# FACTORS ASSOCIATED WITH MATERNAL MORTALITY AMONG WOMEN OF REPRODUCTIVE AGE SEEKING CARE AT WAJIR COUNTY REFERRAL HOSPITAL, WAJIR COUNTY, KENYA

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## DECLARATION AND APPROVAL

This thesis is distinctive to me, Fatuma, and has never previously been submitted to another university.

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## DEDICATION

I dedicate this thesis to my cherished family members for their steadfast support and encouragement throughout my research journey. I am deeply grateful for all you have done.

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## ABBREVIATION AND ACRONYMS

| | |
|---|---|
| **ANC** | Antenatal Care Services |
| **FGM** | Female Genital Mutilation |
| **GoK** | Government of Kenya |
| **KDHS** | Kenya Demographic Health Survey |
| **LMIC** | Low Middle-Income Countries |
| **MHCPs** | Maternal Health Care Providers |
| **MMR** | Maternal Mortality Rate |
| **TUFH** | Towards Unity For Health |
| **UHC** | Universal Health Coverage |
| **UNFPA** | United Nations Population Funds |
| **UNICEF** | United Nations International Children Emergency Funds |
| **WHO** | World Health Organization |

## OPERATIONAL DEFINITION OF TERMS

| | |
|---|---|
| **Antenatal Care Services** | speak of the prenatal and postpartum health care options given to expectant mothers. Monitoring and promoting the well-being and well-being of the mother as well as the unborn baby is the main objective of ANC(Denny et al. 2021). |
| **Emergency Obstetric Care** | Refers to the immediate and specialized medical attention provided to pregnant women during complications in pregnancy, childbirth, or the postpartum period(WHO, 2023b). |
| **Maternal Knowledge** | Refers to the understanding and awareness that pregnant women and mothers have about various aspects of pregnancy, childbirth, postpartum care, and child-rearing. This knowledge is crucial for making informed decisions, ensuring a healthy pregnancy, and promoting the well-being of both the mother and the child(Ikamari, 2020). |
| **Maternal Mortality** | refers to a woman's passing during the course of her pregnancy, during giving birth, or within the 42 days following the pregnancy's end, regardless of the length of the gestation or its location, from any cause connected to or made worse by the conception or its care(WHO, 2023b). |
| **Obstetric Complication** | Medical problems and difficulties that develop during labor, delivery, or the postpartum phase are referred to as complications of obstetrics(WHO, 2023b). |

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|---|---|
| **Prenatal Care** | refers to all the healthcare and medical services offered to expectant mothers in order to monitor and advance the physical and mental wellness of the developing fetus as well as the mother herself(Ikamari, 2020). |

## ABSTRACT

Mortality among women is the term used to describe deaths caused by problems that arise during pregnancy or childbirth. According to UN interagency projections, the world's mother-to-child mortality ratio (MMR) fell from 342 deaths per 100,000 babies born alive in 2000 to 223 deaths per 100,000 live births in 2020, a 34% reduction. This translates to an average rate of decrease of 2.1 percent each year. Despite being a significant figure, this represents only about one-third of the 6.4 percent annual rate needed to meet the Sustainable Development Goal (also known as the SDG) of 70 maternal mortality rates per 100,000 deliveries that are successful by 2030. Finding the factors linked to maternal mortality among reproductive-age women seeking care at the Wajir County Referral Hospital in Wajir County, Kenya, was the primary goal of the study. This study employed a cross-sectional, retrospective, analytical strategy. Two types of data collection methods were utilized during triangulation: qualitative and quantitative. In order to select subjects for the study, both purposive and systematic sampling techniques were used. To generate 366 study participants for the investigation, the Yamane formula for calculating sample size was used. Using binary logistic regression and the chi-square test for independence in inferential statistics, the degree of relationships was determined. A p-value of less than 0.05 was used to indicate statistical significance. The significant variables were imported from the bivariate assessment into binary logistic regression modeling for further analysis. Thematic analysis was employed for qualitative data. Ethical approval was sought from MKU and NACOSTI. The prevalence of maternal mortality in Wajir County was 4.2 %. In the second objective on the association between uptake of ANC and maternal mortality, poor uptake of antenatal care services increased the odds of maternal mortality rate. In the third objective on social demographic factors associated with maternal mortality; study partakers aged 18-23 years, earning 1-10000 Ksh, increased the odds of maternal mortality while being married reduced the odds of maternal mortality. On the fourth objective on health facility factors associated with maternal mortality, not utilizing emergency obstetric and newborn care services, and unavailability of skilled birth attendants increased the odds of maternal mortality while taking 30_60 minutes to reach the nearest health facility reduced the odds. Findings from this research were of vital importance in addressing the maternal mortality rate which is a public health concern and burden in this region. In addition, findings from this research were disseminated to the MOH and the county government of Wajir through seminars and published articles which informed the need to address various factors associated with maternal mortality in this region.

# CHAPTER ONE

# INTRODUCTION

## 1.0 Introduction

The background data, problem definition, investigation goals, questions, relevance and justification, scope, and purpose of the investigation are all thoroughly explained in this section. Key terms are also operationally defined, and delimitation, research assumptions, and investigation assumptions are made.

## 1.1 Background to the Study

Maternal mortality pertains to fatalities resulting from difficulties encountered during gestation or delivery. The global maternal mortality ratio (MMR) decreased from 342 to 223 deaths per 100,000 live births between 2000 and 2020, according to inter-agency estimates from the United Nations (Onambele et al. 2022). This decrease translates to an average yearly reduction rate of 2 percent, or roughly one-third of the 6 percent annual reduction required to meet the Sustainable Development Goal (SDG) target set by the World Health Organization (WHO, 2023b) to reduce maternal mortality to 70 deaths per 100,000 live births by 2030. The rate of decline did not significantly alter between 2016 and 2022, despite the MMR declining significantly between 2000 and 2015. During this time, MMR actually rose in some regions—Western Europe, North America, Latin America, and the Caribbean—while stagnating in other regions. Globally, the number of maternal deaths decreased from 451,000 in 2000 to 287,000 in 2020 (WHO, 2023b). This is a noteworthy accomplishment, particularly in light of the fact that many nations with high rates of maternal mortality are also seeing rapid population growth. Maternal and newborn mortality in Kenya continue to be serious public health concerns. 2023 saw 530 maternal deaths for every 100,000 live births, a rate that was much higher than the 223

global average (Bakari et al. 2020). Kenya has a higher neonatal mortality rate than the rest of the world (18 per 1,000 live births).

Maternal mortality is still a significant problem for African women of childbearing age, even though it decreased by 34.2 percent globally between 2000 and 2020 (Musarandega et al. 2021). The World Health Organization (WHO) and other key stakeholders must move swiftly to lower the MMR to 70 deaths per 100,000 live births by 2030, as the African Region accounts for nearly 69 percent of maternal deaths. In Africa, there are predicted to be 531 maternal deaths for every 100,000 live births in 2020. As per Musarandega et al. Nigeria (1,047 deaths per 100,000), South Sudan (1,223 deaths), and Chad (1,063 deaths) had the highest MMRs. 2021).

Maternal mortality has decreased in 30 of the region's countries, but it has increased in 17 since 2017. For instance, with 1,120 maternal deaths for every 100,000 live births in 2017, Sierra Leone had one of the highest rates in the region. But by 2020, the nation's maternal mortality rate had decreased by almost 60% to 443 per 100,000 live births. Eritrea (33 percent), Mauritania (39 percent), Tanzania (55 percent), and Eswatini (45 percent) are among the other nations that have experienced notable declines since 2017. On the other hand, maternal mortality in Nigeria increased from 917 per 100,000 live births in 2017 to 1,047 in 2020, a nearly 14% increase (Musarandega et al. 2021).

According to Masaba and Mmusi-Phetoe (2023), there will be 390 maternal deaths per 100,000 live births in Sub-Saharan Africa by 2030. The Sustainable Development Goal (SDG) target of reducing maternal mortality to fewer than 70 deaths per 100,000 live births by 2030 is greatly exceeded by this figure, which is significantly higher than the 13 maternal deaths per 100,000 births reported in Europe in 2017 (Tesfay et al. 2022a). Notably, the maternal mortality rate in Africa is higher than the average for the world, which is 211 (Tesfay et al. 2022).

Africa would need to reduce maternal mortality from 2017 levels by 86% in order to meet the SDG target, which would be difficult given the current rate of decline. The infant mortality rate in the area is likewise high, at 72 per 1,000 live births. According to projections, this rate will drop to 54 deaths per 1,000 live births by 2030, which is still significantly higher than the goal of fewer than 25 per 1,000. This is predicated on a 3 percent yearly reduction rate (Tesfay et al. 2022a).

With an average of 355 deaths per 100,000 live births, Kenya has a high maternal mortality rate, meaning that complications related to pregnancy and childbirth claim the lives of almost 5,000 women and girls each year. Over 80 percent of maternal deaths are related to inadequate healthcare, even though access to skilled birth attendance has improved over the past seven years, rising from 62 percent to about 70 percent (Kenya Demographic Health Survey, KDHS, 2022). Many women and girls suffer from serious health consequences, including obstetric fistula and psychological disorders, in addition to fatalities.

The United Nations Population Fund (UNFPA) is striving to increase the capacity of healthcare facilities, especially for underserved populations, such as those in rural and informal settlements, in order to eradicate avoidable maternal and perinatal deaths. The goal of this program is to offer everyone expert, patient-centered midwifery care. As stated by Paul et al. Kenya's maternal mortality ratio decreased from 564 in 2000 to 530 in 2020, which was in close agreement with the average for the region. The number of deaths from pregnancy-related causes that occur within 42 days of the end of a pregnancy per 100,000 live births is known as maternal mortality (KDHS, 2022). Finding risk factors for maternal mortality among women of reproductive age who visit Kenya's Wajir County Referral Hospital was the goal of the study.

## 1.2 Problem Statement

Maternal mortality refers to deaths that occur due to complications during pregnancy or childbirth. According to United Nations inter-agency data, the global maternal mortality ratio (MMR) declined by 34% from 2000 to 2020, dropping from 339 to 223 deaths per 100,000 live births (Ikamari, 2020). However, this reduction translates to an annual average decrease of only 2.1%, which is significantly below the 6.4% yearly decline required to meet the Sustainable Development Goal (SDG) target of reducing maternal mortality to 70 per 100,000 live births by 2030. Despite this progress, further efforts are necessary to accelerate improvements.

In 2020, approximately 287,000 women worldwide died due to pregnancy and childbirth-related complications (Masaba & Mmusi-Phetoe, 2023). Alarmingly, 95% of these maternal deaths occurred in low- and middle-income countries, where most fatalities were preventable. This disparity underscores the urgent need for targeted interventions in these regions to mitigate avoidable maternal deaths.

In Kenya, maternal mortality remains a critical issue. Despite government investments in maternal healthcare, there has been no significant decline in maternal mortality rates over the past fifteen years. In 2020, Kenya reported a maternal mortality ratio of 530 deaths per 100,000 live births, showing a gradual downward trend from 2001 (KDHS, 2022). However, challenges persist, necessitating a focused approach to address gaps in maternal healthcare.

In Wajir County, the maternal mortality rate is alarmingly high at 1,683 deaths per 100,000 live births, despite various interventions to curb the crisis (KDHS, 2022). This study aims to identify the specific factors contributing to maternal mortality among women receiving care at the Wajir County Referral Hospital, ultimately informing policies and interventions to improve maternal health outcomes in the region.

### 1.3 Purpose of the Study

This investigation aimed to identify the specific factors linked to maternal death among women seeking care at the Wajir County Referral Hospital in Wajir County, Kenya, who are of reproductive maturity, this is due to the fact that Wajir County the maternal mortality rate is higher as compared to the national maternal mortality rate indicating the need to carry out the study. In the end, this helped develop suggestions to prevent and eliminate the burden of mortality among mothers in this part of the country by providing an accurate representation of the incidence of mortality among mothers in this area.

### 1.4 Objectives of the Study

#### 1.4.1 Broad Objective

To determine factors associated with maternal mortality among women of reproductive age seeking care at Wajir County referral hospital, Wajir County, Kenya.

#### 1.4.2 Research Objectives

i. To determine the prevalence of maternal mortality among women of reproductive age seeking care at Wajir County referral hospital, Wajir County, Kenya
ii. To determine the association between uptake of ANC services and maternal mortality rate among women of reproductive age seeking care at Wajir County referral hospital, Wajir County, Kenya.
iii. To determine health facility-related factors associated with maternal mortality among women of reproductive age seeking care at Wajir County referral hospital, Wajir County, Kenya.
iv. To determine patient-related factors associated with maternal mortality among women of reproductive age seeking care at Wajir County referral hospital, Wajir County, Kenya.

### 1.5 Research Questions

i. What is the prevalence of maternal mortality among women of reproductive age seeking care at Wajir County referral hospital, Wajir County, Kenya?

ii. What is the association between uptake of ANC services and maternal mortality rate among women of reproductive age seeking care at Wajir County referral hospital, Wajir County, Kenya?

iii. What are the health facility-related factors associated with maternal mortality among women of reproductive age seeking care at Wajir County referral hospital, Wajir County, Kenya?

iv. What are the patient-related factors associated with maternal mortality among women of reproductive age seeking care at Wajir County referral hospital, Wajir County, Kenya?

### 1.6 Significance of the Study

Wajir County benefited greatly from the investigation's findings since they provided new insight into the variables influencing the mortality rate of mothers. Medical professionals and anyone else interested in patient welfare and ANC service uptake found this study's findings to be helpful. These policymakers learned valuable lessons from the research's findings. Because these findings from research substantially added to the body of knowledge already available in this field, educational institutions highly valued them. In underdeveloped nations, delivery services to homes are typical. Kenya is among the countries where traditional birth attendants support mothers during childbirth. The majority of deliveries at home can have problems that need to be managed without the help of trained medical staff and a facility. It is crucial that women give birth in an institution with trained medical staff in order to lower the rate of maternal mortality. Remodeling customized approaches to address particular obstacles faced by various

populations was made easier with a knowledge of these determinants. A medical care system's overall efficacy is frequently gauged by looking at mortality among mothers rates. Elevated rates of maternal death may indicate inadequacies in the availability of excellent medical services, such as skilled labor and delivery, urgent obstetric treatment, and prenatal care. Consequently, these amenities became more readily available.

### 1.7 Scope of the Study

The study enlisted 373 subjects for research and focused on variables related to mortality from pregnancy among women of reproductive age who visit the Wajir County Referral Hospital for antenatal care (thematic scope). Three months were estimated to be needed for the collection of data for this investigation; however, the research scope could be extended to one year if necessary. Up until the predetermined number of participants is reached, the maternal mortality records that were made available for the years 2017–2023 were examined to make sure the research investigation comprises solely carefully selected records that have been deemed roughly equivalent to the population of interest.

### 1.8 Limitations of the Study

1. Cross-sectional studies often rely on self-reported data, and retrospective recall of events can introduce bias. In the case of maternal mortality, relying on retrieved data from files could lead to incomplete files , wrong documentations or lack of information in areas as prenatal care, complications during childbirth, or access to healthcare may be subject to inaccuracies.
2. Cross-sectional studies can identify associations between variables, but they do not provide evidence of causation. Factors associated with maternal mortality may be confounded by other variables, and without longitudinal data or experimental design, it is challenging to establish a cause-and-effect relationship.

3. It is difficult to determine a time correlation between mortality among mothers and exposure variables. It is unresolved whether the variables identified preceded or accompanied the outcome, as well as causality can't be inferred.
4. Some patient files may lack critical information due to improper documentation, lost records, or clerical errors. Reviewing and extracting data from multiple patient files is time-intensive, especially when dealing with large sample sizes.

**1.9 Study Assumptions**

During the data-gathering period, the investigation is predicated on the assumption that records pertaining to maternal outcomes from 2017 to 2023 captured the necessary information.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.0 Introduction

This section offers an empirical review of published studies on the perspectives on mortality among mothers, the use of prenatal care services, factors related to medical centers, and individual factors that affect the death of mothers. Additionally, a summary of the research and a list of research gaps are provided in this section. In conclusion, the theoretical and conceptual framework utilized throughout the research process is also included in this section.

## 2.1 Overview of Maternal Mortality

Deaths brought on by difficulties during pregnancy and childbirth are referred to as maternal mortality. The global maternal mortality ratio (MMR) decreased by 34% from 2000 to 2020, from 339 per 100,000 live births in 2000 to 223 per 100,000 in 2020, according to UN interagency estimates (WHO, 2023). This decline is equivalent to a 2.1 percent average decline per year. Although this decrease is noteworthy, it is not enough to meet the Sustainable Development Goal (SDG) of reducing maternal deaths to 70 per 100,000 live births by 2030, which calls for an annual decrease of 6 percent.

While there was a noticeable decrease in the global MMR between 2000 and 2015, the rate of decline did not significantly change between 2016 and 2022, causing progress to stagnate. In actuality, maternal mortality rates rose in the Caribbean, Latin America, and Western Europe during this time, while they decreased more slowly in many other regions (WHO, 2023). Even though a lot of work is needed, maternal health can still be improved. A small number of nations have succeeded in lowering maternal mortality by at least 15% per year over the previous 20 years, reaching or surpassing the goals required to meet global health objectives. To improve maternal and newborn health more quickly,

UNICEF, the World Health Organization, and other partners work with national governments and organizations (WHO, 2023).

Maternal mortality, defined as deaths resulting from complications during pregnancy or childbirth, remains a significant global health challenge. Between 2000 and 2020, the global maternal mortality ratio (MMR) declined by 34%, from 339 to 223 deaths per 100,000 live births. Despite this progress, approximately 287,000 women worldwide died due to pregnancy and childbirth-related complications in 2020, with about 70% of these deaths occurring in sub-Saharan Africa. In sub-Saharan Africa, the MMR was estimated at 545 deaths per 100,000 live births in 2020, accounting for 70% of global maternal deaths. This represents a 28% reduction since 2000; however, the region continues to experience high maternal mortality rates. In Kenya, the MMR was reported at 530 deaths per 100,000 live births in 2020. Specifically, Wajir County has an alarmingly high MMR of 1,683 deaths per 100,000 live births. This underscores the urgent need to identify and address factors contributing to maternal mortality in this region.

The Ending Preventable Maternal Mortality (EPMM) and Every Newborn Action Plan (ENAP) initiatives are fostering collaboration and leading to the development of creative strategies. With the help of skilled birth assistants, four or more prenatal visits, and follow-up medical care for the mother and child within two days of delivery, these strategies seek to guarantee that all pregnant women and girls receive basic medical care (Rademaker et al. 2022).

By increasing awareness, obtaining funding, and collaborating with groups, communities, and families, especially those in the most need of maternal health coverage and equity have significantly improved (WHO, 2023).

## 2.2 Overview of ANC Services Uptake

As stated by Hijazi et al. (2018), in order to reap the health benefits of prenatal treatment for both herself and her unborn child, a pregnant woman should see a qualified healthcare provider at least four times during her pregnancy. One of the best ways to lessen this burden on society is to provide excellent medical care. However, Tesfaye et al. report that 64% of expectant mothers globally receive prenatal care four or more times during their pregnancy. (2017). Only 42% of pregnant women in Sub-Saharan Africa and 49% of pregnant women in South Asian countries are able to attend at least four prenatal appointments with a licensed healthcare provider (Atuhaire and Mugisha, 2020).

Prior to now, the WHO had advised all pregnant women to make at least four prenatal appointments in order to guarantee that they receive appropriate care during this time. It has since been suggested that eight visits be made. In order to guarantee that expectant mothers experience a comfortable pregnancy, the group developed and published 39 guidelines in 2016. These guidelines are linked to five strategies (WHO, 2020). However, compared to the global average, Sub-Saharan African women use prenatal care at a lower rate. Studies show that 86% of expectant mothers receive prenatal care from a licensed professional, and 65% of pregnant women see a doctor at least four times during their pregnancy. Merely 52% of expectant mothers in sub-Saharan Africa receive four visits or more (UNICEF, 2017).

In Uganda, there are 990,000 conceptions annually (WHO, 2016). Only 65–58% of these, depending on whether they reside in an urban or rural area, make at least four visits to the ANC, with 90–94% of them making at least one visit. The pattern is comparable to that observed in other Sub-Saharan African nations (Onasoga et al. 2020).

In an attempt to significantly expand pregnant women's access to healthcare across the country, the Kenyan government started a free program for pregnant women in June 2013.

All pregnancy services, including prenatal care, delivery, and postpartum care, are now provided to expectant mothers at no cost in healthcare facilities across the country. Few sexually mature women use the services for pregnant women, even though public health facilities are paid by the Ministry of Health's headquarters and do not charge for their services (MoH, 2014).

Lower rates of maternal mortality have been linked to adequate ANC uptake. Frequent antenatal care visits lower the risk of maternal death by enabling medical professionals to recognize and treat problems early in pregnancy. Pregnancy-related complications like infections, gestational diabetes, and hypertensive disorders can be identified and treated early with ANC visits (Tanaka et al. 2017). Pregnant women frequently use ANC visits as a gateway to professional birth attendants and institutional delivery services. Compared to home births attended by untrained personnel, giving birth in a medical facility by skilled providers lowers the risk of maternal mortality (Mamo et al. 2022). Improving ANC quality and coverage is essential to lowering the rate of maternal death. According to Renbarger et al., this entails bolstering health systems, expanding access to ANC services, removing obstacles to care, encouraging community involvement, and guaranteeing the availability of qualified medical professionals and necessary resources. 2021). In summary, there is a direct correlation between the uptake of antenatal care and the rates of maternal mortality. Adequate ANC utilization is critical in lowering these rates because it allows for the early identification and treatment of complications, increases access to professional care during childbirth, and provides vital health education.

## 2.3 Patient-related factors associated with maternal mortality

### 2.3.1 Mothers age

The well-being of mothers can be greatly impacted by support from others, and in certain situations, it may even be able to avert the death of the mother. According to Moyo et al., (2018), social assistance made it easier for pregnant women to access prenatal services, ensuring that they receive the necessary medical interventions and routine checkups. The risk of dying during pregnancy can be decreased by receiving early and regular prenatal care, which can help with the prompt identification and treatment of any complications(Braund et al., 2023). By distributing knowledge about the health of mothers, nutrition, and safe operations during pregnancy and delivery, supportive social networks are able to promote health education (Sara et al., 2019). Mothers who are adequately informed have a greater probability of making wise decisions that lead to favorable results. Another study found that practical support helped pregnant women focus on their well-being and lessen the burden of everyday duties. Examples of this support included childcare, help with chores at home, and transport to doctor's appointments(Meh et al., 2020). Support like this can be especially crucial for women who may experience problems during pregnancy.

### 2.3.2 Social support

The well-being of mothers can be greatly impacted by support from others, and in certain situations, it may even be able to avert the death of the mother. According to Moyo et al., (2018), social assistance made it easier for pregnant women to access prenatal services, ensuring that they receive the necessary medical interventions and routine checkups. The risk of dying during pregnancy can be decreased by receiving early and regular prenatal care, which can help with the prompt identification and treatment of any complications(Braund et al., 2023). By distributing knowledge about the health of

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### 2.3.3 Marital status

According to Omer et al., (2021), Married women may benefit from spousal support during emergencies, which contributes to quicker medical interventions. In contrast, women who lack this support system might experience delays in seeking healthcare, contributing to higher maternal mortality risks. Social support from partners or spouses may be available to married or collaborated women, which can have a positive effect on maternal health. Better pregnancy outcomes can be achieved through informational, practical, and psychological intervention(Tlou, 2018). It's possible that married women are more likely to receive assistance in accessing medical treatments such as prenatal treatment and professional childbirth attendance. Depending on their socioeconomic status, divorced or single moms may encounter additional difficulties in accessing suitable medical care(Ntoimo et al., 2018b).

### 2.3.4 Education level

Education plays a pivotal role in shaping maternal health outcomes, as it equips women with knowledge and skills necessary to navigate healthcare systems effectively. Women with higher educational attainment are more likely to seek prenatal care and adhere to medical advice, which is essential for monitoring and managing potential pregnancy

complications. They tend to understand health information better, leading to improved communication with healthcare providers and increased likelihood of following through with recommended health practices.

Moreover, education fosters economic empowerment, enabling women to gain financial independence and improve their socio-economic status. This financial security can facilitate access to better healthcare services, nutrition, and overall well-being. Educated women are more likely to participate in the workforce, contributing to their families' income and reducing economic constraints that may hinder access to quality maternal healthcare.

In addition, education enhances decision-making autonomy. Women who are educated are more likely to advocate for their health and the health of their children, including making choices about family planning and accessing timely healthcare interventions. This autonomy is crucial in cultures where traditional gender roles may limit women's ability to make independent health decisions.

Furthermore, the positive impact of education on maternal health extends beyond the individual level; it can lead to intergenerational benefits. Educated mothers are more likely to prioritize the education of their children, creating a cycle of empowerment that contributes to better health outcomes for future generations. Thus, investing in women's education is not only a matter of equity but also a strategic approach to improving maternal health and reducing mortality rates globally.

### 2.3.5 Income

Research from low- and middle-income countries has shown that poverty limits access to transportation, health education, and emergency obstetric care, further elevating maternal mortality risks. Addressing income inequalities, therefore, is key to improving maternal health outcomes by enhancing healthcare access and quality, especially for marginalized

populations(Hamal et al., 2020). One important socioeconomic factor that may have an effect on the well-being of mothers, including the chance of passing away during pregnancy, is earnings level. Pregnancy treatment is frequently more easily accessible to women with more money to spend. For the purpose of tracking the mother's and the fetus's health, spotting possible problems, and lowering the chance of maternal death, sufficient and timely prenatal treatment is essential (Singh, 2021). According to their study, women with higher incomes had a greater probability of being able to pay for healthcare facilities and trained birth attendants during labor and delivery (Karlsen et al., 2011). The presence of qualified medical personnel can greatly enhance results and lower the possibility of problems that result in the death of the mother. Tanaka et al., (2023), research revealed that women with higher incomes had easier access to assets and social support services such as childcare assistance, travel, and encouragement networks. This made it easier for them to deal with the difficulties of becoming pregnant and mothers.

### 2.3.6 Social support

A systematic review highlighted that individual-level support, as well as community engagement, can significantly reduce maternal mortality by promoting timely healthcare-seeking behavior and reducing barriers to accessing maternal health services, especially in rural areas(Dagher & Linares, 2022). Pregnant women who receive emotional support from partners, family members, friends, and community networks experience reduced stress and anxiety during pregnancy and childbirth. Lower stress levels are associated with better maternal health outcomes, including reduced risk of complications during pregnancy and childbirth, ultimately contributing to lower MMRs(Yeboah-Antwi et al., 2019). According to Singh, (2021), Supportive social networks provide pregnant women with access to valuable information about maternal health, childbirth, breastfeeding, newborn care, and postpartum recovery. Well-informed women are more likely to make

informed decisions about their healthcare, adhere to recommended prenatal care practices, recognize warning signs of complications, and seek timely medical attention when needed, thereby reducing the risk of maternal mortality. Socially isolated pregnant women are at increased risk of poor maternal health outcomes, including depression, anxiety, substance abuse, and inadequate prenatal care utilization(Karlsen et al., 2011). According to Azuh et al., (2017a), Social support networks provide opportunities for social interaction, companionship, and peer support, mitigating feelings of isolation and enhancing psychological well-being, which in turn contributes to improved maternal health and reduced MMRs. Social support plays a multifaceted role in reducing maternal mortality rates by providing emotional, practical, informational, advocacy, and empowerment support to pregnant women. Strengthening social support networks within families, communities, and healthcare systems is essential for promoting maternal health, improving access to maternal health services, enhancing healthcare decision-making, and ultimately reducing the risk of maternal mortality

## 2.4 Health Facility Factors

### 2.4.1 Clinic time convenience

Flexible clinic hours significantly enhance access to prenatal care by accommodating women's work schedules, family obligations, and transportation challenges. Pregnant women who can visit clinics during convenient times are more likely to attend regular prenatal appointments, receive timely screenings and interventions, and access crucial prenatal services. This accessibility plays a vital role in reducing the risk of complications and maternal mortality. According to Renbarger et al. (2021), consistent prenatal visits enable healthcare providers to screen for and identify potential pregnancy complications early, allowing for prompt management and intervention.

When clinics provide adaptable appointment times, pregnant women are more inclined to attend their scheduled visits, facilitating the early detection of conditions such as hypertension, gestational diabetes, and infections. If left untreated, these conditions can lead to significant maternal morbidity and mortality. The convenience of clinic scheduling directly impacts maternal health outcomes, including the risk of maternal death (Ogawa et al., 2017). Access to timely and adaptable healthcare services is essential for ensuring that pregnant women receive proper prenatal care, identify potential complications, and mitigate the risk of adverse outcomes.

Furthermore, prioritizing flexible clinic hours can have a broader societal impact by promoting health equity. Women from diverse socio-economic backgrounds, especially those with limited resources or support systems, often face barriers to accessing healthcare. By offering services at various times, healthcare providers can better serve marginalized communities and ensure that all women have the opportunity to receive quality prenatal care. This not only improves individual health outcomes but also contributes to healthier families and communities. Moreover, the establishment of telehealth services can further enhance accessibility, allowing pregnant women to receive guidance and support without the need for physical travel. Overall, creating convenient clinic hours and exploring telehealth options are crucial steps in improving maternal healthcare access and outcomes.

### 2.4.2 Friendly Healthcare Providers

The demeanor and attitude of healthcare providers, particularly their friendliness and supportiveness, can significantly influence maternal mortality rates (MMR) through various channels. Friendly healthcare professionals promote better communication and trust between pregnant women and their caregivers. Yego et al. (2014) note that when women feel comfortable and valued during prenatal visits, they are more likely to seek

timely care, follow medical advice, and report any troubling symptoms, which facilitates the early detection and management of complications. Moreover, approachable healthcare providers can more effectively engage pregnant women in conversations about their health and treatment plans, leading to greater adherence to medication regimens, dietary advice, and lifestyle changes (Tanaka et al., 2017).

Pregnancy can be a period filled with stress and anxiety, especially when medical complications arise. Friendly and supportive healthcare providers can help alleviate this stress by offering emotional support, reassurance, and empathy, positively affecting maternal health outcomes and decreasing the likelihood of adverse pregnancy outcomes, including maternal mortality (D. Singh et al., 2014). Research indicates that when healthcare providers are approachable and provide emotional support while ensuring respectful treatment, women are more likely to attend prenatal appointments and deliver in healthcare facilities. This, in turn, reduces the risks of complications such as hemorrhage, infections, and hypertensive disorders that often lead to maternal deaths (Tanaka et al., 2023). In summary, fostering a positive and supportive healthcare environment can greatly enhance the likelihood of women receiving the care they need, ultimately contributing to improved maternal health outcomes and lower mortality rates.

### 2.4.3 Waiting time at the hospital

The association between waiting time at healthcare facilities and maternal mortality is significant, particularly in low-resource settings. Long waiting times can delay access to life-saving interventions during critical moments of labor or postpartum care, contributing to higher maternal mortality rates(Bedford et al., 2013). Studies show that factors such as inadequate staffing, healthcare worker shortages, and administrative inefficiencies often lead to prolonged waiting periods at hospitals, which exacerbate delays in receiving timely care(Bakari et al., 2020). In many cases, when mothers arrive

at healthcare facilities but face long delays due to insufficient human resources, a lack of equipment, or logistical challenges, this can result in preventable maternal deaths. The "third delay" refers to delays in receiving adequate care after arriving at a healthcare facility(Banke-Thomas et al., 2020). According to research, healthcare worker-related factors, such as skill shortages or low motivation, combined with systemic issues like drug shortages and equipment failures, can greatly prolong wait times and lead to fatal outcomes(Nwameme et al., 2018).

### 2.4.4 Distance to the hospital

The distance to healthcare facilities significantly impacts maternal mortality, especially in low-resource environments. Research indicates that women living farther from health facilities are at a higher risk of maternal mortality (Godefay et al., 2015). Increased distance often results in reduced access to essential maternal services, such as antenatal care (ANC) and skilled assistance during delivery. Moreover, longer distances lead to delays in obtaining emergency obstetric care, which is vital for addressing complications during childbirth (Godefay et al., 2015). For example, a study in Ethiopia demonstrated that neonatal mortality increased by 1.33 times for every 10 km added to the distance from the nearest health facility. This pattern likely applies to maternal mortality as well, as access to care particularly in emergencies diminishes with increased distance (Kibret et al., 2023).

Similarly, research in Nepal has shown that women residing far from maternity hospitals are less likely to give birth in healthcare facilities, resulting in heightened risks of maternal complications and fatalities (Amadi-Mgbenka et al., 2022). Kyei-Onanjiri et al. (2018) highlight a correlation between maternal mortality and distance, emphasizing that timely access to emergency obstetric care is essential for managing complications during pregnancy and childbirth. Their investigation revealed that women in remote or rural

areas face challenges related to geographic barriers, such as difficult terrain, insufficient transportation options, and lengthy travel times to reach medical facilities (Amadi-Mgbenka et al., 2022).

Addressing these barriers requires comprehensive strategies, including improving transportation infrastructure, increasing the availability of mobile clinics, and enhancing telemedicine services. Governments and health organizations should prioritize investments in health facility accessibility to reduce maternal mortality rates. Furthermore, community engagement is crucial in raising awareness about available services and encouraging women to seek timely care. Creating a supportive environment that facilitates access to healthcare can significantly enhance maternal health outcomes and ensure safer pregnancies and deliveries. By tackling the distance-related challenges, we can make substantial progress toward reducing maternal mortality and improving overall maternal health.

### 2.4.5 Presence of Emergency obstetric and neonatal care services

Emergency Obstetric and Neonatal Care (EmONC) services are critical in reducing maternal mortality rates (MMR) because they offer expectant mothers and newborns prompt and efficient medical care during labor and the postpartum phase. As some of the main causes of maternal death, obstructed labor, hemorrhage, sepsis, and hypertensive disorders are among the obstetric emergencies and complications that these services are specifically designed to handle (Jammeh et al. 2011). Maternal death rates are directly correlated with the availability and accessibility of EmONC services; areas with easy access to these services usually have lower rates of maternal death because they have access to critical newborn care, emergency obstetric interventions, and skilled birth attendants (Limam et al. 2021).

On the other hand, maternal mortality rates are higher in regions with insufficient or nonexistent EmONC services, mainly because of delays in receiving the right care in an emergency (Thuranira, 2022). Skilled Birth Attendance and Basic EmONC, which include necessary obstetric and neonatal care services provided at primary healthcare facilities that permit assisted vaginal deliveries, the administration of parenteral antibiotics, and postpartum care, are typically the two main components of effective EmONC services. Advanced obstetric and neonatal care that can perform cesarean sections, treat serious complications like eclampsia, and perform neonatal resuscitation is referred to as comprehensive EmONC. These facilities are available for referral.

Improving EmONC services entails fortifying the healthcare system, educating healthcare professionals, guaranteeing the availability of necessary supplies and equipment, and setting up efficient referral systems to enable prompt access to higher-level care when required (Limam et al. 2021). In order to meet global maternal health targets, like the Sustainable Development Goals (SDGs), which seek to bring the global maternal mortality ratio down to less than 70 per 100,000 live births by 2030, investments in EmONC services are essential. Countries can significantly improve maternal and newborn health outcomes and lower maternal mortality by placing a high priority on providing high-quality EmONC services.

EmONC services guarantee that women have access to expert care during their pregnancies, deliveries, and postpartum periods, which is crucial in preventing maternal and newborn fatalities. These services offer a spectrum of interventions to treat obstetric emergencies, ranging from basic to comprehensive (Jammeh et al. 2011; Limam and associates. 2021). EmONC services dramatically lower the risk of maternal deaths linked to delays in receiving urgent medical care by providing timely and appropriate strategies to manage pregnancy-related complications. According to their research, having EmONC

services available improves access to emergency maternal health care, especially in areas with poor transportation networks. This leads to a significant drop in maternal mortality (Jammeh et al. 2011). As stated by Idris et al. (2018) states that preventing, diagnosing, and treating pregnancy-related problems like bleeding, sepsis, and obstructed labor is the main goal of EmONC services. These complications must be treated efficiently and quickly to prevent maternal deaths.

**2.5 Summary of the Literature Review and Research Gap Identification**

No matter how long the pregnancy lasted or where it occurred, the death of the mother is defined as the passing away of a woman from any cause connected to or made worse by the conception or its care, either during the pregnancy or no later than 42 days after the pregnancy ended. The public health concern of mortality among mothers (MM) and morbidity is poorly understood in economically disadvantaged (LIC) nations. There are no population-based research investigations to rely on for data on MM and morbidity. As a result, the majority of the maternal death rate (MMR) estimates are derived from mathematical models. From 430 per hundred thousand live births (LB) in the years 1990 to 211 in 2017, the MMR fell (Chavane et al., 2018). In 1990, there were 585,000 fatalities among mothers, 514,500 in 1995, and fewer than 300,000 today. Reduction or not, MM is still an overlooked tragedy, particularly in LIC nations. The MDGs, or The Millennium Foundation Development Goals, attempted to reduce MMR by the equivalent of three quarters between 2000 and 2015 but were unsuccessful. According to Chavane et al. (2018), the Sustainable Development Goals, also known as the SDGs, aimed to reduce the MMR to 70 per 100,000 LB. It is possible to draw the conclusion that progress is still lacking toward achieving the targeted MMR based on data from the country's report on SDGs in the ten nations with the greatest percentage of deaths from maternal causes.

Inequalities in the availability and quality of female reproductive, the mother's, and infant medical care should be tackled to lower the MMR.

Additionally, health systems ought to be strengthened to better meet the requirements and needs of women and girls, with accountability being maintained to enhance care quality and equity (Margawati et al., 2023). Though many research investigations have been conducted on the health of mothers, relatively few have examined the factors linked to the rate of death among mothers. Maternal death rates in Wajir County are 1683 per 100,000. This is a result of efforts to eliminate and minimize the threat, which has been a matter of public safety in the area and calls for the need for investigation (KDHS, 2022).

## 2.6 Theoretical Framework

The health belief model served as the investigation's compass. The Health Belief Model (HBM) is a model of psychology that takes into account people's views and opinions about the dangers and benefits of health(Rosenstock, 1974). It does this by clarifying and foreseeing behaviors related to health. Although the Health Belief Model (HBM) is primarily utilized to comprehend and encourage health-related behaviors, it may have an indirect correlation with maternal mortality by impacting variables that impact the well-being of mothers. The following are some ways in which the Health Belief Model could be useful in the circumstances of maternal passing away.

**Perceived Susceptibility:**

The HBM states that people evaluate their vulnerability to a health risk. Women may evaluate their imagined susceptibility to pregnancy-related problems in the event of maternal death depending on their age, health, and the existence of underlying medical conditions, among other factors.

**Perceived Severity:**

The term "experienced severity" describes how seriously a person takes a health issue. Women may take into account the possible seriousness of difficulties during pregnancy as well as delivery when discussing maternal death. This belief may have an impact on their desire to seek prompt and appropriate medical attention.

**Perceived Benefits:**

People balance the perceived costs and benefits of changing a behavior that promotes their health. Women may weigh the advantages of getting prenatal treatment, going to checkups on a regular basis, and listening to their doctors in order to lower the risk of problems and infant mortality.

**Perceived Barriers:**

Perceived barriers are obstacles that individuals believe may hinder the adoption of healthy behavior. In the context of maternal health, barriers might include financial constraints, lack of transportation, or concerns about the convenience of healthcare services. Addressing these barriers is crucial for improving maternal health outcomes.

**Cues to Action:**

External factors known as cues to take action on are what motivate people to take action for their health. Cues to action in cases of maternal mortality could include public health campaigns, recommendations from medical professionals, or firsthand accounts from relatives or close associates of problems associated with pregnancy.

**Self-Efficacy:**

Self-efficacy is the conviction that one can carry out a particular health behavior successfully. Maternal medical results can be impacted by women's trust regarding their capacity to obtain and use healthcare services, follow prescribed treatment plans, and make knowledgeable decisions about how well they are doing.

Applying the Health Belief Model to maternal death involves recognizing and addressing individual perceptions and beliefs that influence health-related behaviors during pregnancy and childbirth. Public health campaigns, education programs, and healthcare interventions can use the principles of the HBM to design strategies that promote positive maternal health behaviors, reduce barriers, and improve overall maternal outcomes.

## 2.7 Conceptual Framework

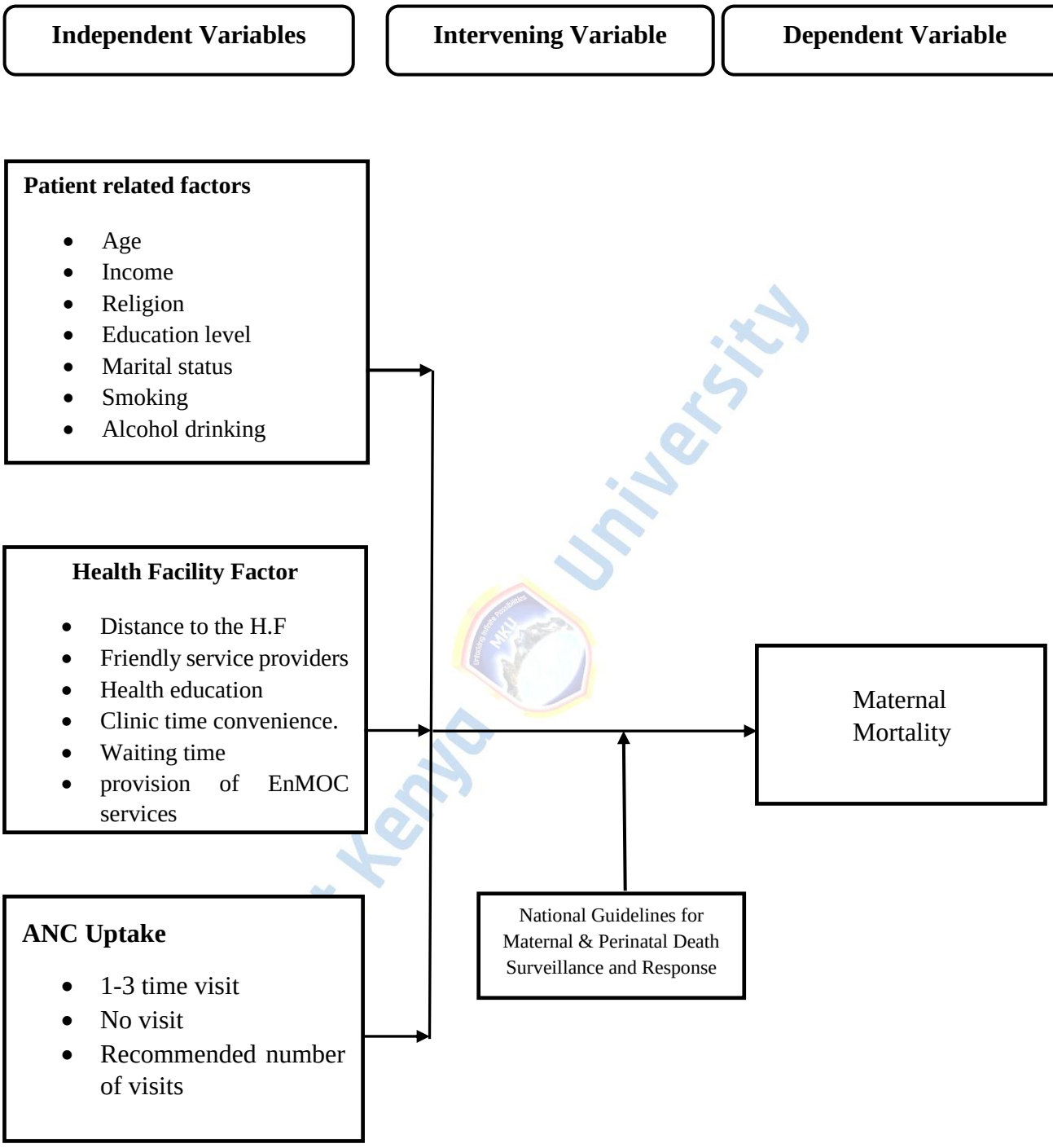


**Figure 1: A Conceptual Framework Adapted From A Literature Search and the Health Belief Model**

# CHAPTER THREE

# RESEARCH METHODOLOGY

## 3.1 Introduction

These sections include the following parameters discussed in Research Methodology: research design, variables involved in the study, sampling design, the population being studied in the investigation, ethical considerations, analysis plan, validity and reliability, study area description, and data collection tools used in the course of the investigation.

## 3.2 Study Design

Since gathering data from patient files required going back in time, the research design for the current investigation employed a retrospective analytical cross-sectional approach. Because the study's primary objective is to find the point of association between the dependent variables and independent variables particularly those who came into the hospital and died or left the hospital alive . an analytical cross-sectional study technique was employed. A thorough understanding of the factors influencing the maternal mortality rate was obtained by triangulating quantitative and qualitative data. Using qualitative data, the opinions of experts were recorded.

## 3.3 Variables of the investigation

### 3.3.1 Dependent Variable

1. The outcome files for women who died and file for women discharged alive

### 3.3.2 Independent Variable:

1. These were patient factors, health facility factors, and ANC uptake

## 3.4 Study Area Description

The Wajir County Referral Hospital, located in the upper region of Kenya, was the site of the investigation. Wajir County Referral Hospital, a level 5 Ministry of Health facility

situated in Wagberi ward of the Wajir East constituency, used to be known as the Wajir District Hospital. As of 2022, the town had 836,264 residents, according to the Kenya National Bureau of Statistics (KDHS, 2022). It has six administrative areas are called Eldas, Tarbaj, Wajir North, Wajir East, Wajir West, and Wajir South. Most of the time, there are substantial barriers due to the weather and terrain. Data gathered in 2015 by the Kenya National Bureau of Statistics indicates that 26% of Kenyans use family planning. Around 29% of births in Wajir occur among teenagers, and only around 24% of women there use contraception (Kakai, 2022). There are 71 government-run hospitals and clinics spread out across Wajir County. There are a total of 41 dispensaries in addition to 10 hospitals and 21 health centers. Indicators of maternal health in the County are not very good in Kenya (MOH, 2022). It is anticipated that 1,683 women die in the County each year, for every 100,000 live births that take place there(KNBS, 2019a). According to Bali et al., (2007), Obstruction of labor, severe instances of female genital mutilation (mostly type III), and cephalopelvic disproportion as a result of early marriages are the primary causes of these fatalities.

### 3.5 Study Population

All files from women who delivered in the facility made up the study population. The files captured were from 2017 to 2023.

### 3.6 Inclusion and Exclusion Criteria

#### 3.6.1 Inclusion Criteria

1. All files of women of reproductive age who sought medical attention prior to and after pregnancy between January 2017 and February 2023 were included in the investigation.
2. The investigation encompassed all files of women of reproductive age who sought care at Wajir County Referral Hospital and who were residents of Wajir

County.Files documenting deaths unrelated to maternal causes for instance , (trauma, chronic illnesses not associated with pregnancy or childbirth) were excluded.

### 3.6.2 Exclusion Criteria

1. 1. All maternal mortality records that fall outside of the investigation's time frame were not included in the study.
2. Patient files with missing or incomplete data were also excluded from the study.

### 3.7 Sampling Design

Since Wajir County and Referral Hospital is the biggest and the only referral facility in Wajir County that provides services for antenatal and postnatal care, it was purposively chosen to conduct the investigation. The selection was made because Wajiy County's maternal mortality rate stands at 1683/100,000 this comes after the presence of interventions to reduce and eradicate the menace which has been a public health concern in this region. In the present investigation, systematic sampling was used to choose files of women of reproductive age to participate. The total number of individuals who sought ANC and post-natal care who were enrolled in this medical center for maternal care was counted and divided by the overall number of samples to determine the sampling interval. A random selection of the initial patient's file was used to establish the starting point. Purposive sampling was used to choose key informant participants.

### 3.8 Determination of the Sample Size

The hospital reproductive health unit received a total of 4651 registered women of reproductive age from the year 2017-2023 who sought maternal care, This formula was utilized in this study since the finite population is known, and only a representative sample

of the population was needed. Since the population size is known the study employed the Yamane formula of sample size calculation(Yamane, 1973).

$$n = \frac{N}{1+N(e)^2}$$

Where

n=size of the sample

N=population size

e= level of precision or sampling of error which is ±5%

$n = 4651/1+4651(0.05^2)$

n= 366

As a result, 366 participants took part in this study and their data was taken from the hospital records.

**3.9 Tools for Data Collection**

Data on patient-related factors was gathered in Section A of the data collection instrument; data on ANC uptake was gathered in Section B; and data on factors associated with health facilities and the death rate of mothers was gathered in Section C. Maternal mortality was the primary outcome of interest in this study. Data on maternal outcomes was collected using a structured data abstraction form, specifically designed for reviewing patient files. Section D of the abstraction form focused on documenting the outcome of each case, particularly whether maternal death had occurred. The abstraction form functioned as a checklist where the researcher systematically extracted and recorded information directly from the patient files including details about the maternal outcome and associated factors.

For the intent of gathering qualitative data, an interview with key informants who were believed to have relevant information to reinforce the data extracted from the files, especially the interviews were to boost the credibility of data on ANC uptake, hospital-related factors were carried out with specifically chosen nurses, physicians, and community health volunteers. This was necessary for the purpose of triangulating quantitative data.

### 3.10 Procedure for Data Collection and Research Instruments

The quantitative data was collected using a data extraction form that collected data on social demographic factors, ANC services uptake history, as well as health facility factors, and finally, the outcome of interest which were documented cases of maternal mortality. Importantly, reviewing the file of a deceased woman often prompted further inquiry through interviews with caregivers and healthcare workers who had direct knowledge of the case. These interviews provided context, clarified gaps in the records, and explored systemic or facility-level issues that may have contributed to maternal mortality. This dual approach ensured a comprehensive understanding of both the quantitative trends and qualitative experiences related to maternal deaths. In addition, a key informant guide was employed to gather qualitative data, and a tape recorder was employed to record the qualitative data from the key informants.

### 3.11 Data Collection Tools Pretesting

Pre-testing of data collection or use of extraction tools was done at Isiolo County Level 5 Hospital. Ten percent(37 patient records) of the research sample size was utilized in the pretesting phase. Carefully recruited study partakers' records were utilized to shape the data extraction tool before the actual phase of data collection. This aided in the general improvement of the data collection tools. Pre-testing was conducted to check for ambiguities in the tools for data collection. Pre-testing evaluated the appropriateness of

the wording, length, and structure of survey items, ensuring they are easily understood by respondents.

### 3.12 Validity And Reliability

#### 3.12.1 Validity

Validity refers to how accurate data modification tools are, which encourages the gathering of accurate and correct information and data. Before beginning the data-gathering process in this investigation, the investigator requested a reproductive health expert to evaluate the tools meant for data gathering. Whereas the accuracy of data extracted could not be 100% the researcher ensured that all that was documented especially as patient demographic data, management, and outcome was captured as documented on the patient's record as the true data for that case in reference.

#### 3.12 .2 Reliability

The degree to which instruments designed for gathering data yield comparable results when administered to the same research participants in multiple scenarios is referred to as reliability. Ten (10%) of the sample size was used in this instance to assess the validity of the data-gathering instruments. The Wajir County level 5 Hospital in Wajir handled this. The Cronbach alpha reliability was calculated using SPSS version 27, as research indicates that internal consistency of greater than 0.7 is accepted in the literature. From, this research, the internal consistency of the data-gathering tool was 0.86, which was considered appropriate for collecting data.

**Summary**

As indicated in Table 1, All the Cronbach's alpha test scores were >0.7 indicating that the questionnaire was reliable in representing the underlying constructs in the study. The overall Cronbach's alpha test score was 0.86.

**Table 1: Reliability test results**

| Reliability Statistics | | |
|---|---|---|
| | Cronbach's Alpha[a] | N of Items |
| Maternal mortality | .90 | 1 |
| Patient-related factors | .86 | 8 |
| Health facility factors | .81 | 7 |
| ANC uptake | .87 | 3 |

### 3.13 Data Analysis Plan

Data obtained from the field underwent a thorough cleaning process before actual analysis. This step was crucial to identify and address omissions, incomplete responses, inconsistencies, and double entries, ensuring the quality and integrity of the dataset. The cleaned data was subsequently imported from Microsoft Excel into SPSS version 29 for statistical analysis. Descriptive statistics, specifically percentages and frequencies, were employed to summarize the data, as the variables under study were predominantly categorical. For the first objective, which aimed to assess the prevalence of maternal mortality, a simple descriptive analysis was conducted to determine the rate of maternal deaths. To explore the association between maternal mortality and selected factors (sociodemographic characteristics, antenatal care (ANC) uptake, and health system factors), inferential statistics were used. The chi-square test for independence assessed the presence of associations between categorical variables. Variables that demonstrated a significant association at the bivariate level ($p \leq 0.05$) were then included in a binary

logistic regression model to control for potential confounding factors and to estimate adjusted odds ratios (AOR) with corresponding 95% confidence intervals. The threshold for statistical significance was set at $p \leq 0.05$ throughout the analysis. For the qualitative component of the study, thematic analysis was employed. Audio recordings were transcribed verbatim, and transcripts were carefully reviewed and coded to identify emerging patterns and themes relevant to maternal mortality and the influencing factors. Triangulation of qualitative and quantitative findings enhanced the robustness and credibility of the study results. Table 2 below outlines the detailed analysis plan adopted for this study.

**Table 2: Data analysis plan**

| Objective | Type of data | Method of analysis |
|---|---|---|
| Mortality rate | Quantitative data | ✓ Frequencies and percentages |
| Health-related factors | Quantitative data | ✓ Frequencies and percentages<br>✓ Chi-square<br>✓ Binary logistic regression |
| | Qualitative data | ✓ Thematic analysis |
| ANC uptake | Quantitative data | ✓ Frequencies and percentages<br>✓ Chi-square<br>✓ Binary logistic regression |
| | Qualitative data | ✓ Thematic analysis |
| Patient-related | Quantitative data | ✓ Frequencies and percentages<br>✓ Chi-square<br>✓ Binary logistic regression |
| | Qualitative data | ✓ Thematic analysis |

### 3.14 Ethical Consideration.

To obtain approval for the investigation, the ethics review committee at Mount Kenya University was consulted, and permission was sought from NACOSTI (NACOSTI/P/24/33686) to conduct research in the designated area. Additional authorization was requested from the county commissioner, the county health department, and other relevant county offices. The ethics and review committee at Wajir County Referral Hospital was also approached for further ethical clearance. Prior to initiating the data collection phase, the researcher secured consent forms from the study participants (key informants), ensuring that participation was voluntary. The confidentiality and anonymity of participants were rigorously upheld. Any patient information gathered from hospital records was password-protected and shared solely with the hospital's consent.

# CHAPTER FOUR

# RESULTS AND DISCUSSION

## 4.1 Introduction

In this section, the study's findings are presented along with information on the prevalence of maternal mortality, the relationship between maternal mortality and the use of antenatal care services, the factors related to social demographics and health facilities, and the rate of maternal death.

## 4.2 Research response rate

366 questionnaires were sent to the records files of eligible study participants. This study's response rate was 98%, meaning that 359 study questionnaire records were deemed suitable for data analysis.

## 4.3 Social Demographic Characteristics of the Study Respondents

Table 3 below presents descriptive statistics regarding the socio-demographic characteristics of the study participants. In terms of age, 235 respondents (65.5%) were between 18 and 23 years old, likely reflecting their prime reproductive age, while 25 respondents (7%) were aged 36 to 40 years. Regarding educational attainment, 125 participants (34.8%) had completed primary education, which may be attributed to the availability of free primary education in Kenya, while only 11 respondents (3.1%) had achieved a tertiary level of education. In terms of marital status, 270 participants (75.2%) were married, a figure that may be linked to strong cultural norms and traditions that promote marriage, while 52 respondents (14.5%) were single. As for income levels, 181 participants (50.4%) reported earnings of less than 10,000 Ksh, likely due to limited economic opportunities and low monthly wages; 48 respondents (13.4%) earned between 20,001 and 30,000 Ksh.

Regarding religion, 323 participants (90%) identified as Muslim, reflecting the region's predominantly Muslim population, while only 10% identified as Christian. Concerning smoking history, 31 respondents (8.6%) were smokers, possibly linked to the lack of health education about the risks of smoking during pregnancy. Among smokers, 4 (64.5%) reported smoking 1 to 2 times per week. With respect to alcohol consumption, 26 participants (7.2%) reported drinking alcohol, which may also be connected to insufficient health education regarding the dangers of alcohol during pregnancy. Among those who consumed alcohol, 22 respondents (84.6%) drank 1 to 2 times per week.

**Table 3: Social Demographic Characteristics of the Study Respondents**

| Variables | Categories | Frequencies | Valid percentage |
|---|---|---|---|
| Age | 18-23 | 235 | 65.5 |
| | 24-29 | 79 | 22 |
| | 30-35 | 20 | 5.6 |
| | 36-40 | 25 | 7 |
| Education level | No formal education | 137 | 38.2 |
| | Primary | 125 | 34.8 |
| | Secondary | 86 | 24 |
| | tertiary | 11 | 3.1 |
| Marital status | Married | 270 | 75.2 |
| | separated | 37 | 10.3 |
| | Single | 52 | 14.5 |
| Income | 1-10000 | 181 | 50.4 |
| | 10001-20000 | 130 | 36.2 |
| | 20001-30000 | 48 | 13.4 |
| Alcohol consumption | yes | 26 | 7.2 |
| | no | 333 | 92.8 |
| Frequency of alcoholism | 1-2 times a week | 22 | 84.6 |
| | 3-4 times a week | 4 | 15.4 |
| religion | Christian | 36 | 10 |
| | Muslims | 323 | 90 |
| smoking | yes | 31 | 8.6 |
| | no | 328 | 91.4 |
| Frequency of smoking | Onces a week | 4 | 12.9 |
| | 1-2 times a week | 20 | 64.5 |
| | 3-4 times a week | 7 | 22.6 |

**Source: Primary data**

### 4.4 Prevalence of Maternal Mortality from Abstracted Data

According to data abstraction tools, Out of the 359 patient files obtained covering the period from January 2017 to February 2023, only 15 files had documented cases of maternal death. Wajir County had a prevalence of maternal mortality of 4.2 percent, or 4,178 deaths per 100,000 live births, as shown in Figure 2 below. The World Health Organization aims for zero maternal mortality among pregnant women, a rate that is much higher than this one. One possible explanation for Wajir County's high maternal mortality rates which are among the highest three in Kenya could be the dearth of maternal health services in the region. These results are in stark contrast to a study done in Nepal (Sitaula et al.), where the maternal mortality ratio was significantly lower at 129 per 100,000 live births. 2021).

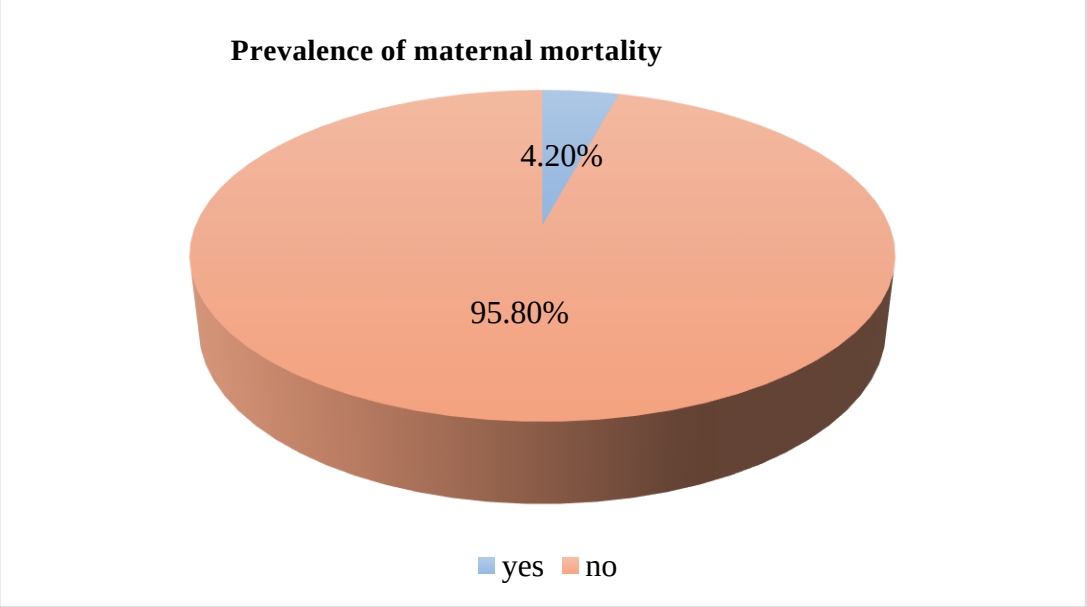


**Figure 2: Prevalence of maternal mortality**

### 4.5. Social Demographic Factors Associated with Maternal Mortality

#### 4.5.1 Social Demographic Factors Associated with Maternal Mortality

As indicated in *Table 4* below, Concerning the age of the study respondents, 24(96%) of the study partakers who never experienced maternal mortality were aged between 36-40 years. Young mothers, particularly adolescents, may face increased risks of complications

during pregnancy and childbirth due to their bodies not being fully matured, lack of access to proper healthcare, and socioeconomic factors. There was a significant statistical relationship when the chi-square test for independence was done between maternal age and maternal mortality ($\chi^2=16.522$, $df=3$, $p^*=0.001$).

As shown in Table 4 below, regarding the education level of the participants, 8 respondents (5.8%) who experienced maternal mortality had no formal education. Education equips women with essential knowledge about reproductive health, family planning, and the importance of seeking timely medical care during pregnancy and childbirth. Educated women are generally more empowered to make informed health decisions and seek appropriate healthcare services when necessary. A significant statistical association was found between education level and maternal mortality, as indicated by the chi-square test for independence ($\chi2=11.652$, df=3, p=0.009).

As indicated in Table 4 below, concerning the religion of the study respondents, 4(11.1%) of the study respondents who experienced maternal mortality were Christians. Religious beliefs can shape cultural attitudes towards pregnancy, childbirth, and healthcare-seeking behavior. In some cultures, religious beliefs may influence decisions about whether and when to seek prenatal care, utilize skilled birth attendants, or access emergency obstetric care. Certain religious practices or beliefs may discourage or prohibit medical interventions, potentially leading to delays in receiving essential healthcare services during pregnancy and childbirth. There was no significant statistical association when the chi-square test for independence was done between religion and maternal mortality ($\chi^2=0.084$, $df=1$, $p=0.772$).

These findings were contrary to the qualitative data where one of the key informants noted that:

"*Religion can affect access to healthcare services through factors such as healthcare infrastructure, funding, and religious-based healthcare facilities. In some regions, religious institutions play a significant role in providing healthcare services, and access to maternal healthcare may be influenced by the availability and accessibility of religious-affiliated healthcare facilities. Additionally, religious beliefs may influence decisions about whether to seek care from secular healthcare providers or religious healers*….."(KII 5, Nurse)

The findings from this study were consistent with those of a study carried out in Ethiopia(Tesfay et al., 2022b). However, another study carried out in Somalia found an association between maternal mortality and religion(Aden et al., 2019).

As indicated in *Table 4* below, concerning the income level of the study respondents, 47(97.9%) of the study partakers who never experienced maternal mortality were earning between 20001-30000 Ksh. Higher income levels often correlate with better access to healthcare services, including prenatal care, skilled birth attendants, and emergency obstetric care. Women with higher incomes are more likely to afford healthcare expenses, transportation to healthcare facilities, and health insurance, which can facilitate timely access to essential maternal healthcare services and reduce the risk of maternal mortality. There was a significant statistical association between income level and maternal mortality when the chi-square test for independence was done ($\chi^2=11.088, df=2, p^*=0.004$).

As indicated in Table 4 below, concerning the smoking status of the study respondents, 314(95.7%) of the study partakers who never experienced maternal mortality were smokers. Smoking during pregnancy is associated with an increased risk of various

complications such as placental abruption, preterm birth, low birth weight, and stillbirth. These complications can directly contribute to maternal mortality, especially if they are severe or lead to obstetric emergencies that are not adequately managed. There was no significant statistical association between smoking and maternal mortality when the chi-square test for independence was done ($\chi^2=0.00$,$df=1$, $p=0.989$).

These findings were contrary to the qualitative data where one of the key informants noted that:

> "*Women who smoke during pregnancy may be less likely to seek prenatal care or adhere to medical recommendations, such as quitting smoking or attending regular check-ups. This can result in delayed diagnosis and management of pregnancy-related complications, increasing the risk of adverse outcomes, including maternal mortality……*"(KII 3,Community health worker).

The findings from this investigation agreed with those of a study carried out in Rwanda(Patrick et al., 2022). This was contrary to an investigation carried out in Nigeria where smoking was associated with maternal mortality (Azuh et al., 2017b).

As indicated in Table 4 below, concerning the marital status of the study respondents, 259(95.9%) of the study partakers who never experienced maternal mortality were married. Married women may have greater social support networks, including emotional, financial, and practical assistance, which can positively impact their overall health during pregnancy and childbirth. This support can lead to better adherence to prenatal care, timely access to healthcare services, and improved management of pregnancy complications, ultimately reducing the risk of maternal mortality. There was a significant

statistical association between marital status and maternal mortality when the chi-square test for independence was done ($\chi^2=12.219, df=2, p=0.002$).

As indicated in Table 4 below, concerning the alcohol consumption status of the study respondents, 25(96.2%) of the study partakers who never experienced maternal mortality were taking alcohol. Alcohol use during pregnancy is associated with an increased risk of adverse pregnancy outcomes, including miscarriage, stillbirth, preterm birth, and low birth weight. These complications can directly or indirectly contribute to maternal mortality, especially if they lead to obstetric emergencies or long-term health problems for the mother. There was no significant statistical association between alcohol consumption and maternal mortality when the chi-square test for independence was done ($\chi^2=1.11, df=1, p^*=0.292$).

These findings were contrary to the qualitative data where one of the key informants noted that:

> "*Alcohol use during pregnancy can worsen pre-existing health conditions in pregnant women, such as hypertension, diabetes, and mental health disorders, increasing the risk of maternal mortality. Chronic alcohol consumption can weaken the immune system, making pregnant women more susceptible to infections and other health problems that can complicate pregnancy and childbirth……*"(KII 2, Nurse).

The findings from this investigation agreed with those of a study carried out in Togo(Douaguibe et al., 2023). This was contrary to an investigation carried out in South Africa where alcohol consumption was associated with maternal mortality (Bomela, 2020).

**Table 4:Social Demographic Factors Associated with Maternal Mortality**

| Independent variables | Categories | Dependent Variable ( Maternal Mortality) | | Statistical Significance |
|---|---|---|---|---|
| | | Yes(N=15) | No(N=344) | |
| Age | 18-23 | 8(3.4%) | 227(96.6%) | $\chi^2$=16.522 |
| | 24-29 | 3(3.8%) | 76(96.2%) | df=3 |
| | 30-35 | 3(15%) | 17(85%) | p*=0.001 |
| | 36-40 | 1(4%) | 24(96%) | |
| Education level | No formal education | 8(5.8%) | 129(94.2%) | $\chi^2$=11.652 df=3 |
| | primary | 3(2.4%) | 122(97.6%) | p=0.009 |
| | secondary | 4(4.7%) | 82(95.3%) | |
| | tertiary | 0(0%) | 11(100%) | |
| Marital status | married | 11(4.1%) | 259(95.9%) | $\chi^2$=12.219 |
| | separated | 3(8.1%) | 34(91.9%) | df=2 |
| | single | 1(1.9%) | 51(98.1%) | p=0.002 |
| Income | 1-10000 | 9(5%) | 172(95%) | $\chi^2$=11.088 |
| | 10001-20000 | 5(3.8%) | 125(96.2%) | df=2 |
| | 20001-30000 | 1(2.1%) | 47(97.9%) | p*=0.004 |
| Alcohol consumption | yes | 1(3.8% ) | 25(96.2%) | $\chi^2$=1.11 |
| | no | 14(4.2%) | 319(95.8%) | df=1 p*=0.292 |
| Religion | Christian | 4(11.1%) | 32(88.9%) | $\chi^2$=0.084 |
| | Muslims | 31(9.6%) | 292(90.4%) | df=1 p=0.772 |
| Smoking | yes | 1(3.2%) | 30(96.8%) | $\chi^2$=0.00 |
| | no | 14(4.3%) | 314(95.7%) | df=1 p=0.989 |

**Fisher test=p***

**Source: Primary data**

### 4.5.2 Binary Logistic Regression Social Demographic Factors Associated with Maternal Mortality

As provided in Table 5 maternal age was an independent factor for maternal mortality (p=.004) when the binary logistic regression analysis was done. Furthermore, study partakers aged 18-23 years were 3.7 more times likely to experience maternal mortality as compared to their counterparts. Adolescents may not seek or have access to adequate prenatal care, which can lead to undetected or untreated medical conditions that increase the risk of complications during pregnancy and childbirth.

These findings were in agreement with the qualitative data where one of the key informants narrated that:

> "*I would say that adolescent bodies are often not fully developed, which can lead to complications during pregnancy and childbirth. Their pelvic bones may not be fully grown, making childbirth more difficult and increasing the risk of obstructed labor. In addition, Young mothers are at higher risk of complications such as preterm birth, low birth weight, and eclampsia (high blood pressure during pregnancy), all of which can contribute to maternal mortality……*"(KII 3, Community health worker).

The findings from this study align with those of a study conducted in Zambia (Moyo et al., 2018a). In contrast, a study in Ethiopia found no association between maternal age and maternal mortality (Getachew et al., 2017).

As provided in Table 5 education level was not identified as an independent factor influencing maternal mortality (p=0.116) when the binary logistic regression analysis. These findings were not in agreement with the qualitative data where one of the key informants narrated that:

"*Women with higher levels of education are more likely to have better access to healthcare services, including prenatal care, skilled birth attendants, and emergency obstetric care. This can reduce the risk of complications during pregnancy and childbirth, ultimately leading to lower maternal mortality ra*tes……..")(KII 3, Community health worker).

Another key informant noted that:

"*Education can empower women to assert control over their reproductive health and make decisions about family planning, pregnancy, and childbirth. This autonomy can lead to better health outcomes and lower maternal mortality rates……"*( KII 1, community health volunteer).

The findings from this research were consistent with those of a study carried out in Nigeria(Sageer et al., 2019). However, in another study carried out in Tanzania, a higher education level was found to reduce the risk of maternal mortality(Mapunda et al., 2017). These findings were consistent in the binary logistic regression analysis where income level was an independent factor for maternal mortality (p=.003). Furthermore, study participants who were earning between 1-10000 Ksh were 5.3 times more likely to experience maternal mortality as compared to those earning between 20001-30000 Ksh. These findings were in harmony with the qualitative data where one of the key informants narrated that:

"*Women with higher incomes may have access to higher-quality healthcare services, including facilities with better infrastructure, medical equipment, and trained healthcare providers. Quality of care is essential for preventing and managing pregnancy complications effectively, ultimately reducing maternal mortality rates……"* (KII 5, Nurse).

The results from this research agreed with those of a study carried out in SSA(Yaya et al., 2018). This was contrary to an investigation carried out in Nigeria where income was not associated with maternal mortality(Ariyo et al., 2017).

As provided in Table 5 marital status was an independent factor for maternal mortality(p=.03) when binary logistic regression analysis was done. In addition, study respondents who were married were 3.9 less likely to experience maternal mortality as compared to those who were single. Marriage is often associated with greater economic stability due to shared resources, financial support from a spouse, and access to health insurance coverage. Economic stability is crucial for accessing prenatal care, nutritious food, and other essential resources necessary for a healthy pregnancy and reducing the risk of maternal mortality.

These findings were in harmony with the qualitative data where one of the key informants narrated that:

> "*Married women may have better access to healthcare services, including prenatal care, skilled birth attendants, and emergency obstetric care, compared to unmarried women. This can be attributed to factors such as shared health insurance coverage, spousal support in navigating the healthcare system, and assistance with transportation to healthcare facilities, all of which contribute to lower maternal mortality rates among married women……*"(KII 1, community health volunteer)

The study findings were in agreement with those of a study done in Ghana(Yarney, 2019). However, another study conducted in Zimbabwe was contrary to these outcomes as marital status was not associated with maternal mortality(Manyeh et al., 2018).

**Table 5: Binary Logistic Regression on Social Demographic Factors Associated with Maternal Mortality**

| Variables in the Equation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | 95% C.I.for EXP(B) | |
| | B | S.E. | Wald | df | Sig. | Exp(B) | Lower | Upper |
| **Step1** study respondents age | | | 13.210 | 3 | .004 | | | |
| 18-23 | -.749 | 1.074 | .486 | 1 | .023 | 3.7 | .058 | 3.881 |
| 24-29 | -.246 | 1.159 | .045 | 1 | .832 | .782 | .081 | 7.580 |
| 30-35 | -2.708 | 1.189 | 5.189 | 1 | . 486 | .473 | .006 | .685 |
| income level | | | 11.924 | 2 | .003 | | | |
| 1-10000 | -1.675 | .796 | 4.427 | 1 | .035 | 5.3 | .039 | .892 |
| 10001-20000 | -.115 | .877 | .017 | 1 | .896 | .892 | .160 | 4.978 |
| education level | | | 10.339 | 3 | .116 | | | |
| Noformal education | -1.253 | .261 | 7.762 | 1 | .145 | 3.6 | .112 | .453 |
| Primary | -1.254 | .340 | 6.877 | 1 | .343 | .289 | .214 | .531 |
| Secondary | -.565 | .432 | 2.118 | 1 | .142 | .455 | .152 | 1.436 |
| marital status | | | 16.055 | 2 | .03 | | | |
| Married | 1.371 | .502 | 7.458 | 1 | .006 | 3.939 | 1.473 | 10.537 |
| Separated | -.618 | .618 | .998 | 1 | .318 | .539 | .160 | 1.812 |
| **Constant** | **22.339** | **1125.858** | **.000** | **1** | **.998** | **503.598** | | |

**Source: Primary data**

### 4.6 Association between Uptake of Antenatal Care Services and Maternal Mortality

#### 4.6.1 Descriptive Statistics on Uptake of Antenatal Care Services

As indicated in Table 6 below, 213(59.3%) of the study respondents had sought antenatal care services which could be linked to easy access to maternal care services, 146(40.7%) of the study respondents had not sought antenatal care services. Concerning the frequency of antenatal care visits, 68(31.9%) of the study respondents had 3-4 antenatal care visits while 145(68.1%) of the study respondents had 1-2 antenatal care visits. Concerning the gestation period at which the mother had Antenatal care visits.139(65.2%) of the study respondents sought antenatal care visits during their 2nd trimester. While 7(3.3%) of the study respondents sought antenatal care visits during the 1st trimester.

**Table 6:Descriptive Statistics on Uptake of Antenatal Care Services**

| Independent variables | Categories | Frequencies | Valid percentage |
|---|---|---|---|
| ANC uptake | yes | 213 | 59.3 |
| | no | 146 | 40.7 |
| Frequency of ANC visits | 1-2 times | 145 | 68.1% |
| | 3-4 times | 68 | 31.9% |
| Gestation period at 1st visit | 1st trimester | 7 | 3.3% |
| | 2nd trimester | 139 | 65.2% |
| | 3rd trimester | 67 | 31.5% |

**Source: Primary data**

### 4.6.2 Association between Uptake of Antenatal Care Services and Maternal Mortality

As indicated in Table 7 , Concerning the uptake of antenatal care services, 205(96.2%)of the study participants who never experienced maternal mortality had sought antenatal care services. The uptake of antenatal care services plays a crucial role in reducing maternal mortality rates. There was a statistical association between the uptake of antenatal care services and maternal mortality when the chi-square test for independence was done($\chi 2=10.08, df=1, p=0.001$). These findings were consistent in the binary logistic regression analysis where uptake of antenatal care services was an independent factor for maternal mortality(p=.002).

***Table 7*:Association between Uptake of Antenatal Care Services and Maternal Mortality**

| **Independent variables** | **Categories** | **Dependent Variable ( Maternal Mortality)** | | **Statistical Significance (Chi-square test)** |
|---|---|---|---|---|
| | | **Yes(N=15)** | **No(N=344)** | |
| ANC uptake | yes | 8(3.8%) | 205(96.2%) | $\chi^2$=10.08 |
| | no | 7(4.8%) | 139(95.2%) | df=1 |
| | | | | p=0.001 |
| Frequency of ANC visits | 1-2 times | 3(3.4%) | 140(96.6%) | $\chi^2$=0.281 |
| | 3-4 times | 8(4.4%) | 65(95.6%) | df=1 |
| | | | | p*=0.59 |

**Source: Primary data**

### 4.6.3 Binary Logistics Regression on Antenatal Care Services

As provided in Table 8, study respondents who never sought antenatal care services were 3.1 times more likely to experience maternal mortality. Antenatal care visits provide an opportunity for healthcare providers to educate pregnant women about healthy behaviors, proper nutrition, and warning signs of potential complications. This education empowers women to make informed decisions about their health and seek appropriate care when needed, ultimately reducing the risk of maternal mortality.

These findings were in harmony with the qualitative data where one of the key informants noted that:

> "*Antenatal care services often include guidance on birth planning and preparation for delivery. Women who attend antenatal care are more likely to deliver with skilled birth attendants in a healthcare facility, where emergency obstetric care is available if complications arise during labor and delivery. This significantly reduces the risk of maternal mortality compared to delivering without skilled assistance……"*(KII 2, Nurse).

The study findings were in agreement with a study done in Congo where the uptake of antenatal care services was associated with maternal mortality(Ramazani et al., 2022). This was contrary to a study done in Namibia which found no association between antenatal care services uptake and maternal mortality(Kornelius, 2018)

**Table 8: Binary Logistic Regression analysis on the Association between Uptake of Antenatal Care Services and Maternal Mortality**

| Variables in the Equation | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **B** | **S.E.** | **Wald** | **df** | **Sig.** | **Exp(B)** | **95% C.I.for EXP(B)** | |
| | | | | | | | | **Lower** | **Upper** |
| **Step 1[a]** | ANC uptake | -1.14 | .374 | 9.316 | 1 | .002 | 3.1<br>**ref** | .153 | .665 |
| | **Constant** | **3.960** | **.636** | **38.737** | **1** | **.000** | **52.463** | | |

**Source: Primary data**

### 4.7 Health Facility Factors Associated With Maternal Mortality

#### 4.7.1 Descriptive Statistics on Health Facility Factors

Table 9 below provides descriptive statistics on health facility factors, Concerning the utilization of emergency obstetric and newborn care services, 199(55.4%) of the study respondents had utilized the EmONC services which could be linked to the availability of these services while 160(44.6%) had not utilized EmONC services. Assisted vaginal delivery was the most(44.2%) reported emergency obstetric and newborn care service which was utilized while blood transfusion was the least(2%) utilized emergency obstetric and newborn care service. Concerning the provision of maternal health education, 228(63.5%) of the study respondents' records indicated the provision of maternal health education which could be linked to the provision of antenatal care services, 131(36.5%) of the study respondents didn't receive maternal health education. Concerning distance taken to the nearest health facility to seek maternal care services, 170(47.4%) of the study respondents took more than an hour to reach the nearest health facility. This could be linked to a lack of mobile clinics as well as a lack of health facilities in this region. Concerning the presence of skilled birth attendants when seeking maternal care services, more than half(63.2%) of the study respondents sought maternal care services from skilled birth attendants while 132(36.8%) never sought maternal care services from skilled birth attendants. This could be linked to the presence of traditional birth attendants and a lack of enough skilled birth attendants. Concerning the uptake of postpartum care, 99(27.6%) of the study respondents sought postpartum care. Lastly concerning the presence of referral systems and transport services, 109(30.4%) of the study respondents sought Referral systems and transport services, this could be linked to poor health services in this region.

**Table 9:Descriptive Statistics on Health Facility Factors**

| Independent variables | Categories | Frequencies | Valid percentage |
|---|---|---|---|
| Emonc services | yes | 199 | 55.4% |
| | no | 160 | 44.6% |
| Type of Emonc | Retained products | 38 | 19.1% |
| | Assisted v.delivery | 88 | 44.2% |
| | Placenta removal | 32 | 16.1% |
| | antibiotics | 9 | 4.5% |
| | Uterotonics drugs | 14 | 7% |
| | Blood transfusion | 4 | 2% |
| | CS | 14 | 7% |
| Maternal health education | yes | 228 | 63.5% |
| | no | 131 | 36.5% |
| Distance to the health facility | 1-30 | 31 | 8.6% |
| | 31-60 | 158 | 44% |
| | >1 | 170 | 47.4% |
| Skilled birth attendants | yes | 227 | 63.2% |
| | no | 132 | 36.8% |
| Referral system and transport services | yes | 109 | 30.4% |
| | no | 250 | 69.6% |
| Postpartum care | yes | 99 | 27.6% |
| | no | 260 | 72.4% |

**Source: Primary data**

### 4.7.2 Health Facility Factors Associated With Maternal Mortality

Regarding the use of emergency obstetric and newborn care services, 190 (93 points five percent) of the study participants who had never experienced maternal mortality had made use of such services, as shown in Table 10 below. Pregnant women who use EMONC services are guaranteed access to emergency care and skilled care in the event that complications during pregnancy, childbirth, or the postpartum period arise. Maternal mortality can be decreased by preventing delays in receiving life-saving treatments through timely access to appropriate care. Using the chi-square test for independence, there was a statistically significant correlation between the use of emergency obstetric and newborn care services and maternal mortality ($\chi2=5.251, df=1, p=0.02$).

Regarding the adoption of maternal health education, 221 (96.9%) of the research participants who had never experienced maternal death had done so, as shown in Table 8 below. Women who receive maternal health education are more likely to seek early and consistent antenatal care, which enables prompt identification and treatment of underlying medical conditions and pregnancy-related complications. Prenatal care visits give medical professionals the chance to educate expectant mothers about healthy pregnancy practices, perform preventive interventions, and screen for risk factors. When the chi-square test for independence was performed, there was no statistically significant correlation found between the adoption of maternal health education and maternal mortality ($\chi2=0.678, df=1, p=0.42$).

These findings were contrary to the qualitative data where one of the key informants noted that:

> "*Maternal health education emphasizes the importance of birth preparedness and complication readiness, including identifying the signs of obstetric*

*emergencies, developing a birth plan, and arranging for transportation to a health facility for delivery. Women who are educated about potential complications are more likely to seek timely care when problems arise, reducing the risk of maternal mortality……*"(KII 3,Community health worker).

These results were consistent with research conducted in Ethiopia (Tesfay et al. 2022b). Nevertheless, a different Nigerian study found that the odds of maternal mortality increased by three in the absence of maternal health education (Ntoimo et al. 2018a).

Regarding the travel time to the closest medical facility, Table 10 below show that 30 study participants (or 96.8%) who had never experienced a maternal death said it took them less than 30 minutes to get there. Reduced maternal mortality rates are linked to shorter travel times to medical facilities. The chi-square test for independence revealed a statistically significant relationship between travel time to medical facilities and maternal mortality ($\chi 2=11.383, df=2 p=0.003$).

Regarding the availability of skilled birth attendants, 220 (96.9%) of the study participants who had never experienced maternal death reported using skilled birth attendants for maternal care services, as shown in Tables 8 and 9 below. Competent labor attendants are educated to identify and promptly address any symptoms of obstetric complications, including prolonged labor, eclampsia, and postpartum hemorrhage. Preventing maternal deaths requires early detection and quick management of complications. Upon performing the chi-square test for independence, there was a statistically significant correlation found between the availability of skilled birth attendants and maternal mortality ($\chi 2=6.924, df=1, p=0.009$).

95 (96 percent) of the study participants who had never experienced maternal death had sought postpartum care, as shown in Table 10 below. Postpartum care entails keeping an eye out for any indications of complications that may occur following childbirth, such as infection, thromboembolism, hypertensive disorders, or postpartum hemorrhage. Preventing maternal deaths requires early identification and timely treatment of these issues. When the chi-square test for independence was performed, there was no statistically significant correlation between seeking postpartum care and maternal mortality ($\chi 2=0.067, df=1, p=0.79$).

These findings disagreed with the qualitative data where one of the key informants noted that:

> "*Postpartum care involves screening for postpartum depression, anxiety, and other mental health disorders that may affect the mother's well-being. Identifying and addressing mental health issues are essential for preventing adverse outcomes and reducing the risk of maternal mortality associated with untreated mental health conditions……"*(KII5,Medical doctor)

These findings were in agreement with another study done in Malawi(Mgawadere et al., 2017). However, this was contrary to a study done in Nigeria which found lack of postpartum care increased the odds of maternal mortalitySageer et al., 2019).

**Table 10: Health Facility Factors Associated With Maternal Mortality**

| Independent variables | Categories | Dependent Variable ( Maternal Mortality) | | Statistical Significance (Chi-square test) |
|---|---|---|---|---|
| | | Yes(N=15) | No(N=344) | |
| Enmoc services | no | 6(3.8%) | 154(96.2%) | $\chi^2$=5.251 |
| | yes | 9(4.5%) | 190(93.5%) | df=1 |
| | | | | p=0.02 |
| Maternal health education | yes | 7(3.1%) | 221(96.9%) | $\chi^2$=0.678 |
| | no | 8(6.1%) | 123(93.9%) | df=1 |
| | | | | p=0.42 |
| Distance to the health facility | 1-30 mins | 1(3.2%) | 30(96.8%) | $\chi^2$=11.383 |
| | 31-60 mins | 4(2.5%) | 155(97.5%) | df=2 |
| | >1hr | 10(5.9%) | 160(94.1%) | p*=0.003 |
| Skilled birth attendants | no | 8(6.1%) | 124(93.9%) | $\chi^2$=6.924 |
| | yes | 7(3.1%) | 220(96.9%) | df=1 |
| | | | | p=0.009 |
| Referral system and transport services | yes | 2(1.8%) | 107(98.2%) | $\chi^2$=4.74 |
| | no | 13(5.2%) | 237(94.8%) | df=1 |
| | | | | p*=0.02 |
| Postpartum care | yes | 4(4%) | 95(96%) | $\chi^2$=0.067 |
| | no | 11(4.2%) | 249(95.8%) | df=1 |
| | | | | p*=0.79 |

**Fisher test=p***

**Source: Primary data**

### 4.7.3 Binary Logistic Regression Analysis on Health Facility Factors

As provided in Table 11, the use of emergency obstetric and newborn care services independently predicted maternal death (p=. 02). Furthermore, the study participants who did not make use of emergency obstetric and newborn care services had a 24 times higher likelihood of experiencing maternal mortality. The availability, accessibility, and caliber of care offered at medical facilities affect how often people use EMONC services. The efficiency of EMONC services in preventing maternal deaths can be impacted by a number of factors, including the availability of necessary supplies and equipment, the presence of skilled staff, and adherence to evidence-based clinical guidelines.

These findings were in harmony with the qualitative data where one of the key informants narrated that:

> "*EMONC services provide essential interventions to manage obstetric complications such as postpartum hemorrhage, eclampsia, sepsis, and obstructed labor. Prompt recognition and management of these complications can prevent maternal deaths that may occur without timely medical intervention……*."(KII 1, community health volunteer)

These results concurred with those of a different study conducted in Nepal (Sitaula et al. 2021). These results, however, disagreed with those of another Indonesian study (Cameron et al.) that found no link between the use of EMONC services and maternal mortality. 2019).

As provided in Table 11, maternal mortality was independently influenced by the distance to the medical facility (p=. 01). Furthermore, compared to those who took longer than an hour, study participants who said it took them 30 to 60 minutes to get to the closest medical facility had a 3 point 9 lower risk of maternal death. Living distant from medical facilities can make it difficult for women to get timely antenatal care, professional birth attendance, and emergency obstetric care. When problems during pregnancy or childbirth arise, women may be discouraged or delayed in seeking care due to factors such as poor road infrastructure, long distances, and lack of transportation.

These findings disagreed with the qualitative data where one of the key informants noted that:

> **"***I would say Referral systems and transport services help overcome barriers to care-seeking, such as distance, lack of transportation, and financial constraints, which can delay women from seeking timely medical attention during pregnancy and childbirth. By addressing these barriers, referral systems and transport services contribute to reducing delays in care-seeking and improving maternal health outcomes…..*"(KII 3,Community health worker).

These results concurred with those of a different study conducted in Nigeria (Ntoimo et al. 2018b). This, however, ran counter to a study conducted in Egypt that found that the likelihood of maternal death rose in the absence of referral systems and transportation services (Mohamed et al. 2019).

As provided in Table 11, maternal mortality was independently influenced by the availability of trained birth attendants (p=. 02). Furthermore, the odds of maternal mortality increased by a factor of two due to the lack of trained birth attendants. Maternal mortality rates are significantly lower when skilled birth attendants (SBAs) are present. Healthcare professionals with training, such as midwives, nurses, or doctors, are skilled birth attendants.

These findings were in harmony with the qualitative data where one of the key informants narrated that:

> "*Skilled birth attendants provide continuity of care throughout the childbirth process, from antenatal care to postnatal care. They monitor the progress of labor, provide emotional support to women in labor, and ensure that appropriate care is provided during the postpartum period, reducing the likelihood of maternal deaths due to untreated complications or inadequate postnatal care……*"(KII5,Medical doctor)

The results were consistent with a study conducted in Lesotho that found that having trained birth attendants decreased the risk of maternal death (Seotla, 2020). In contrast, a study conducted in Ethiopia found no correlation between the presence of skilled birth attendants and maternal mortality Tessema et al. 2017.

**Table 11: Binary Logistic Regression Analysis on Health Facility Factors**

| Variables in the Equation | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **B** | **S.E.** | **Wald** | **df** | **Sig.** | **Exp(B)** | **95% C.I.for EXP(B)** | |
| | | | | | | | | **Lower** | **Upper** |
| **Step 1[a]** | distance to the health facility | | | 11.609 | 2 | .003 | | | |
| | 1-30 mins | 1.741 | 1.052 | 2.736 | 1 | .098 | 5.701 | .725 | 44.841 |
| | 30-60 mins | 1.369 | .435 | 9.883 | 1 | .002 | 3.930 | 1.674 | 9.227 |
| | | | | | | | **ref** | | |
| | Referral Systems and Transport Services | -.904 | .512 | 3.117 | 1 | .077 | .405 | .149 | 1.105 |
| | | | | | | | **ref** | | |
| | skilled health care provider | -.885 | .378 | 5.471 | 1 | .019 | 2.4 | .196 | .866 |
| | | | | | | | **ref** | | |
| | Enmoc services | -.869 | .383 | 5.161 | 1 | .023 | 2.4 | .198 | .888 |
| | | | | | | | **ref** | | |
| | **Constant** | **5.886** | **1.223** | **23.176** | **1** | **.000** | **359.805** | | |

**Source: Primary data**

# CHAPTER FIVE

# SUMMARY, CONCLUSION AND RECOMMENDATIONS

## 5.0 Introduction

This section provides the research findings summary, conclusion, and recommendation from the study.

## 5.1 Summary

Maternal mortality in Wajir County was found to be 4 point 2 percent of the total, or 4,178 per 100,000 live births. This is much higher than the zero maternal deaths among pregnant women target set by the World Health Organization. In reference to the second goal, the analysis showed a statistically significant correlation between maternal mortality and the use of antenatal care (ANC) services, which led to the inclusion of ANC in the binary logistic regression. In the bivariate analysis, however, the frequency of ANC visits did not reveal a statistically significant correlation with maternal mortality. The variables of maternal age, education level, marital status, and income were found to have a statistically significant association with maternal mortality during bivariate analysis, which justified their inclusion in the binary logistic regression for the third objective, which examined socio-demographic factors related to maternal mortality. On the other hand, the bivariate analysis did not show a significant correlation between smoking, drinking alcohol, and religion and maternal mortality. The fourth objective pertained to health facility factors. Specifically, the bivariate analysis revealed a statistically significant correlation between maternal mortality and the variables of availability of transport services, presence of skilled birth attendants, distance to the health facility, presence of an existing referral system, and availability of EmONC services.

## 5.2 Conclusion

According to reports, 4 points 2 percent of women in Wajir County die before giving birth. Examining the second objective, which looked at the connection between maternal mortality and antenatal care (ANC) uptake, the results showed that a higher risk of maternal mortality was associated with inadequate ANC service use. The third goal looked at sociodemographic characteristics that are related to maternal death. It found that participants who were married had a lower risk of maternal death, while those who were between the ages of 18 and 23 and those who made between 1,000 and 10,000 Ksh had higher odds. It was discovered that not using emergency obstetric and newborn care (EmONC) services and the lack of trained birth attendants increased the odds of maternal mortality with regard to the fourth objective, which focused on health facility factors related to maternal mortality. On the other hand, a shorter risk of maternal death was associated with travel times of 30 to 60 minutes to the closest medical facility.

## 5.3 Recommendations

1. 1. The Wajir County government, the Ministry of Health, and relevant stakeholders must ensure that healthcare facilities are adequately prepared to manage obstetric emergencies such as hemorrhage, eclampsia, and obstructed labor. This includes training healthcare personnel in emergency obstetric care and supplying the necessary equipment and resources.
2. The Wajir County government, the Ministry of Health, and other stakeholders should guarantee a sufficient supply of skilled healthcare professionals, including obstetricians, midwives, and nurses, who are trained to manage childbirth and address obstetric emergencies. Access to these experts in hospital settings significantly reduces the risk of complications during childbirth that could lead to maternal mortality.

3. The Wajir County government, the Ministry of Health, and relevant stakeholders should advocate for the establishment of new healthcare facilities, such as hospitals, clinics, and maternity centers, in underserved regions to provide obstetric care closer to pregnant women. Additionally, expanding current facilities and ensuring they are adequately staffed and equipped can minimize the distance women must travel for maternal healthcare.
4. The Wajir County government, the Ministry of Health, and relevant stakeholders should implement community outreach programs, workshops, and awareness campaigns to inform pregnant women and their families about the importance of antenatal care (ANC), the benefits of early prenatal visits, and the services available at healthcare facilities, which play a crucial role in reducing maternal mortality.

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# APPENDICES

## Appendix I:Informed Consent

**Name of the researcher**: Fatuma Alim Jimale

**Research topic**: To ascertain the risk variables associated with maternal death among women who are of reproductive age and seeking medical attention at the Wajir County Referral Hospital in Wajir County, Kenya.

**Introduction and the Study Aim**

I'm Fatuma Alim Jimale, a graduate student at Mount Kenya University, and I'm currently conducting research at the Wajir County Medical Referral Hospital in Kenya on the factors associated with maternal death among women of reproductive maturity seeking care. The investigation aims to identify the precise factors linked to the death of mothers. The investigation is an integral part of my master's degree coursework and is of an entirely academic nature.

**Participation and Extraction from the Research**

Participation in the investigation is completely voluntary, and respondents may stop at any moment without suffering any consequences.

**Potential benefits**

You won't necessarily gain anything from taking part in this investigation, but you will learn more about the extent and contributing factors that affect the incidence of maternal mortality among women of reproductive years who visit Wajir County and Referral Hospital in Wajir County, Kenyas.

**Possible jeopardy and discomfort**

You may find certain of the questions to be bothersome or unsettling. You can choose in this state to ignore all of the questions and to end the conversation whenever you'd like. We ask that you dedicate 20 to 30 minutes to the conversation.

**Privacy and anonymity**

The final report will not use any kind of authentication to describe how the research's questions were answered. The surveys are going to be coded after a year, and the unique ones will be thrown away. It's an entirely educational inquiry.

**Contact information**

The following email addresses are for Fatuma Alim Jimale, ubahalim@ymail.com, 0723764262; and for the Mount Kenya University Institutional of Ethics and Review Committee: research@mku.ac.ke.

**Participant statement**

I have been informed of the objectives, advantages, and risks associated with the investigatory service. It is completely voluntary regarding my part, and I am free to discontinue it at any time. My inquiries concerning the inquiry have been addressed, and my data will be kept private. I hereby give my free consent to take part in the investigation.

Participant Signature /Thumbprint

……. Date ……

**Investigator statement**

I, the investigator, have given those who participated an explanation of the investigation's goal in a language they can comprehend.

Researcher Signature

…… Date ……

**Appendix II: Data Protection and Confidentiality Statement**

The study I am conducting on "factors related to the death of mothers among women of reproductive years seeking care at Wajir County referral hospital, Wajir County, Kenya" is led by me, Fatuma Alim Jimale. as a component of my public health master's program at Mount Kenya University. Examining the factors that contribute to the death of mothers in women who are fertile is the main objective of this research. The medical center records on the death rate of mothers among women of reproductive age seeking care at Wajir County and The referral Hospital in Wajir County, Kenya, are therefore where I must gather secondary data.

a. I am aware that the information gathered will be handled carefully and privately. I am also aware that it will be destroyed six months after the research's end date and will not be distributed to any other parties..
b. I am aware that the investigator, their primary managers, and relevant MOH and county medical records manager participants may review the data I submitted during the data gathering period.
c. I am aware that I have a responsibility to notify the relevant stakeholders of any suspected or actual breaches of the safety or privacy of any supplied well-being data or information.
d. I promise to follow the guidelines and instructions set forth in the Data Protection Act..

**Appendix III: Data abstraction tool**

Dear respondent, please take your time to respond to the question below. Please answer the responses that best suit you. In case of any question you can ask.

**Section A**

Patient-Related Factors

1.what is the age of the study respondent

1) 18-23 [ ]
2) 24-29 [ ]
3) 30-35 [ ]
4) 36-41 [ ]

2. What Is the level of income of the study respondent

1) 0-10000 [ ]
2) 10001-20000 [ ]
3) 20001-30000 [ ]
4) >30001 [ ]

3. highest level of education attained by the study respondent

1) No formal education [ ]
2) Primary level [ ]
3) Secondary [ ]
4) Vocational [ ]
5) Tertiary [ ]

4. marital status of the study respondent?

1) Single [ ]
2) Married [ ]
3) Windowed [ ]
4) Divorced [ ]
5) Separated [ ]

5. religion of the study partaker

1) Christian [ ]
2) Muslim [ ]

6. Does the study respondent have a history of chronic illness

1) Yes [ ]
2) No [ ]

7. If yes which one..

…….

8. Does the study respondent have a history of smoking

1) Yes [ ]
2) No [ ]

9. If yes what is the frequency

……

10. Does the study respondent have a history of alcohol consumption

1) Yes [ ]

2) No [ ]

11.If yes what is the frequency

……

**Section B**

**Health Facility-related Factors**

| | Possible response | Tick the appropriate response |
|---|---|---|
| Was there the presence of friendly healthcare providers | 1) Yes<br>2) no | |
| Distance taken to reach the nearest health facility | 1) 0-15km<br>2) 16-30km<br>3) >30 km | |
| Waiting time at the hospital | 1) 1-15 min<br>2) 16-30 min<br>3) 30-60 mins<br>4) >1hr | |
| Clinic time convenience | 5) Friendly<br>6) unfriendly | |
| Presence of EnMOC services | 1) Yes<br>2) no | |
| Presence of health education on ANC services | 1) Yes<br>2) no | |

**Section C**

**Maternal mortality**

13. What was the outcome of all women of reproductive age who sought maternal care services at the Wajir County referral hospital from 2107-2023?

1) Died [ ]
2) Delivered successfully and no complication for the next 42 weeks [ ]

**Section D**

**Uptake of Antenatal Care Services**

7. Did you use the closest medical facility for prenatal care during your previous pregnancy?

a)Yes

b)No

8. Number of times mother visited the ANC clinic for a check-up

……

9. Gestitation period at the first visit

a)1st

b)2nd

c)3rd

d)4th

**Appendix IV: Key Informant Guide**

Fatuma Alim Jimale is my name.a Mount Kenya University master's program student studying public health. Factors linked to maternal mortality among reproductive-age women looking for care at the Wajir County Referral Hospital in Wajir County, Kenya, is the subject of my research. This study's main objective is to investigate the factors that contribute to mortality among mothers in women who are fertile.Your supplied information will be treated with the utmost confidentiality and used solely for purposes of learning. I would greatly appreciate it if you could dedicate a small amount of time to completing this study. For this interview, you have twenty-five minutes to spare.

1. Let's begin by having each of us introduce ourselves and explain what " Maternal mortality and its incidence in this region" means to each of us.
2. In your opinion, how many women in reproductive age who are seeking care at the Wajir County Referral Hospital in Wajir County, Kenya, are utilizing ANC services?
3. In your opinion, what aspects of the Wajir County Referral Hospital in Wajir County, Kenya, are linked to mortality among mothers among women of reproductive years seeking care there?
4. 4. What specific factors, in your opinion, are connected to the rate of maternal mortality among women of reproductive years who visit the Wajir County Referral Hospital in Wajir County, Kenya?
5. Closing remarks.

## Appendix V: ERC Certificate

# Mount Kenya University

REF: **MKU/ISERC/3482** Date: 27 February 2024
TO: **FATUMA ALIM JIMALE**
REG: **MPH/2022/46168**

Dear Sir/Madam,

**RE: FACTORS ASSOCIATED WITH MATERNAL MORTALITY AMONG WOMEN OF REPRODUCTIVE AGE SEEKING CARE AT WAJIR COUNTY REFERRAL HOSPITAL, WAJIR COUNTY, KENYA**

This is to inform you that **Mount Kenya University** has reviewed and approved your above research proposal. Your application approval number is **2526.** The approval period is **27/02/2024 - 26/02/2025.**

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 **Mount Kenya University**
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 **Mount Kenya University** within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affect the safety or welfare of study participants and others or affect the integrity of the research must be reported to **Mount Kenya University** 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 **Mount Kenya University**

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

Yours sincerely,

The Chairman
Mount Kenya University
Ethics Review Committee
P. O. Box 342 - 0100, Thika

**Dr. Alfred Owino, PhD**
**Chairman, Mount Kenya University ISERC**

**Appendix VI: Introductory Letter**

Mount Kenya University

## DIRECTORATE OF GRADUATE STUDIES

**MPH/2022/46168**

**29th February, 2024**

*National Commission for Science Technology & Innovation (NACOSTI)*
*Off Waiyaki, Upper Kabete*
*P.O Box 30623- 00100*
*NAIROBI, KENYA*

Dear Sir/Madam,

**RE: FATUMA ALIM JIMALE- REGISTRATION NO. MPH/2022/46168**

The purpose of this letter is to introduce the above named student who is pursuing **Master of Public Health** in the Department of **Community Health, Epidemiology and Biostatistics** in the school of **Public Health.**

The title of the research is **"Factors Associated with Maternal Mortality Among Women of Reproductive Age Seeking Care at Wajir County Referral Hospital, Wajir County, Kenya."** It has been cleared by the University's Ethics Review Committee (Certificate attached) and now has to proceed to the field to collect data between **March, 2024 and May, 2024.**

Any assistance accorded to the student will be highly appreciated.

Thank you.

Mount Kenya University
P. O. Box 342 - 01000, THIKA
Office of the Director
Graduate Studies

for **Dr. Samuel M. Karenga, PhD**
**Director, Graduate Studies**
**Enc.**

## Appendix VII: Nacosti Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **501471**

Date of Issue: **08/March/2024**

**RESEARCH LICENSE**

**This is to Certify that Ms.. FATUMA ALIM JIMALE of Mount Kenya University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Wajir on the topic: FACTORS ASSOCIATED WITH MATERNAL MORTALITY AMONG WOMEN OF REPRODUCTIVE AGE SEEKING CARE AT WAJIR COUNTY REFERRAL HOSPITAL, WAJIR COUNTY, KENYA for the period ending : 08/March/2025.**

License No: **NACOSTI/P/24/33686**

**501471**

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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

**See overleaf for conditions**

## Appendix VIII: Data Collection Approval

**DEPARTMENT OF MEDICAL SERVICES, PUBLIC HEALTH AND SANITATION, WAJIR**

When replying, please
Quote our Ref & Date

**Ref: WCG/HR&D/P091/2024**


**WAJIR HEALTH SERVICES**
**RESEARCH & DEVELOPMENT,**
**P O Box 2 – 70200**
**WAJIR**

**10th March 2024**

Mrs. Fatuma Aliim Jimale,
Mount Kenya University

**Re: Authorization to conduct study titled Factors associated with Maternal Mortality among Women of reproductive age seeking care at Wajir County Referral Hospital, Wajir County, Kenya**

Wajir County Health Research and Development Directorate has granted Mrs. Fatuma Aliim Jimale, a MPH student at the Mount Kenya University, authorization to conduct the above-mentioned study in Wajir County effective 10th March 2024 as part of her coursework. This authorization includes access to current and historical data, and interviews with key informants, as needed for study purposes.

Your approval number is WCG/HR&D/P091/2024 and it is valid for six (6) months. Please ensure that all ethical issues including customary and beliefs of the community are observed and respected throughout the study.

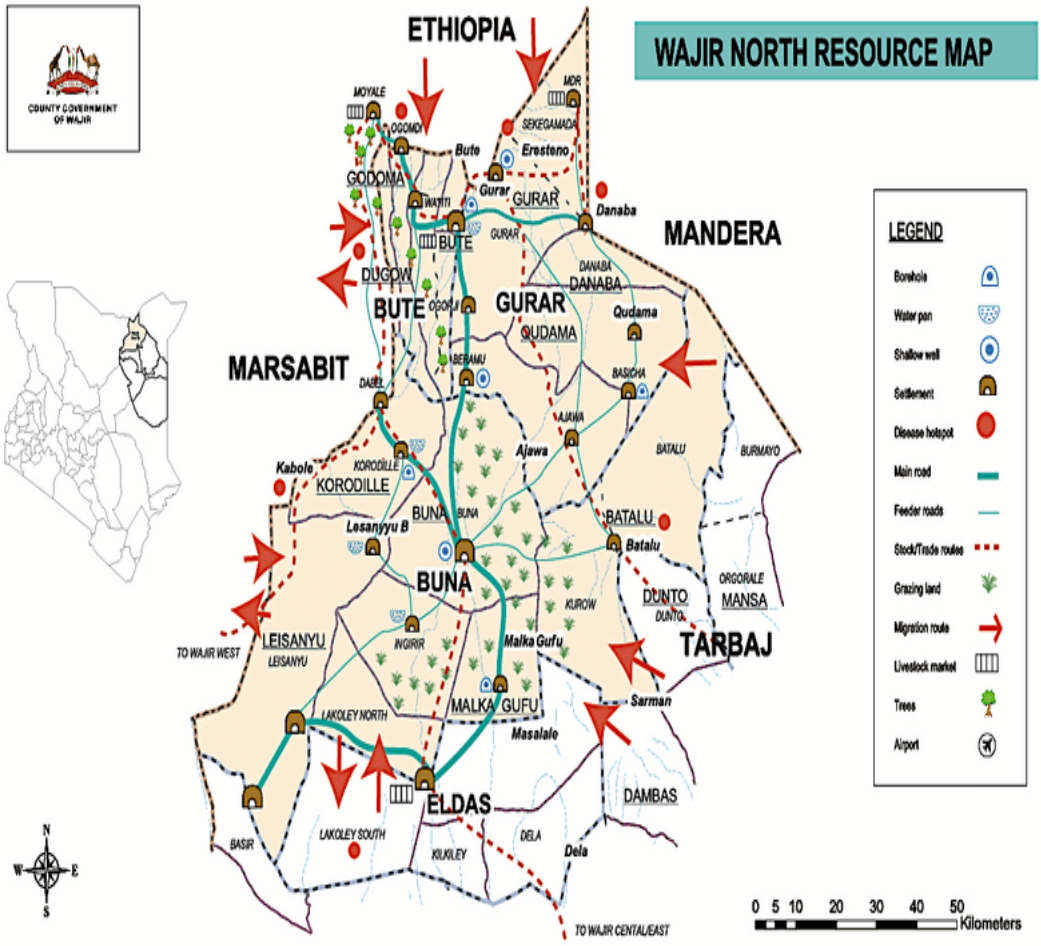
You are also required to share with us the final report of the study for our own consumption as a county.

Please do not hesitate to contact the undersigned for any other query.
Yours Sincerely,

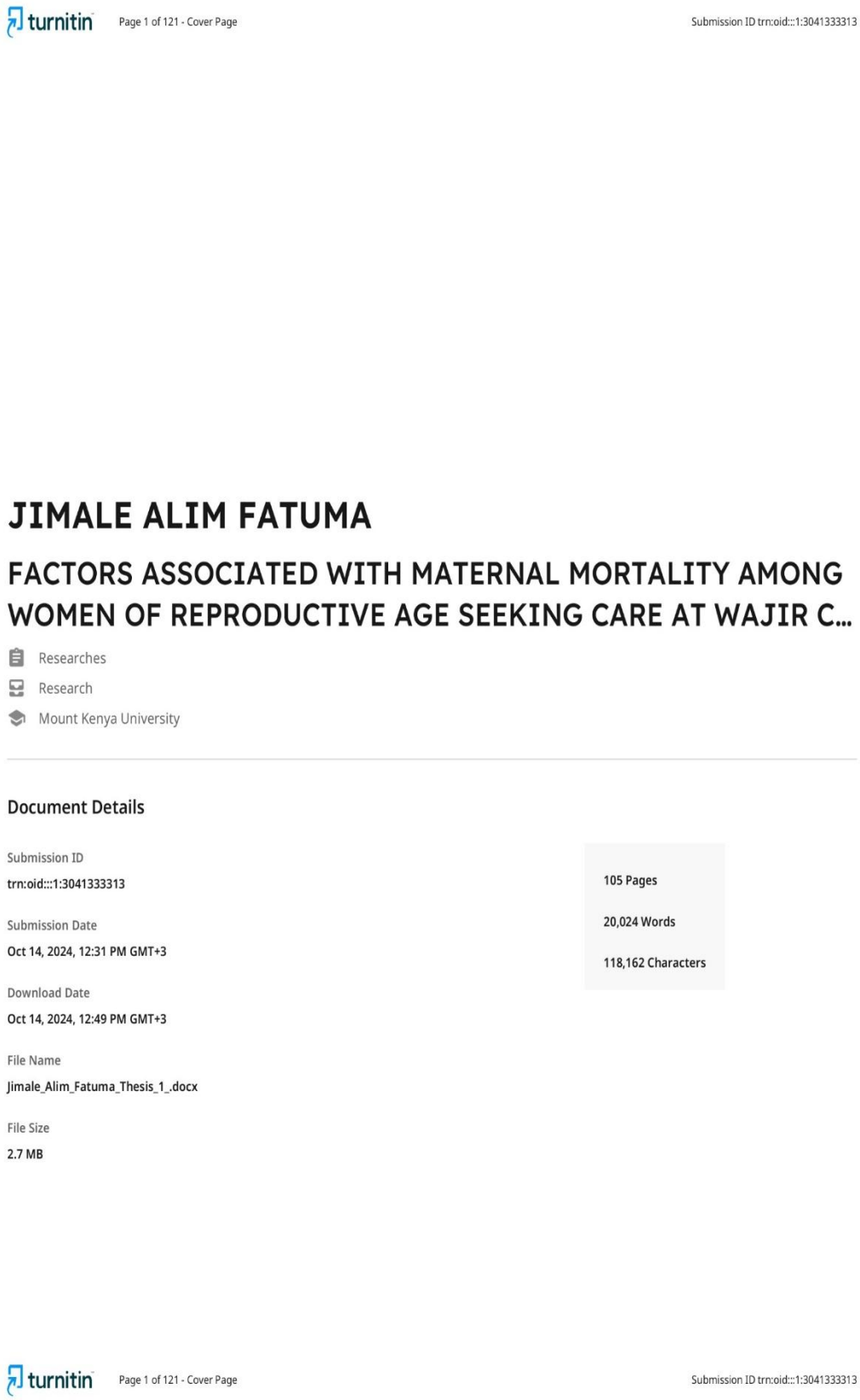
Dr. Mohamed A. Ahmed
**Director of Health Research & Development, Wajir**

CDRO Contact: 0722689038

## Appendix IX:Map of the Study Area



## Appendix X: Similarity Index



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