20	7.7
History of PROM	30	11.5
HIV status		
Negative	258	99.2
Unknown	2	0.8
Chronic illnesses(HTN,DM)	1	0.4
Presence of STD		
Yes	13	5
No	247	95
Type of pregnancy		
Singleton	254	97.7
Twin or more(multiple)	6	2.3
Pregnancy planned		
Yes	194	74.6
No	66	25.4
ANC attendance(n=260)		
Yes	250	96.2
No	10	3.8
Number of visits (n=250)		
One time	40	16.0
Two times	188	75.3
Three times	17	6.8
≥ 4 times	5	1.9
Iron and folic acid supplement given		
Yes	221	85
No	39	15
Time iron and folic supplements given(n =221)		
Before pregnancy	4	1.8
1st trimester	11	5
2nd trimester	184	83.3
3rd trimester	22	9.9
HGB levels recorded		
Equal or above 10mg/l	141	54.2
Mild (9 – 10 gm/dL)	92	35.4
Moderate (7 – 8.9gm/dL)	20	7.7
Severe (<5 gm/dL)	7	2.7
Mode of delivery		
SVD	241	92.7
CS	19	7.3
Stress during pregnancy		
Yes	79	30.4
No	181	69.6
Ultrasound based diagnosis (n =15)		
Polyhydramnios	4	26.7
Oligohydramnios	11	73.3

HDP: Hypertensive Disorders in pregnancy, APH: Antepartum hemorrhage, UTI: Urinary Tract Infection, PROM: Premature rupture of membrane, HTN: Hypertension, DM: Diabetes

Mellitus, STD: Sexually transmitted disease,HGB: haemoglobin level, SVD: Spontaneous vaginal delivery

** Multiparous women: women who have given birth to more than one child at gestation age. **miscarriage. - foetus delivered at less than 24 weeks gestational age*

**Index pregnancy: pregnancy that is being discussed in the study (current pregnancy)*

4.1.3. Fetal characteristics of neonates born to the mother in the study population

Two hundred and sixty-six new-borns, including six twins were examined based on their physical and neuro-muscular maturity using New Ballard score. Gestational age was determined using last normal menstrual period and New Ballard score calculation. New-borns categorized according to gestational age into term babies (> 37 completed weeks gestational age) and preterm babies (<37 weeks' gestational age).

4.2. The prevalence of preterm birth at Banadir hospital in Mogadishu-Somalia

There were 27 preterm births among 260 mothers delivered live births enrolled in the study. Thus, giving a prevalence of preterm births of 10.4%, 95%CI: 7.0 % - 14.8%, as shown in Figure 2. The average gestational age for preterm births was 33.8(SD±2.4) weeks, range (30 – 36) while mean gestational age for term births was 38.9(SD±1.1) weeks, and range (37 – 42).

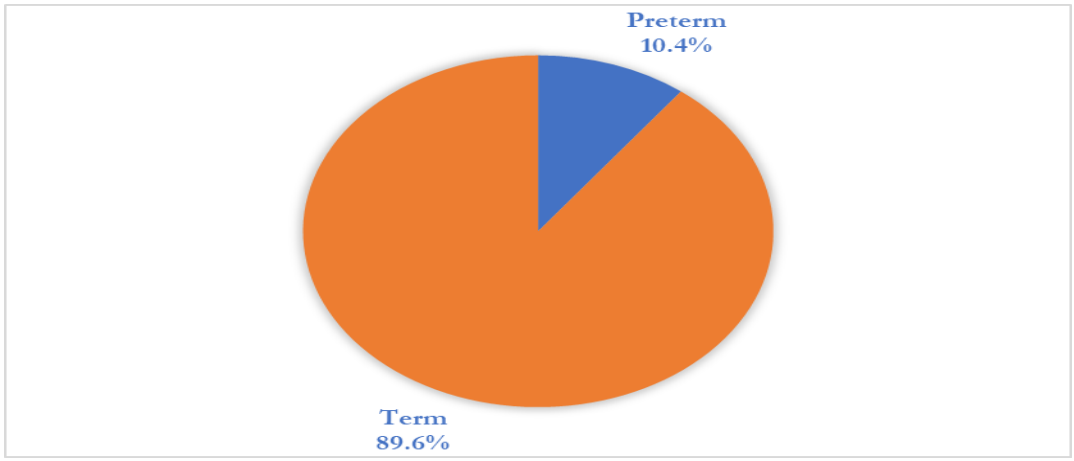


Figure 2: Prevalence of preterm birth at Banadir hospital in Mogadishu-Somalia

4.2.1. Categories of preterm birth according to gestational age (n =27)

Among the 27 preterm births, 21(77.8%) were moderate to late preterm (32weeks-<37weeks), and 6(22.2%) were very preterm, while there were no extreme preterm (< 28

weeks) gestational age as shown in Figure 3. Among the 27 preterm mothers, 11 were below 34weeks GA, out of whom 8/11.(72.3%) were given antenatal corticosteroids.

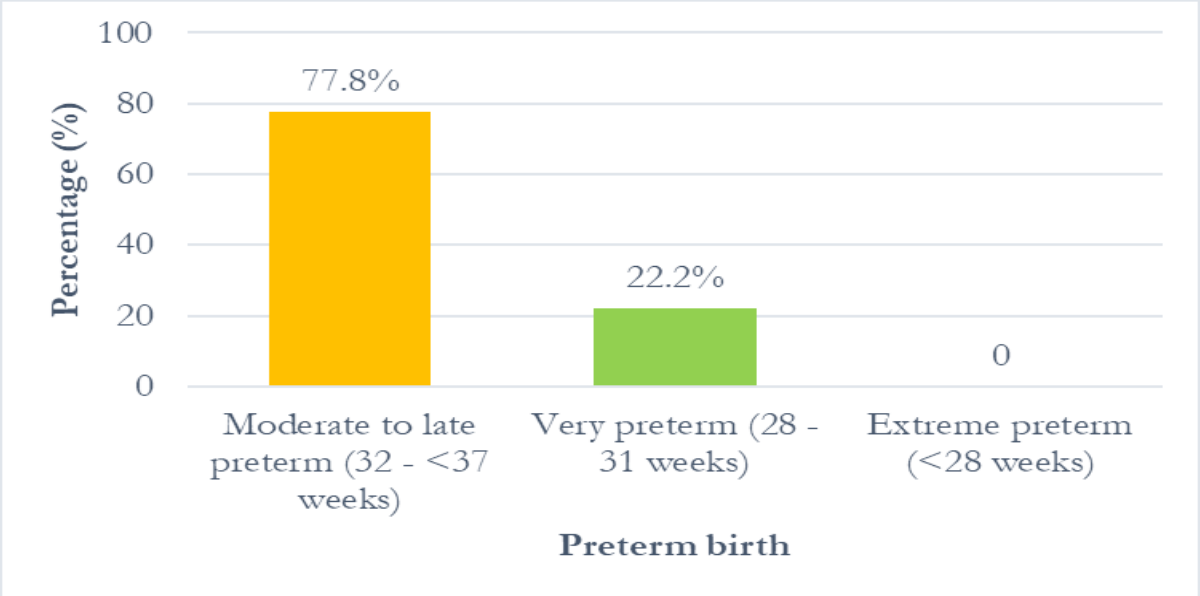


Figure 3: Categories of preterm birth according to gestational age

4.2.2. Categories of preterm birth according to birth weight (n =27)

Among the preterm births, 63 %(n =17) were low birth weights between 1500 – 2499g at birth, of the 17, 47.1%(n =8) weighed between 1500 – 2000g, 22.2 % (6/27) were very low birth weights between 1000 – 1499g, and 14.8% (4/27) were normal birth weight ≥2500g ,while there was no extreme low birth weight (<1000g) because there was no extreme preterm birth in this study as shown in Figure 4.

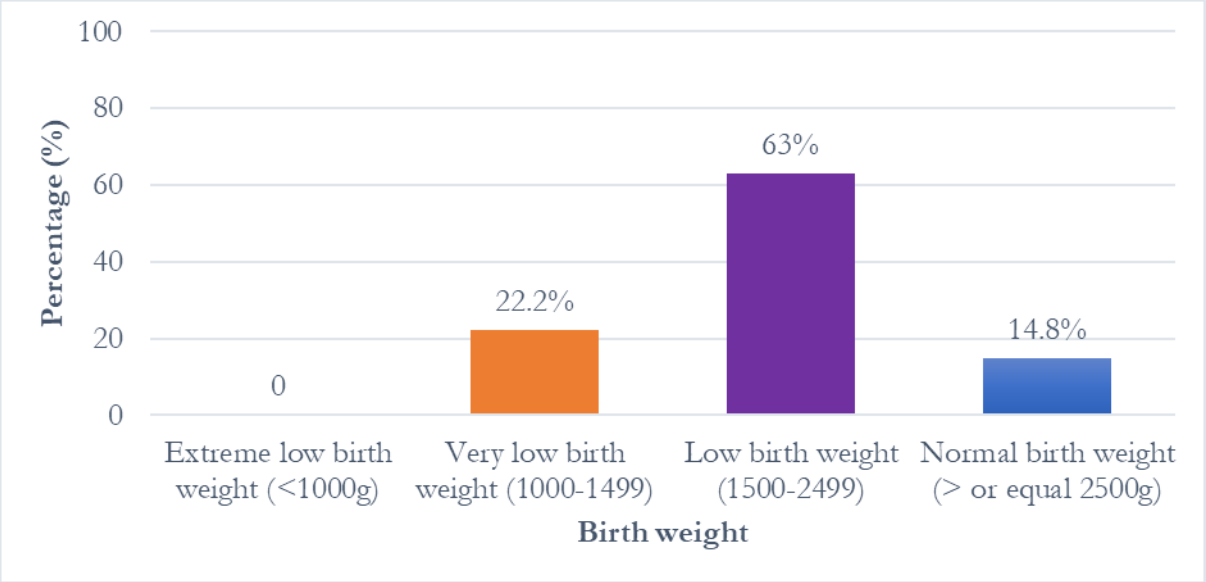


Figure 4: Categories of preterm births according to birth weight

4.2.3. Gender of the new-borns

More than half, 138/260(53.1%) of the new-borns were male while 122/260(46.9%) were female. The majority of the preterm babies were male 18/27(18/27; 66.6%).as shown in Figure 5.

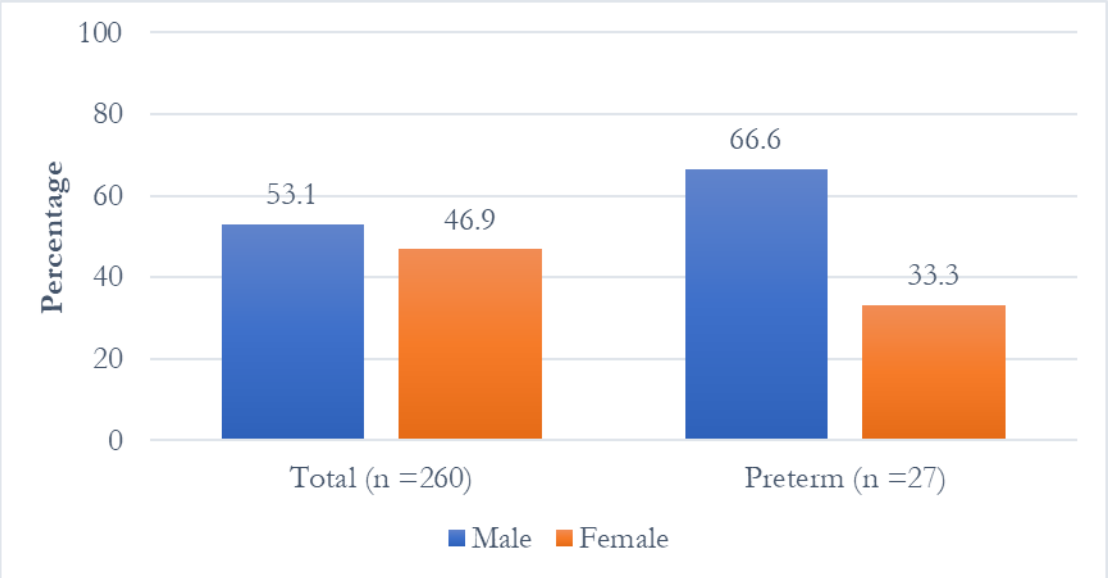


Figure 5: Gender of new-borns at Banadir Hospital

4.2.4. Birth weight of newborns included in the study(n =260)

The majority of the new-borns, 233 (89.6%), weighed more than or equal to 2500g, 21/260(8.1%) weighed between 1500 to 2499g, Further, 6(2.3%) weighed between 1000 and 1499g, as shown in Figure 6.

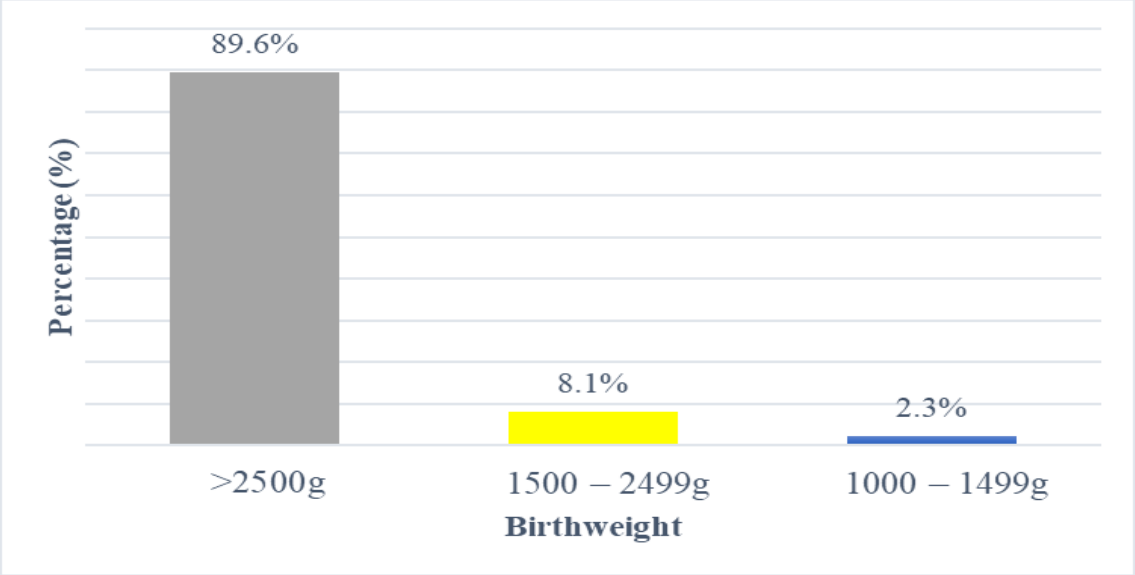


Figure 6: Birth weight of preterm infants born at Banadir Hospital

4.3. The risk factors associated with preterm birth –Bivariable analysis

4.3.1. Demographic and socio-economic factors associated with preterm births

Those who had a family size of < 4 members were 87% less likely to have preterm births compared to those who had more than 7 members, Crude Odds Ratios(COR =0.13, 95%CI: 0.03–0.61, p =0.010. Those who had family members ranging from 4 to 7 were 79% less likely to have preterm births compared to those who had more than 7 family members, COR =0.21, 95%CI: 0.05–0.96, p =0.044. A respondent who had husband smoking cigarette had a 4 times higher likelihood of having a preterm birth compared to those who did not have husbands who smoke cigarette (COR =3.84, 95% CI: 1.52–9.76, p = 0.07). Further analysis showed that those who were cooking with charcoal and firewood in the kitchen were 85% less likely to have a preterm birth compared to those who were cooking in the living room, COR =0.15, 95%CI: 0.07–0.36, p0.001.as shown in Table 5.

Table 5: Demographic and socio-economic factors associated with preterm births

Factors	Preterm n (%)	Term n (%)	COR(95%CI)	P-value
Age				
≤18 years	9(21.4)	33(88.6)	0.15(0.02 - 1.24)	0.077
19 - 35 years	17(8.9)	175(91.1)	0.41(0.05 - 3.23)	0.399
>35 years	1(3.8)	25(96.2)	Ref	
Level of education				
Unable to read and write	24(10.2)	211(89.8)	0.79(0.22 – 2.85)	0.724
Completed primary level or higher	3(15.0)	22(85.0)	Ref	
Marital status				
Married	25(10.2)	219(89.8)	0.80(0.17 - 3.72)	0.676
Divorced	2(12.5)	14(87.5)	Ref	
Maternal occupation				
Housewife	22(10.5)	187(89.5)	0.57(0.07 - 4.50)	0.591
Street vendor/Casual	4(11.4)	31(88.6)	0.52(0.05 - 5.03)	0.57
Employed	1(6.3)	15(83.7)	Ref	
Family size				
<4 members	11(17.5)	52(82.5)	0.13(0.03 - 0.61)	0.01
4- 7 members	14(11.5)	108(88.5)	0.21(0.05 - 0.96)	0.044
More than 7 members	2(2.7)	73(97.3)	Ref	
Monthly family income				
≤100 USD	2(10)	16(90)	0.77(0.14 - 4.20)	0.767
101 - 200 USD	19(10.9)	155(89.1)	0.79(0.30 - 2.07)	0.631
>200USD	6(8.8)	62(91.2)	Ref	
Residence				
IDP camps	1(5.6)	11(94.4)	0.78(0.10 - 6.26)	0.64
Non-IDP camps	26(10.5)	222(89.5)	Ref	
Physical violence				
Yes	1(5.3)	18(94.7)	0.46(0.06 - 3.58)	0.703
No	26(10.8)	215(89.2)	Ref	
Family dispute during pregnancy				
Yes	1(3.4)	28(96.6)	0.28(0.04 - 2.16)	0.33
No	26(11.3)	205(88.7)	Ref	
Husband smoking cigarette				
Yes	8(25.8)	23(74.2)	3.84(1.52 - 9.76)	0.007
No	19(8.3)	210(81.7)	Ref	
Smoke in the house				
Yes	5(26.3)	14(73.7)	1.07(0.20 - 5.63)	0.638
No	3(25)	9(75)	Ref	
Husband chew khat				
Yes	4(13.3)	26(86.7)	1.39(0.44 - 4.32)	0.53
No	23(10)	207(90)		
Use firewood for cooking				
Yes	4(18.2)	18(81.8)	2.08(0.65 – 6.66)	0.262
No	23(9.7)	215(90.3)	Ref	
Use charcoal for cooking				
Yes	22(9.6)	208(90.4)	0.53(0.18 - 1.52)	0.215
No	5(16.7)	25(83.3)	Ref	
Cooking with firewood and charcoal				
In the kitchen	14(6.4)	204(93.6)	0.15(0.07 - 0.36)	<0.001
In the living room	13(44.8)	29(45.2)	Ref	

IDPs: Internally Displaced Persons

4.3.2. Previous pregnancy characteristics associated with preterm births

There was no statistically significant association between previous pregnancy factors studied and preterm birth in this study as shown in Table 6.

Table 6: Previous pregnancy characteristics associated with preterm births

Factors	Preterm n(%)	Term n(%)	COR(95%CI)	P-value
Primiparous				
Yes	9(14.8)	52(85.2)	1.74(0.74 - 4.10)	0.23
No	18(9.0)	181(91.0)	Ref	
Multiparous				
<4	11(12.5)	77(87.5)	2.12(0.79 - 5.73)	0.143
≥4	7(6.3)	104(93.5)	Ref	
Outcome of previous pregnancy				
Alive	13(7.6)	159(92.4)	0.36(0.12 - 1.11)	0.076
Dead	5(18.5)	22(81.5)	Ref	
History of preterm birth				
Yes	4(17.4)	19(82.6)	2.44(0.73 – 8.16)	0.137
No	14(8.0)	162(92.0)	Ref	
History of miscarriage				
Yes	5(16.7)	25(83.3)	1.89(0.66 - 5.44)	0.215
No	22(9.6)	208(90.4)	Ref	
History of caesarean section delivery				
Yes	2(8.3)	22(91.7)	0.77(0.17 - 3.46)	0.534
No	25(10.6)	211(89.4)	Ref	
Pregnancy interval				
<24 months	9(11.5)	69(88.5)	1.62(0.61 - 4.29)	0.326
≥24 months	9(7.4)	112(92.6)	Ref	

4.3.3. Index pregnancy characteristics associated with preterm births

Findings from binary logistic regression revealed that those who had a history of HDP were 9 times more likely to have preterm births compared to those without HDP, COR =8.60, 95%CI: 2.43–30.46, p =0.002. Further, those who had a history of APH were six times more likely to have preterm births compared to those who did not have APH (COR =6.39, 95% CI: 1.93–21.22, p = 0.06). In addition, those who had multiple pregnancies were 9.6 times more likely to have a preterm birth compared to those with singleton deliveries. COR =9.58, 95%CI: 1.83–50.13, p =0.007. Those with oligo-hydramnios were 5.6 times more likely to have preterm births compared to those without; COR =5.62, 95%CI: 1.53–20.63, p =0.018 as shown in Table 7.

Table 7: Index pregnancy characteristics associated with preterm births

Factors	Preterm n(%)	Term n(%)	COR(95%CI)	P-value
Presence of HDP				
Yes	5(45.5)	6(55.5)	8.60(2.43 - 30.46)	**0.002**
No	22(8.8)	227(91.2)	Ref	
Presence of APH				
Yes	5(38.5)	8(61.5)	6.39(1.93 - 21.22)	**0.006**
No	22(8.9)	225(91.1)	Ref	
History of UTI				
Yes	15(12.5)	105(87.5)	1.52(0.68 - 3.40)	0.316
No	12(8.6)	128(91.4)	Ref	
Presence of STD				
Yes	2(15.4)	11(84.6)	1.62(0.34 - 7.70)	0.632
No	25(10.1)	222(89.9)	Ref	
History of malaria				
Yes	3(15)	17(85)	1.59(0.43 - 5.82)	0.449
No	24(10.0)	216(90.0)	Ref	
History of PROM				
Yes	6(20.0)	24(80.0)	2.49(0.92 - 6.77)	0.102
No	21(9.1)	209(90.9)	Ref	
Type of pregnancy				
Singleton	24(9.8)	230(90.2)	Ref	
Multiple	3(50.0)	3(50.0)	9.58(1.83 – 50.13)	**0.007**
Pregnancy planning				
Yes	20(10.3)	174(89.7)	0.97(0.39 - 2.41)	0.553
No	7(10.6)	59(89.4)	Ref	
ANC attendance				
Yes	25(10.0)	225(90.0)	0.44(0.09 - 2.21)	0.278
No	2(20.0)	8(80.0)	Ref	
ANC visits*				
≤2 visits	21(9.2)	207(90.8)	0.46(0.14 - 1.48)	0.252
>2 visits	4(18.2)	18(81.8)	Ref	
Fero-folic Supplement given				
Yes	25(13.3)	196(86.7)	2.36(0.54 - 10.39)	0.392
No	2(5.1)	37(94.9)	Ref	
Oligohydramnios				
Yes	4(36.4)	7(63.6)	5.62(1.53 - 20.63)	**0.018**
No	23(9.2)	226(90.8)	Ref	
Polyhydramnios				
Yes	0	4(100)	-	
No	27(10.5)	229(89.5)		
Anemia				
Yes	11(9.2)	109(90.8)	0.78(0.35 - 1.76)	0.684
No	16(11.4)	124(87.6)	Ref	
Severity of anemia based on HB levels				
Mild (9– 10gm/dL)	8(8.7)	84(91.3)	0.76(0.19 - 3.10)	0.711
Moderate (7– 8.9gm/dL)	2(10)	18(80)	1.11(0.22 - 5.58)	0.585
Severe (<7gm/dL)	1(14.3)	6(85.7)	1.70(0.19 - 15.57)	0.502
Mode of delivery				
SVD	25(10.4)	216(89.6)	0.98(0.22 - 4.51)	0.611
CS	2(10.5)	17(89.5)	Ref	
Stress during pregnancy				
Yes	11(13.9)	68(86.1)	1.69(0.74 - 3.78)	0.267
No	16(8.8)	165(91.2)	Ref	
MUAC				
≤ 23cm	1(20.0)	4(80.0)	2.20(0.24 - 20.45)	0.425
>23cm	26(10.2)	229(89.8)	Ref	

** the number of ANC visit > 4 was just 5 in this study and cannot be used in association analysis to make a meaningful impact on preterm deliveries, so ≤ 2 and >2 was used for association*

MUAC: mid-upper arm circumference

4.3.4. Fetal characteristics associated with preterm birth

In this study, there was no statistically significant association between new-born characteristics (gender) and preterm births, as shown in Table 8.

Table 8: New-born characteristics associated with preterm birth

Factors	Preterm n(%)	Term n(%)	COR(95%CI)	P-value
Gender of the child				
Male	18(13.0)	120(87.0)	1.88(0.81 - 4.36)	0.157
Female	9(7.4)	113(92.6)	Ref	

4.4. Multivariable analysis of factors associated with preterm births

The multivariable analysis included variables (p< 0.05) in the bivariable analysis. Thus, family size, husband smoking cigarette, cooking with firewood and charcoal in the living room, presence of HDP, presence of APH, multiple pregnancy, and oligohydramnios variables were included in the model. Those who had a family size of ≤ 3 family members were 94% less likely to have preterm birth compared to those with more than 7 members; AOR =0.06, 95%CI: 0.01– 0.39, p =0.003. Those with husbands who were cigarette smokers were six times more likely to have preterm birth compared to those whose husbands were not cigarette smokers; AOR = 6.01, 95%CI: 1.56–23.13, p=0.009. Those who were cooking in the kitchen were 83% times less likely to have preterm birth compared to those who were cooking in the living room; AOR =0.17, 95%CI: 0.06–0.50, p = 0.001. Patients who were diagnosed with HDP were 9 times more likely to have a preterm delivery compared to those without HDP; AOR =8.70, 95%CI: 1.83–41.36, p =0.007. Women who had multiple pregnancies were five times more likely to have preterm birth compared to those with singleton pregnancies (AOR =5.02, 95%CI: 2.13–19.19, p 0.001), as shown in Table 8.

Table 9: Multivariable analysis of factors associated with preterm births

	AOR(95%CI)	P-value
Family size		
<4 members	0.06(0.01 - 0.39)	**0.003**
4- 7 members	0.28(0.05 - 1.48)	0.134
More than 7 members	Ref	
Husband smoke cigarette		
Yes	6.01(1.56 - 23.13)	**0.009**
No	Ref	
Cooking with firewood and charcoal		
In the kitchen	0.17(0.06 - 0.50)	**0.001**
In the living room	Ref	
Presence of HDP		
Yes	8.70(1.83 - 41.36)	**0.007**
No	Ref	
Presence of APH		
Yes	4.88(0.86 - 27.7)	0.073
No	Ref	
Pregnancy type		
singleton	Ref	
Multiple	5.02(2.13 - 19.19)	**<0.001**
Oligohydramnios		
Yes	3.87(0.74 - 20.32)	0.109
No	Ref	

To control or adjust the multiple comparison problems, the Holm-Bonferroni formula was calculated and all were significant and reject the null hypothesis of above hypothesis tests in table 9

The formula to calculate the Holm-Bonferroni is:

$$\frac{\text{Target Alpha Level}}{\text{n - rank number of pair (by degree of significance) + 1}}$$

Where:

- Target alpha level = overall alpha level (usually .05),
- n = number of tests.

Where P-values ordered from smallest to greatest in table 9 significant tests, the greatest p-values was 0.009 which is rank 5 in the order, so 0.05/5-5+1=0.05

The p-value of .009 *is* less than 0.05, so the null hypothesis for H 5 is rejected.

CHAPTER FIVE: DISCUSSION

This section discusses the findings from the present study comparing with previous studies about the prevalence and factors associated with preterm birth. The studies that have been included are from regional, continental and global context to help understand the concept of preterm birth.

5.1. Prevalence of preterm birth

The findings from the current study about the prevalence of preterm birth was 10.4%. This is comparable to several hospital based studies done within the east African context such as Dagnew et al. (65) in Amhara region Ethiopia and Muhumed et al in Somali region of Ethiopia. (43) , which found that the prevalence of preterm birth was 11.4%, 12.3% respectively. In addition, a systematic review conducted in Ethiopia, including hospital-based studies also found that pooled prevalence of preterm birth was 10.48% (32). Similarly, these results are consistent with a global preterm birth prevalence of about 11%, though this is a population-level estimate (12,66). A hospital based study in Northeast Thailand also showed the prevalence of preterm birth of 10.8% (28). Comparable findings were also found in Latin America in a study conducted by Do Carmo Leal *et al*. in Brazil, which found that the prevalence of preterm births was 11.5% (30). The present results however, were higher compared to a study done in Bhutan which found a prevalence of 6.4% (67). The difference could be due to the adequacy of ANC in Bhutan, where 95 percent of mothers in their study had ANC, whereas, in our study, 91% of mothers had 2 ANC visits. The Bhutan study used second or third-trimester obstetric ultrasound to calculate gestational age, which underestimated or overestimated actual preterm births in their study, whereas WHO recommends early pregnancy ultrasound before 24 weeks for accurate gestational age ascertainment (68). In setting where hospital delivery is not universal such as Somalia– the term babies might be born at home increasing prevalence of preterm birth in hospitals.

Studies in high-income countries have also depicted a lower prevalence of preterm births(31,45). A seven-year hospital-based retrospective study in Italy revealed that the prevalence of preterm of 7.8%. Comparably, another hospital-based research in Spain by Hidalgo-Lopezosa *et al*. revealed that the prevalence of preterm births was 6.7% (45). The lower prevalence of preterm birth in high-resource settings could be attributed to advanced care, where underlying causes of preterm birth are addressed during antenatal care, which is essential for improved pregnancy outcomes.

The present findings have shown a lower prevalence of preterm birth than other studies (33,34,37,69,70). Wagura et al., in a study done in Kenya at Kenyatta National Hospital, established that out of 322, the preterm birth prevalence was 18.3% (33). Similarly, another study in rural Kenya in Kakamega revealed that the prevalence of preterm birth was 18.6% (34). In Nigeria, the prevalence of preterm birth was 16.9% (37), and in Ghana, the prevalence of preterm birth was 14.1% (70). The higher prevalence of preterm birth in these settings is due to study setting, duration and could be due to seasonality associated with preterm birth, as the spring is associated with high preterm birth (71), as in Nigeria and Ghana, the study period was five years and one year, respectively, compared to one month period in the present study, though the Wagura study was similar with the current study in duration. The findings from the present study established that among those who had preterm births, 77.8% had moderate to late preterm (32 – < 37 weeks), 22.2% had very preterm (28 – 31 weeks), and none of the preterm births was extreme preterm. Lack of extreme preterm birth in this study could be due to most mothers in this study sought ANC care late. It could also be due to the extreme and very preterm deliveries occurred at home and could it be immediate death before New Ballard score examination done due to lack of service for extreme preterm at Bandir hospital such as surfactant and caffeine and the overall prevalence of extreme preterm birth in all studies were low. These findings were comparable to Wagura

et al., which found that the majority of the preterm birth (62%) were late preterm, 19% were moderate preterm, 16% were very preterm and 3% were extremely preterm (17). These findings align with those from a study conducted in Nigeria, 61.2% of preterm births were moderate preterm, 22.1% were later preterm, and 16.7% were early preterm (72). Similarly, another hospital-based cross-sectional study conducted in India established that 88% of preterm births were late preterm, 7% were moderate (32 – 33 weeks of gestation), and 5% were early preterm (73).

5.2. Socio-demographic factors associated with preterm birth

The findings from the present study show that family size was significantly associated with preterm births. The study revealed that mothers in families with less than four members were less likely to have preterm births. These findings are comparable to a hospital-based cross-sectional study in Ethiopia, which shows Families with a size of four or more members were associated with an increased risk of preterm birth (65). Similarly, another study conducted in Ethiopia by Bekele *et al*. also showed that mothers from families with less than five members were less likely to have preterm birth (74). These findings illustrate that women with large families (>4 members) may be at increased risk of preterm birth compared to those with smaller families. This may be due to a number of factors, including the stress associated with caring for multiple children, limited resources, and less access to healthcare because of the need to care for many people within the household.

The present study also revealed that women with husbands smoking cigarettes were six times more likely to have preterm births. These findings are comparable to a study conducted in Iran by Mojibyan et al. which revealed that second-hand smoke exposure by pregnant women was significantly associated with early preterm delivery (75). Another study in China by Wang et al. revealed that the risk of preterm birth among women whose husbands were smokers increased with an increasing number of daily cigarettes (76). Similarly, another

study conducted in Vietnam investigating second-hand smoke's effect on pregnancy established a significant relationship between second-hand smoke and preterm birth (77). Among women whose husbands were smoking in the present study, 61.3% of them affirmed that their husbands used to smoke in the house, which increased exposure to second-hand smoke. This means that they inhaled the smoke passively during pregnancy, which could increase risk. Smoking causes vasoconstriction, or narrowing of blood vessels, which can reduce blood flow to the uterus and placenta. This can lead to decreased oxygen and nutrient supply to the developing fetus, which can cause growth restriction and other complications such as preterm deliveries (78). Further, smoking can also lead to inflammation and oxidative stress, damaging the developing fetus and increasing the risk of preterm birth. In addition, smoking during pregnancy is associated with a higher risk of placental abruption. This serious complication can cause preterm birth and other health problems for both the mother and the baby (77).

The findings from the present study also established that cooking with charcoal and firewood in the living room was associated with preterm birth. Mothers who cooked in the kitchen were less likely to have preterm births than those who cooked in the living room. This could be due to exposure to carbon monoxide, nitrogen dioxide, and sulphur dioxide, which harm both the mother and fetus. These findings are comparable to those from a hospital-based study in Ghana, which found that mothers who used charcoal had a 1.5 times higher risk of preterm birth, while those who used firewood for cooking had a 1.2 times increased risk of preterm birth (79). These findings are also comparable to a cohort study done in China which revealed that using biomass as cooking fuel was associated with an increased risk of preterm births (80). Another study in Nigeria investigating adverse birth outcomes due to exposure to household air pollution from unclean cooking fuel revealed that common adverse outcomes identified included premature births and low birth weight (81). The findings have revealed

that cooking using certain fuels, mainly charcoal, and firewood, inside the living room probably expose pregnant women to pollutants and irritants, potentially harming fetal development and increasing the risk of preterm birth.

5.3. Obstetric factors associated with preterm births

The findings from the present study also established that mothers who had hypertensive disorders in pregnancy were nine times more likely to have a preterm birth, COR =8.60, 95%CI: 2.43–30.46, p =0.002. The wide confidence interval in this finding is due to the small size of the sample of HDP. HDP is a known risk factor for preterm births. Similarly, another study conducted by Wagura et al. in Kenya shows that women with pregnancy-induced hypertension were eight times more likely to have preterm births (8). These findings are comparable to those by Granese *et al*., in a seven-year retrospective study conducted in Italy which found that hypertension during pregnancy was one of the independent factors associated with preterm births (31). Alijahan et al., in a hospital-based study in Iran, also found that hypertension during pregnancy was associated with preterm births. Other factors included low diastolic pressure and bleeding(50). These findings have illustrated that pregnancy-induced hypertension can increase the risk of preterm birth. This may be because hypertension can cause damage to the blood vessels wall in the placenta, which can affect the flow of blood and nutrients to the fetus because of narrowing of arteries, which could lead to preterm birth. The high illiteracy level (90.4%), low attendance of ANC, and a late start of ANC in this study's participants could have a negative implication on the occurrence of pregnancy complications such as hypertension as they are not benefiting from the WHO recommendation of a positive pregnancy outcome, as this recommendation relates to maintaining a healthy pregnancy for mother and baby and management of complications during pregnancy through adequate ANC (68).

The current study also found that mothers with multiple pregnancies were five times more likely to have a preterm birth. These findings are consistent with a study in Tanzania by Temu et al., which found that preterm delivery was associated with multiple pregnancies, urinary tract infections, and cesarean section delivery(38). However, in our present study, the mode of delivery and presence of UTI were not significant factors associated with preterm births. This was mainly due to a smaller sample of patients in the present study with UTI and caesarean section delivery (7.5%). Another study by Vogel et al., in a study assessing the trends of preterm birth globally, established that there was a higher proportion of preterm births among women with multiple pregnancies (11). The risk of prematurity can be reduced while controlling and mitigating all other factors found in this study except multiple gestation in a natural pregnancy, which cannot be prevented.

5.4. Fetal characteristics associated with preterm birth

Fetal characteristics were not significantly associated with preterm births. Fetal characteristics that were investigated in this study were gender and birth weight. These findings are comparable with a study in Kenya by Wagura et al., who found no significant association between newborn characteristics and preterm birth (33). Similarly, a study in the United Kingdom by Teoh et al. established no significant association between fetal gender and preterm births (24 to 37 weeks) (82).

These findings, however, contrast those from Vogel et al. in a study investigating the trends of preterm birth globally which found that the male gender was associated with preterm birth (11). Another study in the Netherlands revealed a higher risk of preterm birth in male fetuses than in females (54). Another study by Zetlin et al. found a higher risk of preterm birth in male babies than in female babies (47). Studies have shown that male fetuses are more likely to be born preterm than female fetuses. The risk of preterm birth is approximately 10% higher in male infants than in female infants. The reasons for this difference are poorly understood,

but it may be related to male fetuses growing more rapidly in the last trimester of pregnancy (83). However, in a study in Nigeria by Ezechi et al., it was found that the preterm prevalence was higher among female new-borns compared to male new-borns (47).

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

- The prevalence of preterm birth at Banadir Hospital in Somalia was 10.4%. There was no previous study to compare in the country but it is still a public health problem this prevalence, among those with preterm births, 77.8% were moderate to late preterm, and 22.2% were very preterm birth.

- Factors associated with preterm birth in this study included husband smoking cigarette, having hypertensive disorders of pregnancy, family size, indoor cooking using charcoal and firewood, and multiple gestation were the significant factors associated with preterm birth.

- Fetal characteristics included in the study were found not to have a significant association with preterm birth.

6.2. Study strengths and limitations

6.2.1. Study strengths

This was the first study investigating the prevalence of preterm births and associated factors in Somalia.

6.2.2. Study limitation

- The short duration of the study period, which might have an influence on the variability of the study findings?

- Most of the mothers in the present study attended antenatal care very late, which can imply that extreme deliveries could have occurred at home and also lack of service for extreme preterm birth in Banadir Hospital, such as surfactant and caffeine make it difficult to find extreme preterm babies, possibly due to early death before the Ballard score examination is done in this study.

- High numbers of illiterate mothers in this study, such that the social determinants of health could not be felt.

6.3. Recommendations

- We recommend for the Ministry of Health of Somalia and the Banadir Hospital Administrator to use this finding to allocate resources to improve the care for preterm babies by providing cost-effective care.
- Early detection and management of pregnancy-related conditions such as HDP and APH and other factors, which are significant risk factors for preterm birth in this study, by improving ANC attendance and early treatment of complications.
- Ministry of Health of Somalia to enhance public awareness of the risks of cigarette smoke exposure in the home, particularly to pregnant women and their fetuses.
- Policymakers should support the United Nations initiative, "Global Alliance for Clean Cook Stoves," with the goal of "foster the adoption of clean cook stoves and fuel."
- To enhance mother's educations in Somalia by the government as a high of number of mothers included in this study were illiterate.

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APPENDICES

Appendix I: Consent form

Title of the study: Prevalence and risk factors of preterm birth at Banadir Hospital in Mogadishu-Somalia

Principal Investigator:

Dr. Mohamed Yousef Hussien, registrar at the department of Paediatrics, University of Nairobi.

Supervisors:

Prof. Grace Irimu, chairperson, Department of Pediatrics, University of Nairobi.

Dr.Florence Murilla, Lecturer, Department of Paediatrics, University of Nairobi

Introduction/Purpose of the study

My name is Dr. Mohamed Yousef Hussien, a registrar at the University of Nairobi, Department of Paediatrics and Child Health. I am conducting a study to determine the prevalence and risk factors of preterm birth at the Maternity Unit, Banadir hospital as part of the requirements to attain Master's degree in pediatrics and child health. Such study was never done in our country. The aim of this consent form is to tell you the information that you need to take a decision to participate or not in this study.

Participant selection

I intend to recruit you and your child to be part of this study considering that your child meets the inclusion criteria that I am looking at enrolling him/her as a participant. This study does not alter the intervention given to you and your child and thus participation is a simple process.

Voluntary Participation/Participants rights and roles

Your participation in the study is voluntary and you are free to withdraw from the study even after recruitment without any consequences

Procedure

If you agree to participate in the study, your demographic details, medical history will be taken and your baby will be physically examined as well and no harmful procedure.

Time: The study is simplified and will not consume much of your time with approximately 30-40 minutes required to finish the whole process.

Confidentiality

Neither your child's name or your name or contact details will appear on the questionnaire. Instead, the questionnaires will have serial numbers. The form containing your information will be kept in a locked cabinet and I will be the only person with access to the cabinet. The information that will be obtained from the research will be used strictly for research purposes.

All the information obtained during the research will be kept confidential to everyone who will participate in it.

Benefits and Reimbursements

Your participation in this study will help us identify the factors associated with preterm delivery and the prevalence and this will help us as a country in developing measures to reduce preterm delivery and allocate resource for management of preterm babies after we understood the prevalence of this problem. You will not benefit any monetary reward from participating in this study.

Risk, stress and discomforts

A potential risk of the study may be concerns regarding the privacy of information you share in which case you can be assured that every case will be kept as confidential as possible with a code number being the only identifier in a password protected computer database.

Cost and risk of loss of Confidentiality

There will be no additional direct cost incurred by you neither will you receive any money for participating in this study. Information that you will provide is mainly for academic purposes and at no point in time will you be required to provide personal information unwillingly. Your data will be labeled with your unique identity number and your name concealed maintaining confidentiality when taking part in the study. Furthermore, your name will not appear in any report or publication of the research and all your personal information will be handled with a high level of confidentiality.

Voluntary Participation and withdrawal: Remember, your participation is entirely voluntarily. Should you consider changing your mind midway, you have the right to do so and you shall not suffer any consequence whatsoever.

Sharing of results: The results of this study may be presented during scientific and academic forums and may be published in scientific medical journals and academic papers.

Participants consent

I confirm that the researcher has explained fully the nature of the study and the extent of activities which I will be asked to undertake. I confirm that I have had adequate opportunity to evaluate and ask questions about this study. I understand that my participation is voluntary and that I may withdraw at any time during the study, without having to give a reason. I agree to take part in this study by filling in the form.

Signed by participant…… Date……

In case of any issues or challenges related to this study, please contact me on +25261 8968540 and e-mail address is drmohamed6000@gmail.com or my supervisor Prof. Grace Irimu on Phone number +254 722 564 600 or email at grace.irimu@uonbi.ac.ke or Dr.Florence Murila on phone number +254729430022 or email at fmurila@gmail.com or you may also contact Secretary/Chairperson, Kenyatta National Hospital-University of Nairobi Ethics and Research Committee Telephone No. 2726300 Fxt. 44102. Email: uonknh_erc@uonbi.ac.ke.

Thank you for sparing your precious time dedicated to participating in this study exercise.

Researcher's statement

Interviewer: I certify that the purpose, potential benefits and possible risks associated with participating in this research have been explained to the above participant and the individual has consented to participate.

Signature_____ Date_____

Appendix I: Consent form in Somali language

Lifaaqa I: Foomka ogolaanshaha

Cinwaanka daraasadda: Ka hortagga iyo qodobbada halista ee dhalashada hore ee Isbitaalka Banadir ee Muqdisho-Somalia

Baaraha: Dr. Maxamed Yousef Hussien

Hordhac daraasadda: Waxaa lagaa codsanayaa inaad kaqeybqaadato daraasadda oo ah mid iskaa wax u qabso ah waxaana lagu sameyn doonaa qeybaha dhalmada ka dib isbitaalka Banadir

Ujeedada daraasadda: Si loo go'aamiyo fiditaanka, qodobbada halista ee dhalashada hore ee isbitaalka Banadir.

Nidaamyada: Haddii aad oggolaato inaad kaqeybqaadato daraasadda, faahfaahintaada tirakoobka, taariikhda caafimaad ayaa la qaadi doonaa oo cunuggaaga sidoo kale jir ahaan ayaa loo baari doonaa.

Waqtiga: Daraasada waa la fududeeyay kumana isticmaali doono waqtigaaga badan qiyaastii 30-40min daqiiqo ayaa loo baahan yahay si loo dhammeeyo hawsha oo dhan.

Faa'iidada daraasadda: Ka qaybqaadashadaada daraasaddan waxay naga caawin doontaa inaan ogaano arrimaha la xiriira dhalmada ka horreeya tani waxay naga caawin doontaa waddan ahaan inaan horumarinno tallaabooyin lagu dhimayo dhalmada kahor iyo u qoondaynta kheyraadka maaraynta dhallaanka ka horreeya dhallaanka ka dib markii aan fahannay baaxadda dhibaatadan. Wax abaalmarin lacageed ah kama faa'iidaysan doontid ka qaybqaadashada daraasaddan.

Khataraha, walbahaarka iyo raaxo darada: Khatarta suurtagalka ah ee daraasada ayaa laga yaabaa inay tahay walaac ku saabsan asturnaanta macluumaadka aad la wadaagto taas oo kiis kasta lagu hubin karo in kiis kasta loo hayn doono si qarsoodi ah intii suurtagal ah iyadoo lambarka koodhku yahay aqoonsiga kaliya ee sirta ah ee la ilaaliyo keydka kumbuyuutarka.

Qiimaha iyo halista luminta Qarsoodiga: Ma jiri doonto kharash dheeraad ah oo toos ah oo kugu soo dhaca mana heli doontid wax lacag ah oo aad kaga qeybgasho daraasaddan. Macluumaadka aad bixin doontid badanaa waa ujeedo waxbarasho oo waqti go'an looma baahna inaad siiso macluumaad shaqsiyeed si ikhtiyaar ah. Xogtaada waxaa lagu calaamadayn doonaa aqoonsigaaga gaarka ah magacaagana waa la qarin doonaa iyadoo la ilaalinayo sirta marka aad ka qeyb qaadaneyso daraasadda. Intaa waxaa sii dheer, magacaagu kama muuqan doono warbixin kasta ama daabacaadda cilmi-baarista oo dhammaan macluumaadkaaga shakhsiyeed waxaa lagula tacaali doonaa heer sare oo sir ah.

Kaqeybgalka iskaa wax u qabso iyo ka bixitaanka: Xusuusnow, kaqeybgalkaagu gabi ahaanba waa ikhtiyaari. Haddii aad ka fiirsato inaad maskaxdaada beddesho bartamaha, waxaad xaq u leedahay inaad sidaas sameyso mana ku dhici doontid wax natiijo ah.

Wadaagista natiijooyinka: Natiijooyinka daraasaddan waxaa la soo bandhigi karaa inta lagu gudajiro shirarka sayniska iyo aqoonta waxaana lagu daabici karaa joornaalada caafimaadka sayniska iyo waraaqaha tacliinta.

Kaqeybgalayaashu way oggolaadeen

Waxaan xaqiijinayaa in cilmi-baaraha uu si buuxda u sharxay nooca daraasadda iyo heerka howlaha la i weydiin doono inaan qabto. Waxaan xaqiijinayaa inaan helay fursad igu filan oo aan ku qiimeeyo oo aan ku weydiiyo su'aalo ku saabsan daraasaddan. Waxaan fahamsanahay in kaqeybgalkeygu uu yahay mid iskaa ah oo aan ka bixi karo waqti kasta inta lagu gudajiro daraasada, aniga oo aan sabab bixin. Waxaan oggolahay inaan kaqaybqaato daraasaddan anigoo buuxinaya borotokoolka.

Waxaa saxeexay kaqeybgale ..... Taariikh
.....
.....

Haddii ay jiraan wax arrimo ah ama caqabado la xiriira daraasaddan, fadlan igala soo xiriir +252 61 8968540 cinwaanka e-mail drmohamed6000@gmail.com ,ama laxariir nambarada ama emailada hoos ku qoran ama my supervisor Prof. Grace Irimu on Phone number +254 722 564 600 or email at grace.irimu@uonbi.ac.ke or Dr.Florence Murila on phone number +254729430022 or email at fmurila@gmail.com ama laxariir Secretary/Chairperson, Kenyatta National Hospital-University of Nairobi Ethics and Research Committee Telephone No. 2726300 Ext. 44102. Email: uonknh_erc@uonbi.ac.ke.

Waad ku mahadsan tahay waqtigaaga qaaliga ah ee aad uga go'antahay ka qeybqaadashada layligan waxbarasho.

Bayaanka Baaraha

Wareyste: Waxaan cadeynayaa in ujeedada, faa iidooyinka iyo halista suurtagalka ah ee la xiriirta ka qeybqaadashada cilmi baaristan loo sharaxay ka qeybgalaha kor ku xusan shaqsiguna uu ogolaaday inuu ka qeybqaato.

Saxeex_____
_____
_____
_____

Appendix II: Questionnaire

Title of research: Prevalence and risk factors associated with preterm birth at Banadir hospital in Mogadishu-Somalia

INSTRUCTIONS TO INTERVIEWERS

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

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

Section One: Demographic Information

1. Age of the mother (in years) .....
2. Marital status

   Married [ ] Divorced [ ] Widowed [ ] Separated [ ]

3. Maternal level of education:

   Unable to read and write [ ] Not completed secondary school [ ]
   Completed Primary [ ] Completed secondary school [ ]
   Intermediate level [ ] University [ ]

4. Maternal occupation

   House-wife [ ] Formal employment [ ]

   Self-employment/Business [ ] Casual laborer/street seller [ ]

5. Husband's current occupant

   Formal employment [ ] Casual laborer/street seller [ ]

   Self-employment/Business [ ] Private employment [ ]

6. Average monthly income in US dollar…
   a) 100$ [ ] 200$ [ ] 300$ [ ] 400$ [ ]

7. Residence

   IDPs Camps [ ] Non-IDPs [ ]

8. Does your husband smoke cigarettes?

   Yes [ ] No [ ]

   Does he smoke inside the home……Yes [ ] No[ ]

9. Does your husband chew Khat (Somali woman doesn't chew khat)

Yes [ ] No [ ]

10. Was there any physical violence during your pregnancy?

Yes [ ] No [ ]

11. Was there a family dispute during your pregnancy?

Yes [ ] No [ ]

12. What is your family size at home, your children [ ] and if with grandparent [ ]

13. What type of fuel you use for cooking

a) Firewood [ ] b) Charcoal [ ] c) Gas [ ] d) Electricity [ ]
d) Whether in separate room (kitchen) [ ] e) Inside the living room [ ]

Section Two: Obstetric and Neonatal Information

1. When was your last normal menstrual period……
2. Gestational age by dates (to the nearest weeks)……..
3. When did you deliver your baby? (Dd/mm/yr)..... (Confirm from records_....
4. When was your previous delivery (last delivery if multiparous)? (Dd/mm/yr).....
5. Inter-pregnancy interval (in months) with last delivery if multiparous …….
6. Number of previous pregnancies or parity……. .(Confirm from mother ANC card) or primigravida [ ]
7. Is your last baby before this one alive or dead? ( )

Alive [ ] Dead [ ]

8. History of previous preterm birth:
Yes [ ] No [ ]
9. History of Previous Miscarriage
Yes [ ] No [ ]
10. What is the pregnancy outcome (current pregnancy if multiparous)?

Singleton [ ] Twins or more [ ]

11. Whether pregnancy was planned?
Yes [ ] No [ ]
12. Antenatal care visit

None [ ] One time [ ] Two times [ ] Three times [ ] ≥ four times [ ]

13. Were mother given antenatal corticosteroids (preterm mother)……look mothers file?

Yes [ ] No [ ]

14. What test are done in ANC

a). HB level [ ] b) blood group [ ] c) syphilis [ ]

d) HIV test [ ] e) urine analysis [ ] f) rapid malaria test [ ]

15. What supplement was given?

a).ferro-folic [ ] b) tetanus vaccine [ ] c).

At what gestation you took ferofolic?

1. 1st trimester [ ] 2. 2rd trimester [ ]

3. Before pregnancy [ ]

16. Presence of pregnancy induced hypertension/eclampsia?

Yes [ ] No [ ]

17. Presence of antepartum hemorrhage? ……

Yes [ ] No[ ]

18. Presence of gestational diabetes

Yes [ ] No [ ]

19. HIV infection

Yes [ ] No [ ] Unknown [ ]

20. Anaemia during pregnancy (look for mother ANC card or file)

Yes [ ] No [ ] Hb Level……..

21. Do you have any of these chronic conditions before your pregnancy?

a).Hypertension [ ] b).DM [ ] c).Other [ ] d). None [ ]

22. History of UTI during Pregnancy (burning sensation and dysuria)

Yes [ ] No [ ]

23. Malaria infection

Yes [ ] No [ ]

24. Presence of other infections

Yes [ ] No [ ]

If yes, specify …….

25. History of PROM

Yes [ ] No [ ]

26. How labor started

Spontaneous [ ] Induced labour or C/S due to medical indication [ ]

27. Mode of Delivery:

SVD [ ] C/Section [ ]

28. Have you experienced any stress during your pregnancy(self-reported or medical record stress)

Yes [ ] No [ ] If yes how long [ ]

29. Previous c/section

Yes [ ] No [ ]

30. Any medication for chronic conditions or pregnancy related conditions

Yes [ ] No [ ]

If yes, mention it…….

31. Maternal left mid upper arm circumference (MUAC) .....cm (to the nearest 0.1cm) for nutritional status assessment.

≤ 23cm [ ] > 23cm [ ]

Section Three: Newborns Information

1. Gender

Male [ ] Female [ ]

2. Birth weight in grams ……Actual weight in grams……..…

<1000g [ ] 1000-1499g [ ] 1500-2499g [ ] >2500g [ ]

3. Gestational age assessment using Ballard score by weeks……

1. Term [ ]

2. Preterm [ ]

a. Late preterm 32weeks-<37weeks [ ]

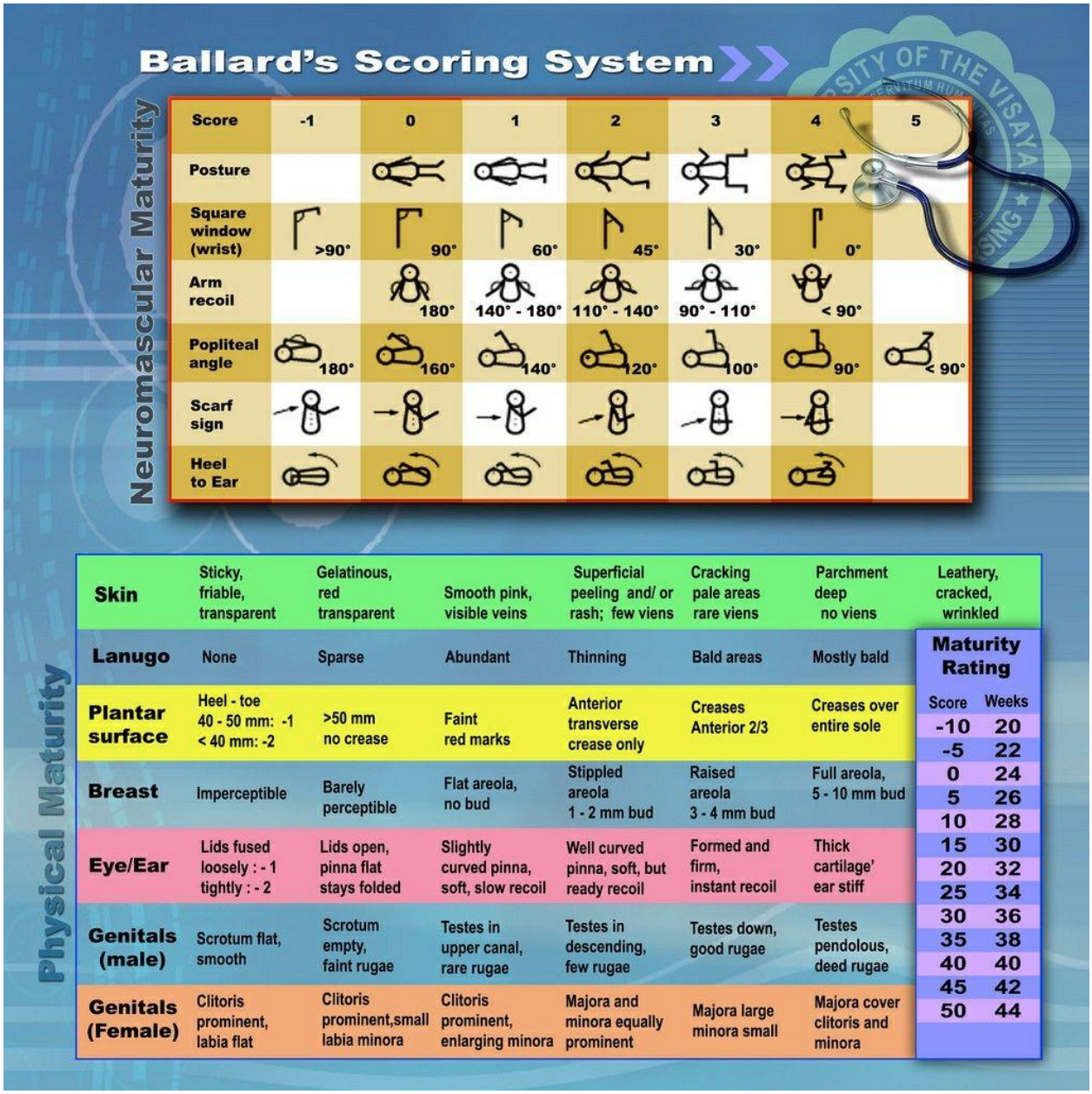
b. Very preterm 28-32weeks [ ]

c. Extreme preterm <28weeks [ ]

Thank you

Appendix III. Ballard score

Source: https://www.ballardscore.com/



Appendix IV: Antenatal Card

Observations or examinations:

Antenatal care card n°:

Name: Age:

Address:

Obstetric history

Last menstrual period: **Gravidity:** **Parity:**

Previous pregnancies:

Live birth	Yes ☐	Number:	No ☐
Still birth (born dead)	Yes ☐	Number:	No ☐
Neonatal death (< 1 month)	Yes ☐	Number:	No ☐
Infant death (1 month - 1 year)	Yes ☐	Number:	No ☐
Abortion (spontaneous or induced)	Yes ☐	Number:	No ☐

Problems during previous pregnancies

Anaemia	Yes ☐	No ☐
Hypertension/pre-/eclampsia	Yes ☐	No ☐
Ante-partum haemorrhage	Yes ☐	No ☐
Other		

Problems during previous deliveries

Prolonged labour	Yes ☐	No ☐
Malpresentation (breech, other)	Yes ☐	No ☐
Caesarean section	Yes ☐	No ☐
Instrumental extraction	Yes ☐	No ☐
Placenta (manual delivery)	Yes ☐	No ☐
Episiotomy	Yes ☐	No ☐
Post-partum haemorrhage	Yes ☐	No ☐
Puerperal infection	Yes ☐	No ☐
Fistula	Yes ☐	No ☐
Other		

Medical history

Hypertension	Yes ☐	No ☐
Diabetes	Yes ☐	No ☐
Tuberculosis	Yes ☐	No ☐
Sexually transmitted infection	Yes ☐	No ☐
HIV infection	Yes ☐	No ☐
Abdominal surgery	Yes ☐	No ☐
Other		

Tetanus vaccination (TV)

	Date	Next appointment
TV1		
TV2		
TV3		
TV4		
TV5		

	1st visit	2nd visit	3rd visit	4th visit	5th visit
Date					
Examination					
Gestational age					
Weight (+ height if appropriate)					
Blood pressure					
Mid-upper arm circumference (if appropriate)					
Uterine fundus height (cm)					
Foetal heart rate (beats/minute)					
Foetal movements (present/absent)					
Position (longitudinal, transverse, oblique)					
Presentation (cephalic, breech, transverse)					
Conjunctiva (pale, yellow)					
Oedema					
Complaints (use back page if needed)					
Laboratory tests					
Syphilis test					
Haemoglobin					
HIV test					
Urine analysis					
Rapid malaria test					
Pregnancy test (if appropriate)					
Other tests (e.g., blood type)					
Treatments					
Ferrous salts + folic acid or multiple micronutrients					
Albendazole (contra-indicated in 1st trimester)					
Intermittent preventive treatment of malaria (if appropriate)					
Malaria curative treatment (if appropriate)					
Urinary tract infection treatment (if appropriate)					
Syphilis treatment (if appropriate)					
Sexually transmitted infection treatment (if appropriate)					
Other treatment(s)					
Other distributions (if appropriate)					
Mosquito nets (2 nets at the first visit)					
Supplementary food					
Clean delivery kit (3rd trimester)					
Next appointment					

Appendix V: Ethical approval KNH-UoN ERC

UNIVERSITY OF NAIROBI
FACULTY OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
Tel:(254-020) 2726300 Ext 44355

KNH-UON ERC
Email: uonknh_erc@uonbi.ac.ke
Website: http://www.erc.uonbi.ac.ke
Facebook: https://www.facebook.com/uonknh.erc
Twitter: @UONKNH_ERC https://twitter.com/UONKNH_ERC

KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/245

28th June, 2022

Dr. Mohamed Yousef Hussein
Reg. No. H58/38062/2020
Dept. of Paediatrics & Child Health
Faculty of Health Sciences
University of Nairobi

KENYATTA NATIONAL HOSPITAL APPROVED 28 JUN 2022 KNH/UoN-ERC P.O. Box 20723 - 00202 NAIROBI

Dear Dr. Hussein,

RESEARCH PROPOSAL: PREVALENCE AND RISK FACTORS OF PRETERM BIRTH AT BANADIR HOSPITAL IN MOGADISHU-SOMALIA (P133/02/2022)

This is to inform you that KNH-UoN ERC has reviewed and approved your above research proposal. Your application approval number is **P133/02/2022.** The approval period is 28th June 2022 – 27th June 2023.

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 KNH-UoN ERC.
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 KNH-UoN ERC 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 KNH-UoN ERC 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 KNH-UoN ERC.

Appendix VI: Permission from Banadir Hospital

Banadir Hospita

Ministry of Health & Human Services

Mogadishu-Somalia

مستشفى بنادر

وزارة الصحة ورعاية المجتمع

مقديشوا- صوماليه

Ref: BH/0046/8/22 *Date: Sunday, 07, August, 2022*

Research Approval Letter

Research Title: Prevalence and Risk factors of Preterm Birth at Banadir Hospital, Mogadishu-Somalia.

Name of the Researcher	Research Title	Sample Size	Duration	Target Area	Direction	University	Faculty	Contact Number
Dr. Mohamed Yousef Hussein	Prevalence and Risk factors of Preterm Birth at Banadir Hospital, Mogadishu -Somalia.	259	1 Month (August 2022)	Maternity Department Ward 15 Ward 16	Dr. Mohamed Salad Olow Mrs. Naima Badane Mrs. Shugri Dirac	University of Nairobi	Master of Pediatric and Child Health	+252-618968540

Best Regards

Dr. Mohamed Abdirahman Omar (Dr. Qalbi)

Head of Research and Disease Surveillance Department

Dr. Qalbi

Website: www.banadirhospital.com **E-mail:** banadirhospital@moh.gov.so

Contacts: +252-615563404 Or +252-615210385

Appendix VII: Approval from Ministry of Health

Somali Federal Republic
Ministry of Health & Human Services

ETHICAL APPROVAL

This is to certify that the proposal submitted by:

Principle Investigator, Mohamed Yousef Hussein

Reference No:
MOH&HS/DGO/1029/August/2022

Full project Title:

Prevalence and risk factors of preterm birth at Banadir hospital in Mogadishu

To be undertaken

Somalia

Starting Date: 21 August 2022 **Finishing Date: 21 September 2022**

For the proposed period of research
Has been approved by the Research & ethical committee at the Ministry of Health on the 23/August/2022

Director of Policy & Planning **Secretary**

Chairman

Wasaaradda Caafimaadka & Adeegyada Bulshada Ministry of Health & Human Services Somali Fed Republic

Tell: +252619997299 E-mail: [redacted] =Mogadishu-Somalia=

Appendix VIII: Study Timelines

	2022-2023							
	Jan-Feb	march	April	August	September	October	March 2023	May
Proposal development								
ERC approval								
Data collection								
Data analysis								
Results presentation								
Final report								

Appendix IX: Study Budget

Item Description	Unit Cost (Kshs.)	Quantity	Total (Kshs.)
Proposal and questionnaire development			
Files	500.00	2	1000.00
Pens	100.00	6	600
Flash Disk	2000.00	1	2,000.00
Printing	10.00	50	500.00
Photocopying	5.00	50*5	250.00
Binding	250.00	5	1,250.00
Sub-total			5612
Data Collection and Analysis			
Research assistant	40,000.00	2	80000
Statistician	20,000.00	1	20000
Sub-total			100000
Thesis Development			
Printing	10.00	100	1,000.00
Binding	500.00	5	2,500.00
Photocopying	5.00	100	2,500.00
Sub-total			6,000
Other Expenses			
Airtime	100.00	30	3000
Travel cost(Nairobi to and fro Mogadishu	33900	2	67800
Sub-total			70800
Sum-Total			192412
Contingencies (10%)			19241
Grand Total			**211653 ksh**

Budget Justification:

I purchased 2 box files to store collected consents and questionnaires at a cost of 285ksh. I will also purchase pens which will be used to serialize the questionnaires by the research assistants. Each of the research assistant will get three pens at a cost of 225ksh each. A flash disk will also be purchased as a backup during the data entry process. One flash disk will be needed at a cost of 2000ksh. Printing and photocopying of the consents and questionnaire will also be done. The proposal and final documents will be binded. Research assistants will collect at 10 questionnaires a day with each collecting at least 5 questionnaires. This taken one month period. The two research assistants will be paid 40000 each for one month totaling to 80000ksh. Bio-statistician will be recruited at a cost of 20000ksh.

Appendix X: Assent form

Project Title: **Prevalence and risk factors of preterm birth at Banadir Hospital in Mogadishu-Somalia**

Investigator: Dr. Mohamed Yousef Hussien, registrar at the department of Paediatrics, University of Nairobi.

My name is Dr. Mohamed Yousef Hussien, a registrar at the University of Nairobi, Department of Paediatrics and Child Health. I am conducting a study to determine the prevalence and risk factors of preterm birth at the Maternity Unit, Banadir hospital as part of the requirements to attain Master's degree in pediatrics and child health. Such study was never done in our country. The aim of this consent form is to tell you the information that you need to take a decision to participate or not in this study. I intend to recruit you and your child to be part of this study considering that your child meets the inclusion criteria that I am looking at enrolling him/her as a participant. This study does not alter the intervention given to you and your child and thus participation is a simple process.

Permission has been granted to undertake this study by the Kenyatta National Hospital-University of Nairobi Ethics and Research Committee (KNH-UoN ERC Protocol No. _____)

This research study is a way to learn more about children who are born before the expected due date. This will be important in helping pregnant mothers manage their pregnancies sufficiently and control preterm births. All information obtained shall be treated with highest level of confidentiality.

There are some things about this study you should know. The procedure conducted in the study is non-invasive hence it will not have any negative or harmful influence on the study participants. Most of the information will be obtained from the file hence there will be no any risk. The time taken will be 30 minutes.

However, participating in this study is extremely beneficial to your health and the wellbeing of your child.

When we are finished with this study we will write a report about what was learned. This report will not include your name or that you were in the study.

Remember, your participation is entirely voluntarily. Should you consider changing your mind midway, you have the right to do so and you shall not suffer any consequence whatsoever.

If you decide you want to be in this study, please sign your name.

I, _____, want to be in this research study.

_____ _____

(Signature/Thumb stamp) (Date)

Appendix XI: Similarity Report

PREVALENCE AND RISK FACTORS OF PRETERM BIRTH AT BANADIR HOSPITAL IN MOGADISHU-SOMALIA

ORIGINALITY REPORT

14%	9%	6%	6%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	adhlui.com.ui.edu.ng Internet Source	1%
2	bmcpregnancychildbirth.biomedcentral.com Internet Source	1%
3	Submitted to Excelsior College Student Paper	1%
4	Okubatsion Tekeste Okube, Lillian Moraa Sambu. "Determinants of Preterm Birth at the Postnatal Ward of Kenyatta National Hospital, Nairobi, Kenya", Open Journal of Obstetrics and Gynecology, 2017 Publication	1%
5	Submitted to Mount Kenya University Student Paper	1%
6	Submitted to Kampala International University Student Paper	1%
7	erepository.uonbi.ac.ke Internet Source	1%

8	Submitted to University of Nairobi Student Paper	<1%
9	Yonas Abebe, Maedot Kebede, Tomas Getahun, Marekegn Habtamu, Behailu Tariku, Esubalew Tesfahun. "Maternal Health Services as Determinant Factors for Low Birth Weight in public hospitals of Addis Ababa, Ethiopia: a Case-control Study.", Research Square Platform LLC, 2022 Publication	<1%
10	ugspace.ug.edu.gh Internet Source	<1%
11	Submitted to Glasgow Caledonian University Student Paper	<1%
12	dspace.knust.edu.gh:8080 Internet Source	<1%
13	etd.aau.edu.et Internet Source	<1%
14	reproductive-health-journal.biomedcentral.com Internet Source	<1%
15	Submitted to International Health Sciences University Student Paper	<1%
16	Emmanuel Hafiz Ramsis Hakem. "Prevalence And Risk Factors of Preterm Births in the	<1%