

**INFLUENCE OF TRANSPORT ON MATERNAL MORTALITY
A CASE STUDY OF THARAKA SUB-COUNTY, THARAKA-NITHI
COUNTY, KENYA.**

BY

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DECLARATION

This research project report is my original work and has not been presented for a degree in any other university.

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DEDICATION

I dedicate this project report to all the Members of Mr. Mitugo's family from Tharaka who have lost their loved ones in the course of delivery and to my wife Lucy Njeri and my children Dennis, Collins, and Nkatha who have been my source of comfort and strength throughout this study. To you all I say thank you.

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ABBREVIATIONS AND ACCRONYMS

AIDS	Acquired Immunodeficiency Syndrome
DHS -111	Demographic Health Surveys
HIV	Human Immune Virus
MDGs	Millennium Development Goals
MMR	Maternal Motility Ratio
PIHIS	Pakistani Integrated Household Survey
SPSS	Statistical Package for Social Science
TBA	Traditional birth attendant
UNPF	United Nations Population Fund
VHF	Very High Frequency
W.H.O	World Health Organization

ABSTRACT

This study sought to explore the influence of means of Transport on maternal mortality in Tharaka Nithi District. Specifically the study sought to establish how management and operations of transportation vehicles affect maternal mortality in Tharaka Sub County, establish how mode of transportation and the conditions of the roads impact on the health of the mother and the unborn baby, examine how transportation and road infrastructure influence maternal and child mortality, establish how would improved referral system influence maternal mortality in Tharaka Sub County. The study used descriptive and exploratory research designs. The population of the study targeted, 44,000 households in Tharaka sub County, based on the census household survey of 2009. The sample size was selected using Kregen Morgan 1970 formulae in which a sample size of 7% giving a total of 204 was applied. A random approach was employed in selecting the respondents, whereby the target was 100 medical staff, 80 mothers and 24 group leaders. Questionnaires and interview schedule were used in primary data collection. Secondary data was collected through review and management records and reports and magazines. The data collected was coded and entered into Statistical Package for Social Sciences (SPSS) software. Quantitative data was analyzed using descriptive statistical analysis. Study results were presented in form of tables. This study demonstrated significant relationship between transport and maternal mortality in Tharaka Sub County. Study findings showed that majority of pregnant mothers used both motorized and non motorized means of transport to get to hospital. There was poor management of health transportation vehicles and poor states of the roads affect the movement of the mothers from their homes to hospitals. The study recommends that the government should provide funds to the ministry of health and transport for the purpose of purchasing ambulances at the County level and ensure that roads in the rural areas are properly secured to enable quick transportation. Health education should be provided in schools and during clinic days so that women understand the importance of pre and post natal care. In addition, future research should seek to understand the influence of other obstacles like education of the mother, attitude of the staff and location of health facilities on maternal mortality.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The lack of transport to ensure timorous transfer of patients between levels of health care and for delivery of medicines, vaccines, and other essential equipment is a commonly heard cry from health workers, particularly those working in rural areas, but is often overlooked and rarely researched. A multi-country study on transport management in the health sector carried out in four sub-Saharan countries demonstrated the importance of a functional transport system for ensuring the effective and efficient delivery of health services.

Research carried out by United Nations Children Fund indicates that every minute a woman in the world dies as a result of complications arising during pregnancy and childbirth (United Nations International Children Emergency Fund (UNICEF), 2008. It is more disheartening to know that many of these deaths could have been prevented if there were good means of transport for the sick. Reducing maternal mortality is the fifth MDG. This goal is directly related to improving the health status of mothers and the care they receive before, during, and immediately after giving birth. It will be difficult to achieve this unless proper attention is given to the improvement of means of transportation.

According to the world health organization report maternal mortality is one of the most sensitive indicators of health disparities between richer and poorer nations. The complications may be experienced during pregnancy or delivery itself, or may occur up to 42 days following childbirth (World Health Organization [WHO], 1993). The women who die in many developing countries are usually in the prime of their lives and most often have other children and other dependents. Developing countries therefore stand the greatest risk of having obstetric complications which constitute the leading cause of death of women of reproductive age claiming the lives of an estimated 529,000 each year (Biego, G. 1995.)

The lifetime risk of dying due to maternal health causes is about one in six in the poorest countries, compared with about one in 30,000 in the Western World (Ronsmans and Graham,

2006). According to WHO (2007) each year, more than 536,000 women die due to complications developed during pregnancy and childbirth. Yet death from pregnancy related causes represents one of the most preventable categories of female death worldwide.

A study of maternal mortality in Anantapur Sub-County (Andhra Pradesh) in 1985 (BhatiyaJagdish, 1985) brought out the need for timely availability of transport for taking patients to hospitals. Out of 140 women who were taken to the hospital in serious condition, 68.5% were transported by public bus, 19.2% by bullock cart, 3.5% by manually driven rickshaw and only 8.6% of the remaining women were taken to the hospital in motor driven vehicle or ambulance. This resulted in considerable delay and consequently 17% women died on the way to the health facility and another 39% died immediately after reaching the hospital. Another study done by WHO in 2000 showed that in most developing countries due to poor rural transport infrastructure access to medical care (Nancollas, 1999), many women die before reaching the health facility. A similar study conducted in Andhra Pradesh showed that among the 98 women who used hospital facilities nearly sixty percent went to two or more hospitals.

According to Kenya health demographic survey (2010) maternal mortality levels in Kenya remain unacceptably high at 488 per 100,000 live births. The United Nations estimated in 2005 that 1 in every 39 Kenyan women die in childbirth (African Union *et al.*, 2005 this usually applies to people think it ought not to be there). While major progress has been made in reducing infant and child mortality rates, it is estimated that 1 in every 19 babies born in Kenya this year will die before their first birthday. The demographic survey also states that 60% of these deaths will occur in the neonatal period. Despite the fact that poverty and high rates of HIV, TB, malaria and other infectious diseases provide underlying substantial challenges, the appalling mortality statistics implicate dysfunctional health systems as the principal obstacle for addressing these challenges and preventing pre-mature mortality.

The Government of Kenya's March 2009 National Road Map for Accelerating the Attainment of the MDGs Related to Maternal and Newborn Health in Kenya and the Child Survival and Development Strategy 2008 -15 identified several barriers for program improvement. These barriers included lack of recognition of danger signs due to lack of

accessible prenatal service for expectant mothers, low utilization of available services before and after, limited access to essential and emergency obstetric care due to limited health provider competencies and inadequate staffing and equipment .

These studies provide useful insights in understanding the multiple factors that influence women's health in general. However, little is put up on transportation especially of women living in rural areas. This study helps to fill the gaps by exploring the relationship between transportation means and maternal mortality. Although Kenya government used these studies and established a safe motherhood in 1987 with the hope of ensuring that pre and post Natal Health for women, many of the Health centers in the country especially in rural areas where the rural poor people are report no decrease in maternal deaths. The objective of the program was to ensure that women are healthy through pregnancy and childbirth.

This study seeks to investigate how influence of means of transport affects efficient delivery of health care. Enabling women to access health care in a timely manner is vital aspect in our endeavor to decrease maternal deaths. For women who live in rural areas like Tharaka Sub County where the study was done, transportation to clinics is vital to both the mother and the baby. Currently many people walk for hours to reach health facilities either because they cannot afford the transport cost or because they cannot wait for limited, slow and/or uncomfortable transportation services.

1.2Statement of the Problem

More than half a million women die annually worldwide, due to pregnancy related complications (Tinker, 1998). What is more disheartening is that 90 - 95% of the women come from developing countries. These complications can be prevented.

Inadequate ambulances and shortage of other means of transport in remote areas like Tharaka Sub County, delays the management of life - threatening complications. Since majority of the women in Tharaka depend on public transportation to get to the hospital, rainy seasons present a great challenge because the earth roads are difficult to navigate. The Kenyan Government has invested a lot in good delivery of care but despite the government's effort to improve health services in all the eight divisions of Tharaka Sub-County, maternal deaths

continue and has reached alarming proportion as per the Kenya demographic survey of report of 2009. According to this report maternal mortality rate stands at 147 per 1000. It is against this background that this study sought to determine the role and impact of transport related intervention in the achievement of maternal mortality reduction in Kenya with particular reference to Tharaka Sub-County.

1.3 The Purpose of the Study

The purpose of this study was to examine the influence of transport on maternal mortality with particular reference to Tharaka Sub County. The sub County was used as a case study with the hope that these findings can have relevance to other rural areas of Kenya. The study is useful for Tharaka Sub County because if the transport factors influencing maternal mortality are established, appropriate strategies can be devised to enhance the use of maternal care services in the Sub County.

1.4 Objectives of the Study

The study was guided by the following objectives;

1. To establish the extent to which delayed transport influence maternal mortality in Tharaka Sub County.
2. To establish how the means of transport influence maternal mortality in Tharaka Sub County.
3. To establish the influence of the condition of roads on maternal mortality in Tharaka Sub County.
4. To establish the influence of transport referral system on maternal mortality in Tharaka Sub County.

1.5 Research Questions

The study was guided by the following research questions;

1. To what extent does delayed transport influence maternal mortality in Tharaka Sub County.
2. How does the means of transport influence maternal mortality in Tharaka Sub County
3. How does the condition of roads influence maternal mortality in Tharaka Sub County.
4. How does transport referral system influence maternal mortality in Tharaka Sub County.

1.6 Significance of the Study

This research study is significant in that the results will provide an understanding on how transportation factors influence maternal mortality and therefore assist policy makers and program managers to design and implement programs to reduce maternal mortality. This study will also form a base to researchers and those in Medical field for future empirical and conceptual research. The study may enable Tharaka community to be more proactive and anticipate challenges facing management and operation of ambulances and also ways of militating against the challenges.

1.7 Delimitation of the Study

The scope of this research study encompassed the investigation of the influence of transport on maternal mortality in Tharaka Sub County of Tharaka – Nithi County Kenya. Therefore the results cannot be generalized to all other rural parts of Kenya and the exclusion criteria limit true randomness.

1.8 Limitation of the Study

There are a number of limitations that were expected in this research study which included failure by some respondents to respond to questionnaires and unwillingness by the respondents to give account of some information that they may consider sensitive. Conducting exit interviews introduced a bias in presenting the views as only those that overcame certain transport barriers were interviewed. Exit interviews were complemented by field trips in the community, and results from the exit interviews were counter checked to minimize selection bias. Some of the observations may not have been recorded and might compromise the reliability and the validity of the result.

1.9 Assumptions of the Study

The study is based on the assumptions that all births should be assisted by trained persons, preferably nurses and midwives or a trained birth attendant and that Lack or inadequate transport could pose a danger to the mother and baby.

1.10 Definition of Significant terms Used in the Study

Ambulances: An ambulance is a modified vehicle with specialized fittings used for transportation of sick people to, from or between places of treatment for an illness.

Maternal death: Death of a woman while pregnant or within 42 days of termination of pregnancy irrespective of its duration and site.

Maternal mortality ratio: Number of maternal deaths per 100,000 live births.

Quality: Quality is the ongoing process of building and sustaining relationships by assessing, anticipating, and fulfilling stated and implied needs.

Quality of maternity care services: Quality of maternity care services is providing a minimum level of care to all pregnant women and their babies.

Mortality rate: This is a measure of the number of deaths in a population, scaled to the size of that population, per unit time.

Maternal Mortality: Maternal mortality is considered as any death during pregnancy and delivery or within the 42 days of termination of pregnancy from any cause associated with pregnancy or its management but not from accidental or incidental causes.

Transport referral: This is the system and referral protocols used when transferring patients from one level facility to the next level of care.

1.11 Organization of the Study

The research study is organized in five chapters. The first chapter started with the background to the problem, followed by statement of the problem. In the same chapter the purpose of the study was outlined, followed by highlighting of research objectives and the research questions. Then the limitations and delimitations of the study followed. The significance of the study was also given and the chapter also concluded basic assumptions and the organization of the study. In Chapter two, there is the literature review on transportation and its influence on maternal mortality. This chapter was sub-divided into sub-themes which were based on influence of transportation on maternal mortality. Chapter three covers the research methods which include: research design, target population, sampling procedures, research instruments, instruments validity and reliability, data collection, data

analysis and ethical considerations. Chapter four contains findings and discussions, while chapter five covers the summary, conclusions, recommendations and suggestions for further study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter discusses the relevant literature reviews on the subject matter and focused on empirical studies on various modes of transport and sub-divided into sub-themes which were based on influence of transport on maternal mortality. It provides the researcher with information pertinent to the study and indicates what research has been done. The chapter also explains the conceptual framework and highlights the variables under consideration.

2.2 Transport and Maternal Health

Every year more than half a million women die from pregnancy related complications in developing countries. Studies show that most maternal deaths are due to five direct causes: hemorrhage, obstructed labour, eclampsia, sepsis, and unsafe abortion. Even though these complications can occur without forewarning and can rapidly become life threatening, many of these conditions can be controlled if women had access to appropriate, affordable and timely transport to the medical facilities. Like many women in Kenya, Tharaka women's inability to receive preventive and emergency obstetric care is one of the major reasons for the high maternal mortality in the area (Babinard and Roberts, 2006). The World Health Organization estimates that 75 per cent of maternal deaths can be prevented through timely access to child-birth related care (WHO, 2002). More studies have shown that most of the obstetric emergencies can be managed if comprehensive emergency obstetric care is reached within 12 hours, with the exception of obstetric hemorrhage which requires attention within 2 hours. Timely access to care also helps reduce other long term maternal health problems including obstetric fistula caused by obstructed labour (Ban K .2010). These Studies help to highlight the importance of good transportation in health delivery.

The increasing focus on women's reproductive health and primary health care is a pointer to the need for better information and data than is currently available. Lack of adequate data especially on means of transport hampers the development of appropriate health interventions and responsive strategies especially in countries like Kenya where maternal mortality is high. The study will generate useful information regarding utilization of maternal health care and their determinants. For a long time in Kenya, maternal and child health were

combined at hospitals and service delivery points. This was in the hope that no time would be wasted in locating the two services at their respective points. The effect was that more emphasis was placed on childcare at the expense of maternal health. Even demographic and health surveys seem to lay more emphasis on child health.

2.2.1 Impact of Maternal Death

According to the World Health Organization every year over five hundred thousand maternal deaths occur worldwide, an estimated 30 to 50 women suffer pregnancy related health problems such as vesico vaginal fistulae, infertility and depression that can be permanently debilitating (WHO, 1997). Women in the developing world have a one (1) in forty eight (48) chance of dying from pregnancy related causes; the ratio in developed countries is 1 in 1,800 (WHO, 2002). These heart breaking statistics show how important it is for the government in developing countries to develop strategies to reduce maternal mortality.

There is enough evidence from scholars which shows that investing in safe motherhood not only improve a woman's health and the health of her family but also increases labour supply, productive capacity and economic well-being of communities. Children whose mothers die or are disabled in childbearing have vastly diminished prospects of leading a productive life (WHO 1997). In addition to economic benefit that women bring to any society, every human being has a right to a healthy life and the right should be protected by ensuring maternal and reproductive health of women are on top of any agenda of a country's development. Maternal and reproductive health has been codified in multiple international covenants as the best option of ensuring governments observe human rights issue (WHO, 1997).

The studies done in Uganda and some rural parts of Western region of Kenya in general provide reason for the government to invest on women's health (IK Notes 2002). However, even though many obstacles have been identified, the importance of means of transportation has received minimal consideration. This is why this gap is being closed by studying the Kenya national bureau of statistics, 2009. Tharaka Sub-County Multiple indicators cluster survey 2008 Nairobi, Kenya: Kenya national Bureau of Statistics.

2.3 Prolonged Transport Delay

Prolonged delay in deciding to seek medical care on the part of the woman or her relative is

usually regarded entirely as patient factor. First, the illness or complication must be recognized and classified as abnormal. Recognition of an illness may be influenced by factors such as the prevalence of the condition Brown J.E (1997). In a study among pregnant women in Senegal, 13% regarded fever, pallor and dizziness as normal signs of pregnancy because these conditions were common among pregnant women in that area Brown J.E (1997). In Tharaka rural women seem to avoid going to the hospital because of fear of discrimination, geographical and financial barriers and different interpretation of danger signs. Raising awareness in health education is an issue for health care workers and the community which is vital and appropriate antenatal care service delivery. The tendency to act or not in the presence of a complication is also influenced by the interpretation supported by cultural beliefs. Several studies carried out in Africa and elsewhere (Jansen, et al.,1973) have highlighted how culture influenced health care seeking process. Religious belief was mentioned to have influenced the care seeking process in our study. Jansen (1973) asserted that religion, medicine and magic are closely interwoven.

Health service related factors can also lead to delays in the decision-making process. Bad experience with the health system will mostly lead to reluctance or non-utilization of health care services. Poor provider attitude towards patients has been identified as a major factor to low utilization of services in Kigoma (Sundari. (1995) and to low compliance to a referral hospital by high-risk pregnant women. The communication barriers between lay people's concepts and those of professional care providers may lead to serious misinterpretations. Women in the Gambia often resort to home delivery assisted by a traditional birth attendant or a relative as their first option. Sundari identified unfamiliar setting at the health facility, being attended to by strangers, lack of family support, attendant being a male care provider, reduced autonomy, lack of sympathy and understanding on the part of the health care personnel and not seeing the need for care as some of the factors contributing to non-utilization of health services during labor and childbirth. Delay in reaching an appropriate medical facility Lack of public transportation systems in rural areas requires that communities need to form partnership with the local commercial transport owners in addressing the issue.

2.4 Role of Means of Transport

Although more evidence is needed to determine what can be done on transport to improve access to health facilities, there is clear evidence that delivery of health care and good transportation cannot be separated. Appropriate and timely intervention has been proved to have tremendous impact on maternal mortality. A study by Wagstaff and Claeson 2004 showed appropriate health interventions could have a tremendous impact on mortality rates of Women and that three-quarters of the current maternal deaths might be averted if full provision of the key maternal mortality interventions were to be achieved in developing countries (Wagstaff and Claeson, 2004).

There is overwhelming agreement among scholars that transportation plays major roles in the socio-economic development of a nation. However, this study has emphasized the importance of transport in accessing basic facilities such as health centers. (R. Chambers,1980) It noted that access is an important factor in rural development because its existence or absence defines the opportunity that rural people have to improve their social and economic well-being. One of the important factors limiting access is the time spent by the rural poor in developing countries to meet their everyday needs. The amount of time they spend in collecting water, obtaining fuel, getting to school, the Health clinic, the grinding mill or the market can be quite considerable. Not only is this time unproductive but it also takes away the quality time women could spend taking care of their babies and other family members.

2.5 Management of Referral Transport Vehicles

Inadequate transport facilities and shortage of staff often results in increased workload with subsequent increase on workload for the available staff which can lead to decreased job satisfaction. Workers who are not satisfied with their job may not do their work well and this can impact negatively of services. As Glenda Dames Cruz observes job dissatisfaction is a concern for many leaders in the world (Cruz, 2000). In high income countries, transport systems are generally adequate and operated either by the public or the private sector; systems are available for the entire population and usually supplemented by an ambulance service, which provides transport to key health facilities in the event of emergency or infirm individuals. Travel by the poor, for health or other purposes, can be provided as a public

good though a subsidized scheme if necessary. In the United States for example, ambulance services are provided by local governments, community volunteer organizations, and hospital groups; whereas in France, ambulance services are provided by emergency medical organizations attached to hospitals, under legislative control (JICA, 2005). This model can be replicated in many developing countries like Kenya with some modifications.

Some of the challenges that face many developing countries have to do with the organization of medical services and budget constraints. In places where many people are in daring need of transport, vehicles such as ambulances are converted into public transport. Budget constraints make it difficult to maintain the vehicles hence making them usable for the patients. This is part of the reason why ambulances are used only to transfer patients between health facilities and not from the scenes of injury or from their homes (Kobusingye, et al., 2004). This problem can be solved if the government allocated more money to the department of medical services and transport.

Privately operated transport is rarely available in many rural areas and when it does operate, it is often not affordable. As a result, patients are most likely to reach medical facilities or doctors by walking. Even in South Africa, one of the least poor countries in Sub-Saharan Africa, more than 40 percent of the population accesses health services on foot (Department of Transport, 2003). While walking does overcome the problem of transport services being unaffordable, it is very time consuming and constitute a severe constraint for the many rural people who are “time poor.” Walking can also be arduous and the effort of walking long distances on difficult paths can constitute a serious barrier, which can be made even more serious when a woman is pregnant.

2.6 Mode of Transport Vehicles to Health Facilities

Despite the fact that health access inequalities have steadily decreased through the years, with the result that today, more and more people can easily reach medical care, more needs to be done to ensure that majority of women have transport to health centers. This will lower the cost of medical services for both the patient and the health providers because there will be less missed appointments and patients will benefit from early interventions.

Transport services between villages, market hubs and sub County centers in many

developing countries are provided by 'rural taxis' (minibuses, Land rovers, pickups) and intermediate means of transport (motorcycles, bicycles, and animals like donkeys). Motorcycles are increasingly important. They are now the most numerous means of transport on some rural spokes in Colombia, Indonesia, Nepal and Timor Leste. Motorcycles can operate on poor roads, passing road blocks caused by mud, water or landslides. Rural motorcycle taxis carry men, women and children, and their goods, to link poorly served villages to conventional transport services on main roads (Starkey, 2008). Motorcycle taxis in rural communities benefit women, children and disadvantaged people through emergency and routine transport to health care and other services. Motorcycle taxi passenger fares and freight tariffs are significantly higher per kilometer than rural taxis (Starkey, 2008).

Motorcycles and bicycles are common in Kenya especially within the last less than five years. They have greatly helped the sick reach the health facilities but due to poor road network and careless cycling, they pose a great danger to the pregnant women as traffic rules are rarely observed. Their comparative advantage is their availability and flexibility as they transport passengers immediately to their destinations.

Starkey (2008) conclude that the profitability of motorcycle services led to similar private financing systems in Cameroon, Colombia, Rwanda and Tanzania. The researcher was keen to study the mode of transport being used in Tharaka and especially by pregnant women who are out to seek medical care.

2.7Condition of the Roads

Transport services are complementary to maternal and child health services because they facilitate access to care during the critical prenatal and neonatal periods. These services are particularly important in sparsely populated rural areas of most parts of Kenya where the ratio of health facilities tends to be low, as health facilities have large catchment populations widely dispersed over many hundreds of square miles.

Access to transport as well as greater proximity to health facilities has been linked to lower levels of maternal and child deaths, and identified as one of the several factors affecting attendance to antenatal care and hospital choice (Rose, et al., 2001). Likewise, prenatal health status as measured by the frequency of low birth weights, neonatal death, stillbirth, and early

neonatal morbidity is significantly improved with access to motorized transport (Ondimu, 2001).

In many countries, however, women living in rural and remote areas have less access to health services to women living close to urban centers. Also, since health facilities that are providing maternal and child health services are few and far apart, most people spend a lot of time walking to and from areas of treatment. Data collected between 1993 and 1996 in round III of Demographic Health Surveys (DHS-III) of 10 countries reported that between 40 and 75 percent of all women or an average four out of five women live within 5km of the nearest health facility (Rose et al., 2001).

An enquiry into causes of delay and death “Mothers Brought Dead” in Jinnah Post Graduate Medical Centre Karachi found that out of 118 pregnant or recently delivered women in 10 years period (1981-1990) were brought dead, 29 couldn’t reach because of unavailability of transport, in 14 cases the reason was time lost in transfer from one place to another and for 10 patients the delay was due to delay in referral by lower level facilities due to inadequate means of transport (Jafary, 1993).

Access to maternal services in rural Africa is best in Benin (median distance to services is 5km) and worst as in Mali (median distance is 11-13km). In Mali, Uganda and Zimbabwe, more than half of rural women live further than 5km away from the nearest health facility that provides some form of maternal care; and in Mali, more than one-third of the women live beyond 15km.

These distances are aggravated if the quality and efficiency of road infrastructure is poor. While in four countries (Benin, Uganda, the Philippines, and Bolivia), at least half of the population have access to an all-weather road, the majority of women in Mali and Haiti live in communities accessed only by a seasonal road and in Uganda, about 13 percent of women rely on using a river path or train line for access. Indonesia is the only country where the majority of women use motorized transport. During the rainy season in Kenya in particular most women walk to health facilities as roads can become impassable, particularly for communities where the main means of access is via a seasonal road.

A survey done in Pakistan Integrated Household Survey PHIS also illustrated clearly the link between proximity to health facilities and higher rates of utilization of key maternal and neonatal health services. PHIS data for 2001/2002 indicate that attendance rates for pre and postnatal care tend to be higher in urban than in rural areas. Some 35 percent of mothers who gave birth during the three years prior to the survey went for prenatal consultations during their pregnancy; attendance rate was much higher in urban (63 percent) than rural.

According to the World Bank report on rural roads and transport (2000), 70% of the world's population lives in rural areas. The World Bank defines rural transport as all transport activities that take place at local government and community household levels. It comprises both motorized and non-motorized transport and rural transport infrastructure (e.g. roads). Most literature on transport in developing countries describe rural transport infrastructure as in bad condition, seasonally passable and poorly maintained. This constrains access as well as social and economic development (, 1992; Nancollas, 1999).

The report published by the World Bank (2000) found that many households do not have reliable, suitable, and affordable transport services essential for access to care during critical prenatal and neonatal periods (Babinard and Roberts: 2006). The study noted that emergency access to care is particularly vital for women and children because much childbirth related complications are unpredictable and the majority of births in developing countries take place at home. The report argues that improved transport and roads for poorly served communities can contribute to reducing maternal and child mortality rates.

Women in labor can spend several hours travelling on a makeshift stretcher and over difficult terrain that can induce other health complications for the mother and child. Where access to roads is unavailable, delays of several days are often encountered as families try to raise the money necessary to pay for hiring a vehicle to transport the patient.

Emergency transport costs also hinder the services and lead to an overwhelming financial burden for families and this applies even over short distances. Hamlin (2004) argues that the delays in access to health services caused by the difficulties in raising money are one of the important contributors to the occurrence of obstetric fistula and the increased vulnerability among Ethiopian women in Africa. The extent to which the transport burden on women can

be improved will however depend on the policies affecting rural development and the role of women in the planning of transport and social services (Hamlin, 2004).

Transportation and road infrastructure as reviewed above is a prerequisite in delivery of efficient and on time health care and especially for antenatal and pre-natal care. This made it very necessary to study the influence of road infrastructure on maternal mortality in Tharaka Sub County.

2.8 Referral System

Accessing timely care in the event of a health complication also puts emphasis on the importance of an efficient referral system in which a woman or child can be moved within the health system to the right level of care, being dispensed either at a hospital or a sub County health center. It is recommended that an efficient referral system should cover, on average, 30,000 to 50,000 people in a zone with a radius of between 10 and 30 km, with an average response time of 3-6 minutes (Weil and Fernandez 1999; Kobusingye et al. 2005). In most developing countries, experience shows that the speed and effectiveness of the referral remains far below this standard. In Mexico, the average response time reported was 10 minutes with an area of 1km per 100,000 people; in Vietnam, five teams are expected to serve 3 million people with a recorded average of 30 minutes (Kobusingye et al. 2005).

In Grenada (a Caribbean island), virtually all the births are attended by qualified midwives. There are clear protocols for managing serious complications which are known, understood and utilized by majority of midwives. The essential features of the referral system are the use of a maternity record card that is kept by the woman, effective communication among primary care providers and between the primary and secondary care levels, an efficient emergency transport system, and referral back to primary level as soon as possible (Lankaran, 1994). In most cases women have no past records of the subsequent visits and the referring staff at times may end up giving the wrong information to the next levels hence complicating the diagnosis. All this could be avoided if there were good means of communication as it would be easier for the relatives to rush home and get the documents on time.

Good means of transport plays a critical role in the delivery of and access to health services and in effectiveness of the referral process (Martin et al., 2002). In effect, transport and road infrastructures act as a key link between potential accessibility and actual utilization of health services. Transport is essential for the distribution of drugs, blood and other supplies necessary for care and proper operations of health facilities. It also enables the timely transfer of patients between health facilities and to the different levels of care of health referral systems. Efficient transport systems and roads facilitate access by health workers to often sparsely populate rural areas as well as the necessary monitoring and supervision of health services and initiatives (Martin, and et al., 2002).

As already observed, transport and road infrastructure play important roles in a patient's ability to access health care. In places where the ratio of health facilities to population is low or uneven, proper means of transport and good roads can ensure a more adequate distribution of and access to care (Martin, and et al., 2002). With a good transportation system patients can choose where they want to seek health care. If a patient does not like the nearest health facility due to various reasons then she has an option to go to another one irrespective of the distance. Reversely, poor road infrastructure or lack of transportation leaves women with no option but to use the nearest care. Sometimes this care is from less trained providers who may prove unhelpful in cases of complications (Martin, and et al., 2002).

Typically, population density is used as proxy for determining the transport needs of a particular population or catchment area in relation to the location of health facilities (Martin, and et al., 2002). However, this type of measurement often fails to consider obstacles that may be caused by the actual location of health facilities or by the state and quality of roads available in that particular area. As a result, studies seeking to determine health sector needs fail to consider factors affecting access variability such as the range of services that are actually provided at any particular health center and the different travel times that may apply to different categories of roads or to travel by different transport modes (Martin, and et al., 2002).

Another drawback is that transport costs for health improvements are high lightened but do take into account the costs of purchasing, operating and maintaining the vehicles. Failure to

consider particular situations has resulted in findings and recommendations that are too general and less helpful in getting a cost effective picture of a good transport system (Ensor and Cooper, 2004).

2.8.1 Transport Interventions set in Referral System

Meeting women's health needs during adolescence, pregnancy, childbirth, and the Postpartum period is a proven way to save women's lives. High use of facilities for birthing and the level of maternal mortality are inversely related, since health services deliver several benefits, including prevention of illness and death (Koblinsky and Campbell, 2003). Medical benefits are quite evident, and the access to services prevents deaths due to AIDS, cancer, childbirth complications, and unsafe abortion (Singh et al., 2003). A World Bank study suggests that, if all women had access to the interventions for addressing complications of pregnancy and childbirth, in particular emergency obstetric care, 74% of maternal deaths could be averted (Wagstaff and Claeson, 2004).

The more serious issue, when it comes to MDGs, is that they do not address the special needs of the most disadvantaged populations within countries. Unfortunately, in the context of the Tharaka Sub-County, access to health services is still heavily skewed in favor of the non-poor, and it is often considered to be the most unequal region in the eastern part of Kenya. Many African countries have had various initiatives to help public health services improve the management of mothers on labour. Some of these initiatives include a non-governmental organization Trans aid which has mobilized professional transport operations expertise to study health sector fleets in Kenya, Nigeria, and Zimbabwe, eight provinces in South Africa, Ghana and Côte d'Ivoire (Trans aid 2005; Timpson, 2004). Its work is to assess the size and condition of existing fleets and management systems in place to improve the efficiency of service delivery.

Riders for Health are another non-governmental organization that has helped to improve access to medical services especially in Gambia. This organization provided assistance by establishing motorcycle ambulances and health outreach services in Gambia. Since 2002 Riders for Health has been appointed by the Gambian Government to be responsible for all its vehicle management (2005). Such initiatives are needed all over Africa to help in reducing

maternal mortality and improving healthcare in especially on reduction of maternal mortality.

2.8.2 Trained Drivers, Medical Staff and Supplies

The personnel handling referrals play a major part in its success. In a study in Ghana it was found that many TBAs trained in safe delivery were performing the high risk deliveries instead of referring them for specialized care. Some of the reasons given were that many patients refused to go for specialized care due to financial limitations, lack of transportation and the expectation of disrespectful or painful treatment from hospital personnel (Eades, 1993).

Even when appropriate transport is available women may also not use it. A study conducted of personal and professional transport use among a women's trade unions association in India (Shresthova, 2002). During my tenor as an administrator of many hospitals in Kenya, I have heard many other reasons why most women refuse to go when they are referred to many health facilities for skilled care. The most common fear is separation from friends and family. In Kenya where most hospitals are in big towns and cities, transfer to a distance hospital means separation from immediate family members who are often an important source of emotional support. For women who have other children referral means they have to endure many days of not hearing or seeing them. Among older patients they feel that if they have to die far away from home, the cost of transporting the bodies to their rural home will be unbearable especially if the family is already straggling to pay the hospital bills.

Readiness of facility is essential for a referral to succeed. A study on maternal deaths in rural Gambia states that availability of doctors, blood transfusion and facilities are equally important. It identifies sub-standard care for obstetric referrals as a contributing factor for majority of the deaths in Gambia (Riders for Health, 2005).

Recognition of severe obstetric complications and provision of immediate or urgent care at first contact facilities, such as primary health care centers, can improve the efficiency of emergency transport system. With appropriate training in the principles of triage and essential equipment and supplies, staff can stabilize conditions on site or sort out sick patients and make appropriate triage and treatment decisions to take patients to the next level

of care (Razzak and et al., 2002). The triage process staff in a pre-hospital phase can determine which patients get transported to which facility instead of merely taking patients to the nearest facility (Kobusingye and et al., 2005).

In both Malaysia and Sri Lanka, measures to stabilize the health condition of women with complications and the availability of blood supplies ensured the successful transportation of patients to the next level of care (Pathmanathan et al., 2003).

When triage is not possible, having trained drivers with equipment can also make a significant difference in improving emergency transport. Having medical staff on board emergency transportation or trained drivers who know how to position patients or how to use the transport equipment, can also be beneficial. In the Gambia, Riders for Health are training drivers of motorcycle ambulances in the essentials of patient handling and care from the point of collection, during transport and while being transferred to the hospital (Riders for Health, 2005).

Cultural norms and practices can influence the recognition of complications and/or risk factors during pregnancy, birth, and post-partum periods, thereby inhibiting women from seeking health care outside the home, either for themselves or their children. Socio-cultural factors such as the fear of being stigmatized, or complications that may be seen as the result of insubordination or infidelity to the husband have also been reported as factors that delay women in seeking care and may lead to consultations with traditional and spiritual healers before going to the hospital (Wilson et al. 1997). A woman may also need approval within her household in order to seek emergency care. A survey in a rural sub County in Mali investigated the levels of knowledge, attitudes, and practices related to maternal health care among women of reproductive age and corresponding household heads. The survey revealed that over 70 percent of women and household heads cited the husband as the principal decision maker for decisions about whether or not to seek care in the face of a sign of potential danger during pregnancy (Smith et al. 2004).

Cultural practices and prevailing norms can also strongly influence the decision to use means of transport, thereby constraining the delivery of health care. In Malawi, where a bicycle

ambulance was set up to improve emergency obstetric care, cultural beliefs deterred pregnant women from using bicycle ambulances (Lungu et al. 2001; Cham et al. 2005). In several cases, where bicycles or motorcycles were introduced to facilitate community visits by health visitors, midwives and other individuals providing care did not feel comfortable to use such vehicles (Gauthier, 2004).

Transport approaches that consider cultural concerns about privacy and desire for accompanying family members at the referral facility have been shown to improve the frequency and use of the service (Ahluwalia, *et al.*, 2003).

The successful introduction and use of hand-operated and bicycle powered ambulances has been reported from the Gambia and Tanzania. In Gambia female patients have accepted to be carried on the modified sidecar of a motorcycle ambulance which has been introduced by Riders for Health.

A non-government organization that specializes in helping the health services in low income countries to establish and manage appropriate vehicle fleets. Moreover, female health assistants in Gambia are willing to ride motorcycles in order to increase the coverage and scope of their activity.

Various community approaches to improve transport systems have also been successful in including training activities for village and community leaders to discuss problems specific to transporting mothers with obstetric emergencies; activities to sensitize drivers to the specific transport needs of pregnant women and to be more respectful of those being transported. (Ahluwalia, *et al.*, 2003).

Training sessions have also been crucial in facilitating the participation of labor unions and drivers in community-based transport schemes (Shehulkeh, and Kuna, 1997). Various community-based transport interventions have also demonstrated and create awareness that transport is not simply a family responsibility but an issue that should concern the whole community. This has encouraged sustainability of community-wide support for transport systems focused on emergency care (Ahluwalia, and *et al.*, 2003). Other initiatives such as training women and their families to identify reproductive problems; to recognize danger

signs and to mobilize for referral when complications arise have proven to have a positive impact (Skilled Care, 2002; WHO, 2005).

The situation is not different in Tharaka for it was established that though most women attend antenatal clinic during their pregnancy specifically in the 1st and 3rd trimester over 50% deliver in the community assisted by TBAs. Many of these TBAs are unable to identify labour complications many of which are linked to cultural issues such as FGM (Female Genital Mutilation).

2.8.3 Improving Timeliness of Transport Response

Reduction in activation time is one of the most effective ways to improve response times. It is established practice for trusts to aim for an activation time of 3 minutes, 95% of the time it is recommended that a faster activation time standard is aimed for as this allows for increased journey time to meet the 8 minute target. The easiest way to reduce response times is to deploy vehicles as soon as the area of the incident is identified by the caller's telephone number (Best Practice Guidelines on Ambulance Operations Management Modernization Agency).

Where health sector resources are very limited, innovative interventions have been implemented to improve access to emergency transport while reducing delay in reaching health facilities. Communities, sometimes with the assistance of health authorities, have set up community-based emergency transport systems.

The success of these initiatives has been mixed and review of this experience shows some of the factors that are likely to be important in this respect. Since 1998, motorcycle ambulances have been introduced in several African countries through the Safe Motherhood Project. The largest project is in Eastern South Africa where a dozen units, each covering a radius of about 50km, are operated by the health department of the Oliver Tambo Sub County in both rural and urban communities supporting local hospitals and remote clinics. In Malawi, ambulances have been introduced in a phased approach covering 2-3 sub counties per year with a major focus on community participation. Produced locally, these ambulances, which are engineered by the Ranger Production Company, have also been introduced in Malawi and Ghana under the SMP (e Ranger, 2005).

Efficient and reliable transport systems often go hand in hand with communication technologies such as two-way radios and mobile phones to ensure that the referral system is fast and efficient. Effective communication between the community and the transport operator is particularly important in rural areas where the population is dispersed and demand is low.

The rapid spread of mobile telephone technology has increased the prospect for better Communications in the referral process for an increasing number of communities which are currently underserved. A project in Sierra Leone provided radios to summon vehicles to take women to hospital in the case of an obstetric emergency; results showed that 38 percent of the women who came with the project vehicle arrived in good condition compared to 30 percent of those who came by other means (Samai and Sengeh, 2004).

Early alert systems are reported to be effective in improving access to emergency transport in some situations. In West Africa, the International Planned Parenthood Foundation not only negotiated with a local transport association to help transport women to hospital; it has also established a system to alert other motorists. This is done by placing a yellow flag on the road to alert drivers that a woman is in urgent need of transport. The BBC reported that there has been a significant reduction in maternal mortality as a result of this initiative (BBC, 2005).

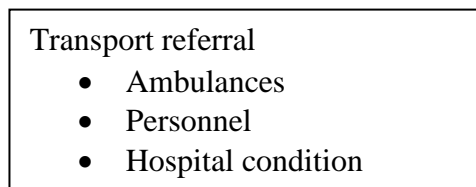
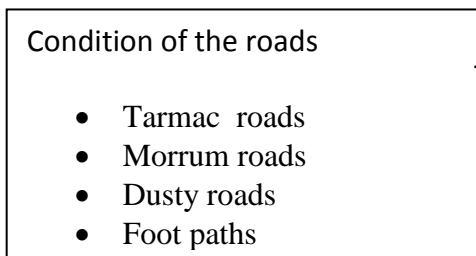
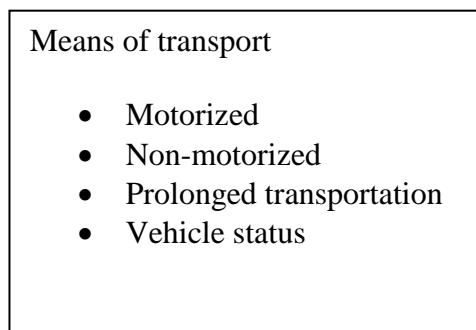
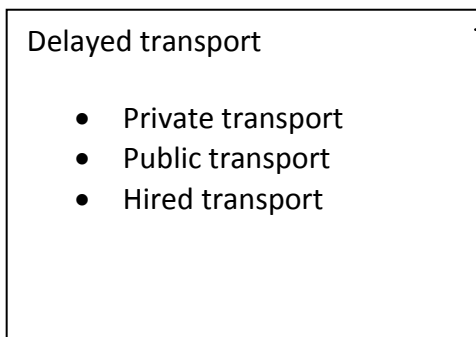
Other forms of communications have also helped overcome situations when transport was unavailable or inexistent. The project Rural Extended Services and Care for Ultimate Emergency Relief (RESCUER)—a joint effort between the United Nations Population Fund, Uganda’s Ministry of Health and Population Secretariat, and local authorities has provided traditional birth attendants and midwives with very high frequency (VHF) radios and walkie-talkies to improve the referral system; as well as by posting them in health posts, the referral hospital ambulance and in the sub County medical officer’s vehicle (IK Notes, 2002). Ever since the emergence of cell phones in Kenya most rural people can now access and communicate to a health provider within the shortest time possible.

2.9 Conceptual Framework

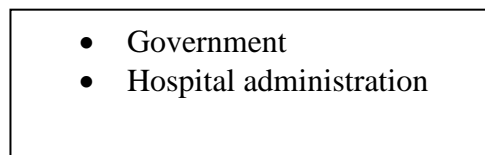
The conceptual framework shows the relationship between the independent and the dependent variables. Further, it shows any other factor that may have any effect of the two variables. The conceptual framework in this particular study showed that management of health transportation vehicles, mode of transport, road infrastructure prolonged transportation and referral systems are key independent variables in reduction of maternal deaths.

Geographical barriers of transportation as indicated plays a major role in ensuring antenatal clinic attendance, especially when and where they are readily available. In most areas, due to the bad nature of their road network, few vehicles ply such routes. Moderating variable included government and hospital administration. It is then through this conceptual frame that the researcher was able to find out whether the independent variables have any influence on the maternal mortality. As shown in the above literature review, the role played by means of transport had not been fully researched and documented. The work has therefore emphasized on basic need which is access to health care. There is need for further research on other needs such as training of care givers, post natal training and other areas related to pre and post natal care as in figure 2.9.1.

Independent Variable



Moderating Variable



Dependent Variable

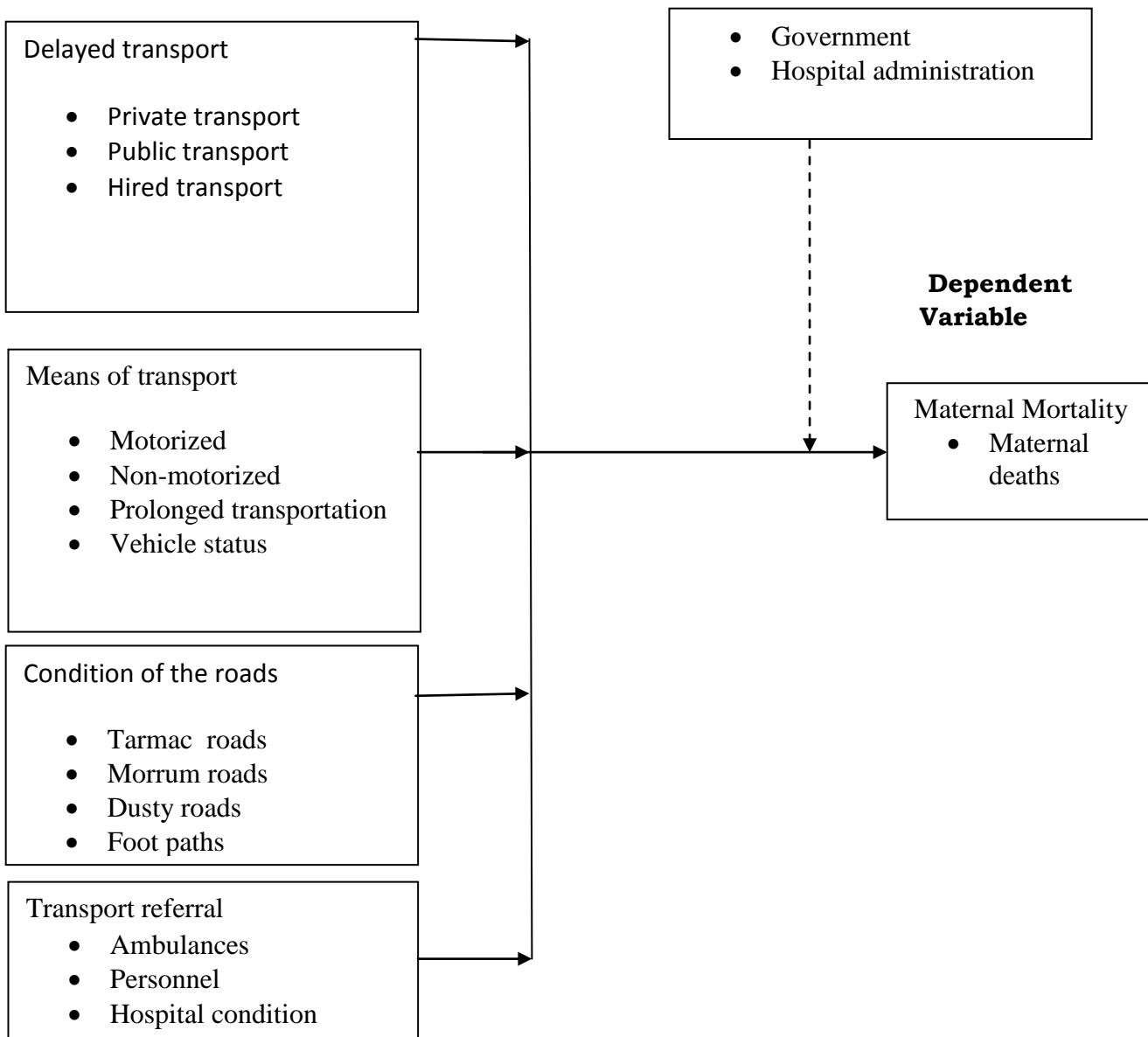
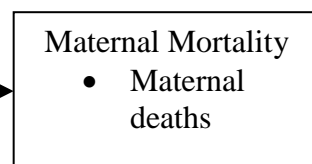


Figure 2.9.1 Conceptual Framework

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section describes the methodology used to carry out the research study. It contains research design, target population, sample size and sampling procedure. It also contains, research instruments, validity and reliability of the instruments, procedure for data collection, data analysis and ethical standards.

3.2 Research Design

The study used descriptive research and inferential design. Questions based on the research objectives were administered to the respondents. Descriptive statistics provide a description of the sample as it is, thus it was used to represent the population and the results hold up if the research is conducted over and over again each time with new sample subjects. (Paul C,1996). According to Kaleen and Ahmed (2008) descriptive research design is used to obtain information concerning the current status of the phenomena and to describe what exists with respect to variables or conditions to the situations.

The inferential design helped to seek a deeper knowledge of the problem and explores the dimensions of the phenomenon, the manner in which it's manifested and the other factors which it can interrelates. It also helped me assess if the sample size was significant .This is because the topic chosen had not yet been widely studied in details on previous occasions and therefore there was still not much data about specific issues.

3.3 Target Population

The total target population for the respondents was picked from 44220 women who were as per the 2009 census. The total number of medical staff in the entire district during the period of study was 306 as per the same census. The total number of mothers who were registered in the facilities attending Anti-Natal clinic in the period were 247(Kenya Medical Vital Statistics 2013). Records held in the Ministry of Culture and Social Services showed there were 24 groups in the region covered. Since the sample population of the groups was small the researcher considered all the groups. For the medical staff and the mothers attending ANC clinics the researcher considered 30% of the population as the sample size (Mugenda

and Mugenda, 2003). Using the Yamane’s formula the sample size came to 204. The distribution is as in table 3.1

Table3.1: Target population and sample

Category of respondents	population	sample
Medical Staff	306	100
Mothers attending ANC	247	80
Group leaders	24	24
Total		204

3.4 Sampling Procedure and sample size

The sample size was selected using Yamane’s 1997 formulae which gives the sample size for every population as per percentage degrees of confidence. The researcher employed stratified sampling technique in which the entire population was put into different sub groups and randomly selected by selecting a confidence level of 7% giving a total sample size of 204. The study targeted all mothers working in medical facilities in Tharaka Sub-County, Mothers attending antenatal clinics, and group leaders from all the divisions. A total of 204 questionnaires were administered to the respondents out of which 190 responded which 93% of the target population. A total of 80 mothers attending ANC clinics responded and 24 groups and medical staff participated in the study.

Yamane’s formulae $n = N / (1 + N(e^2))$

Table3.2: Sample size

Category of respondents	sample
Medical Staff	100
Mothers attending ANC	80
Group leaders	24
Total	204

3.5 Data Collection Instruments

In designing research instruments the researcher considered the objectives of the study and

the research questions. Data was collected using questionnaire and interview schedules. The Questionnaire was used in primary data collection. Secondary data was collected through review of management records and reports, magazines, and other literature.

3.6 Data Collection Procedure

The study identified a total of eighty (80) mothers attending ANC services by using different community and health facilities case finding strategies. The cases identified were those who tried to reach or had reached health care services. Medical and social details about the fatal cases were submitted. A verbal autopsy technique whose aim was to identify what contributed to the death of the often the “road death” in the area was used. Interviews were performed with family members or other persons usually those present during the time mothers developed illness or those who accompanied them to the health facilities. These were mainly the in laws or their husbands. Group interviews were preferred as the whole family participated in revealing their versions. Specific issues such as time to seek care, places where care was sought, financial constraints, and cultural factors influencing care seeking process, means of transportation and time to reach medical facilities were explored and recorded. The staff in the medical facilities who participated in the provision of care were also interviewed and were provided with an introductory letter certified by the university to instill confidence to the respondents and encourage them to participate fully in the study. The respondents were not required to disclose their personal information as names. This sought to eliminate any bias in response to target information inferred.

3.7 Validity of the Research Instruments

The validity of an instrument refers to whether the instrument measures what it is intended to measure. The results of this research were validated in consultation with the supervisor.

To measure validity the researcher ascertained truthfulness of the sturdy by selecting research sample relevant to the objectives and compared the research findings of the research assistants and that of the researcher. The validity of the questionnaire was further ascertained by comparing the results of test-retest during piloting. These were all done and validated in consultation with the supervisor.

3.8 Reliability of the Research Instruments

Reliability is the measure to which a research instrument yields consistent results after

repeated trials (Mugenda and Mugenda, 2003). The researcher used split half technique of assessing reliability. Scores from one part were correlated with scores from the second part thus eliminating chance of error due to differing test conditions. A coefficient of 0.75 was realized on the questionnaires, 0.80 on the interview schedule and the instruments were accepted.

3.9 Data Analysis

Data analysis involved checking the research instruments to ensure completeness and error free. The data was categorized according to research questions. Qualitative data organized into themes. The interviews with staff were carried out independently and interpretation of the findings with a view to provide possible and plausible results was then performed using Statistical Package for Social Sciences (SPSS) software vs 20. Forty two (42) cases of maternal deaths were reviewed and a verbal autopsy technique was applied for (20) of the cases. Key people who had witnessed any stage during the process leading to death were interviewed. Health care staff who participated in the provision of care to the deceased was also interviewed.

The length of time in delay within each phase of the model was estimated from the moment the woman, her family or health care providers realized that there was a complication until the decision to seeking or implementing care was made. Quantitative data taken was analyzed and edited using descriptive statistical analysis. From SPSS, frequencies, percentages and correlations were calculated. The results were then presented inform of tables.

3.10 Operation Variables

Table3.3: Operational table

Objectives	Variables Independent	Indicators	Measur ement scale	Types of Data Analysis
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To establish the extent to which delayed transport influence maternal mortality in Tharaka Sub County.	Availability and reliability of faster means of transport	<ul style="list-style-type: none"> Type of transport means used Seeking maternal services Means of calling for ambulance during emergency cases Transport means for timely referral 	Ratio Ordinal	Descriptive: frequencies Inferential: correlations
To establish how the means of transport affect the delivery of maternal care.	Transport types and modes	<ul style="list-style-type: none"> Type of transport used Vehicle states Availability of vehicles 	Ratio Ordinal	Descriptive: frequencies Inferential: correlations
To establish the influence of the condition of roads on maternal mortality in Tharaka Sub County.	Accessibility of roads	<ul style="list-style-type: none"> Road networks State of roads 	Ratio Ordinal	Descriptive: frequencies
To investigate how transport referral system for emergency medical obstetric care affect maternal mortality in Tharaka Sub County.	Management of transportation vehicles and health service provision	<ul style="list-style-type: none"> Transport management systems Public private partnership support Source of funds to support transport resource acquisition Challenges in transport resource management 	Ratio Ordinal	Descriptive: frequencies
	Dependent Maternal mortality	<ul style="list-style-type: none"> Maternal deaths Antenatal attendance 	Ratio	Descriptive

3:11 Ethical Considerations

The identities of the respondents were treated with confidentiality. Data was used only for the purpose of this study which is; influence of means of transportation on maternal mortality in Tharaka Sub County. Oral consent was taken from each participant.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

The section presents findings and discussions. The presentation is around key variables such as delayed means of transport, transport referral systems, the roads conditions and the demographic characteristic of the respondents. The findings are presented in frequency tables and percentages.

4.1.1 Questionnaire Response Rate

The researcher sought to collect data to support the study from 100 medical staff members from different facilities, 80 mothers attending ANC and 24 Group leaders. The questionnaire response rate was as shown in Table 4.1

Table 4.1 Questionnaire Response rate

Category of respondents	Number	Response	Rate
Medical Staff	100	94	94%
Mothers attending ANC	80	75	93.75%
Group leaders	24	21	87.5%
Total	204	190	93%

The overall response rate was 93% as shown in Table 4.1. This response was considered enough for the study since it was a representative of the population.

4.2 Demographic Characteristics

The study sought to find the demographic characteristics of the respondents in order to understand the population dynamics and also establish the influence of transport on maternal mortality rate. Respondents occupation, age, and gender, and marital status, number of children of the mothers attending ANC, their income, education level and how regularly they attend antenatal services was assessed as shown in tables 4.2 to table 4.6 respectively.

Table 4.2 Age of respondents in the medical field

Variable	Frequency	Percentage
25 years and below	2	2.1%
26 to 30 years	10	10.6%
31 to 35 years	41	43.6%
36 to 40 years	31	33%
41 to 45 years	8	8.5%
Above 45 years	2	2.1%
Total	94	100

Table 4.2 shows that 43.6% of the respondents were between 31 to 35 years of age, 33% of them in turn indicated they were 36 to 40 years while 10.6% from 26 to 30 years of age. However those at 25 years and below were minimal at 2.1% with the remaining 8.5% and 2.1% hence stating they were aged 41 to 45 years and above respectively.

4.2.1 Age of pregnant women

The age of the pregnant women was also considered and the results tabulated as shown below.

Table 4.3 Age of pregnant women

Variable	Frequency	Percent
18 – 25	16	21.3%
26 – 30	17	22.7%
31 – 35	17	22.7%
36 – 40	10	13.3%
40 and above	15	20%
Total	75	100.0

For the pregnant women attending antenatal services, the age distribution is as shown in table 4.3 that is 18-25yrs at 21.3%, 26-30yrs at 22.7%, 31-35yrs constitute 22.7% of the women visiting. Age is important because women with previous experience (more likely to be a bit older) have high chances of seeking maternal services since they understand the complications and know the timings well.

4.2.2 Marital status of the women and Group Leaders

Respondents' marital status was assessed and the results are as shown in Table 4.4.

Table 4.4 Marital status of the women and Group Leaders

Variable	Women attending ANC		Group leaders	
	Frequency	Percent	Frequency	Percentage
Single	18	24%	5	23.8%
Married	31	41.3%	14	66.7%
Divorced	21	28%	2	9.6%
Co-habitation	5	6.7%	0	0%
Total	75	100.0	21	100%

Table 4.4 shows that a bigger percentage of the respondents are married at 41.3%, nearly half of the respondents, followed by 28% who were divorced. Twenty four percent were single women and cohabitation least with 6.7%. For the group leaders, 23.8% were single, 66.7% married while 9.6% were divorced.

4.2.3 Occupation of the respondents

The occupation of the respondents was essential as it was used to get varied results and perspectives of different stakeholders. The findings are as shown in the Table 4.5.

Table 4.5 Occupation of the respondents

Group	Variable	Frequency	%
Women attending ANC	Unemployed	30	40%
	Artisan	14	18.7%
	Formal	15	20%
	Trader	13	17.3%
	Other	3	4%
Medical staff	Medical staff	60	63.8%
	Medical records	21	22.3%
	Others	13	13.8%

Table 4.5 shows that among the women attending ANC, 40% were unemployed, 18.7%

artisan, 20% formal, 17.3% traders while 4% were from other occupations. Among the medical staff members, 63.8% were management staff members, 22.3% worked in the medical records department while 13.8% worked as subordinate members.

Respondents in formal employment are not only likely to seek maternity services but from better health facilities as opposed to those in informal or no employment at all.

4.2.4 Level of education

The respondents' education level was assessed to get to know its relevance with regard to seeking maternal health service. The findings are as shown in Table 4.6.

Table 4.6 Level of education

Group Variable	Women attending ANC		Medical staff	
	Frequency	%	Frequency	%
None	9	12.0%	0	0%
Primary	28	37.0%	11	11.7%
Secondary	22	29.3%	14	14.9%
Post secondary	12	16.0%	58	61.7%
University	4	5.3%	11	11.7%
Total	75	100%	94	100%

The Table 4.6 shows that quite a majority of women who attended ANC were mostly equipped with the basic education many of whom are primary and secondary school leavers that is 37% had attained primary level education while 29.3% had attained secondary school education. Sixteen percent had post-secondary certifications while only 5.3% were university graduates. Surprisingly, 12% of the women had never gone to school. On the other hand, most of the medical staff members had attained higher education status as 58% had post secondary certifications while 11.7% were university graduates. Fourteen point nine percent had attained secondary education while 11.7% were of primary level.

Education level is essential as it informs women and other people the importance of maternal care. Lack of health information is a significant issue. Delays in seeking maternal services

are sometimes caused by poor understanding of complications and risk factors in pregnancy and of when medical interventions are needed. Knowledgeable and exposed individuals are therefore more likely to seek maternal care services. This information is gained through formal learning, friends and on social media and therefore every person can get the opportunity to make the right decisions especially those pertaining to maternal care. Provision of these services on the other hand requires expertise and hence the high number of highly educated medical staff. Low level of education individuals mostly work as subordinates in the various health facilities' departments.

World vision's research found that when many people in rural Uganda fell sick, a popular option was to seek traditional herbal medicine advice and remedies' with incidences of ill-health worsening to a critical condition by the time health facilities were reached.

4.2.5 Health workers Length of service

The period health workers had taken in their various health stations was assessed and the results are as shown in table 4.7.

Table 4.7 Health workers Length of service

Variable	Frequency	%
Less than 3 years	4	4.3%
4-6 years	17	18.1%
6-8 years	14	14.9%
8-10 years	31	33.0%
Above 10 years	28	29.8%
Total	94	100%

Table 4.7 shows that 4.3% of the workers had less than 3 years stay in their various jobs, 18.1% had 4 to 6 years, 14.9% had 6 to 8 years, 33% had 8 to 10 years while 29.8% had above ten years.

4.2.6 Length of work for the Group Leaders

Their gender was considered and the results are shown in the Table 4.8.

Table 4.8 Length of work for the Group Leaders

Variable	Frequency	%
Less than 3 years	3	14.3%
3-5 years	4	19.0%
Above 5 years	14	66.7%
Total	21	100%

Table 4.8 shows that 14.3% of the group leaders had spent less than three years in their current job positions, 19% had spend 3-5 years while 66.7% had above 5 years.

4.2.7 Gender of Medical staff members and Group leaders

Their gender and that of the medical staff was considered and the results are shown in the Table 4.9.

Table 4.9 Gender of Medical staff members and Group leaders

Variable	Medical staff		Group Leaders	
	Frequency	%	Frequency	%
Female	55	58.5%	7	33.3%
Male	39	41.5%	14	66.7%
Total	94	100%	21	100%

Fifty eight point five percent of the medical staff were females while 41.5% were males as shown in Table 4.9. This can be attributed to the fact that women usually offer hospitality services better than men and especially those related to maternal services as the clients are of the same gender. As for the group leaders, 33.3% were females while 66.7% were males.

4.2.8 Antenatal service attendance by the women

The study sought to know how regularly the women attend the antenatal services and the following were the findings.

Table 4.10 Antenatal service attendance by the women

Variable	Frequency	%
Regularly	23	30.7%
Irregularly	35	46.7%
Not at all	17	22.7%
Total	75	100%

The Table 4.10 shows that 30.7% attend ANC regularly, 46.7% irregularly while 22.7% never attend. Majority (52) of the women don't attend to the services due to various reasons including transportation and inadequate information on the importance of maternal services.

The number of antenatal checks during pregnancy is always significant. Mothers with no regular checks are most likely to deliver their babies at home. On the other hand, mothers who go for their regular checks have greater chances of delivering in a health institution.

This study is however different from another research (Nyarko et. al., 2006) which indicated that there was a higher tendency for third and fourth visit clients attending the intervention clinics to seek antenatal care at the appropriate time, there was no significant difference from the control sites. Almost one-third of the clients in the intervention clinics sought care between 28 and 32 weeks of gestation.

4.2.9 Average distance to health facility

The average distance to health was assessed and results are as shown in table 4.11

Table 4.11 Average distance to health facility per household

Factor	Mean
Number of health facilities	4.62
Average distance to health facility per household	9.76
Number of community health workers	4

Table 4.11 shows that Tharaka sub County had a mean of 4.62 health facilities, 9.76 average distance to health facility per household and a mean of 4 community health workers. These factors show that other reasons causing maternal death include inadequate health professionals and facilities, and location in remote areas far away from the facilities. This is supported by Bhatia, 1993, who documented in his research conducted in India that half of the maternal death in Anantapur district took place at home or on the way to the facility.

4.2.10 Pregnancy duration

The study assessed the pregnancy durations of the pregnant women and the results are shown in the Table4.12

Table 4.12 Pregnancy duration

Factor	Variable	Frequency	%
Pregnancy duration	1 st Trimester	19	25.3%
	2 nd Trimester	33	44.0%
	3 rd Trimester	23	30.7%
Total		75	100%

The results show that 25.3% of the women were in the first trimester, 44% in the second

while 30.7% were in the third trimester of their pregnancy. The study shows that antenatal services are sought mainly during the second and third trimesters and this is in agreement with Nyarko et. al, 2006 where almost one-third of the clients in the intervention clinics sought care between 28 and 32 weeks of gestation.

4.3 Delayed Transport

Delay in receiving timely and appropriate care in the event of pregnancy complications is a major determinant of maternal mortality. One cause of delay is reaching the appropriate facility mostly due to difficulty in transport given the low socio-economic status of women and residing in rural areas. The influence of delayed transport was therefore assessed and its contribution to maternal mortality. The variables were analyzed and the results tabulated as shown in the tables 4.13 to 4.20.

4.3.1 Reason women seek for maternal services from the facilities

First, the study sought to know why the women sought for maternal services from the health facilities where they were being served and the medical staff opinions on the same. The results are as shown in Table 4.13

Table 4.13 Reason women seek for maternal services from the facilities

Group	Women attending ANC		Medical staff	
	Frequency	%	Frequency	%
The nearest possibility to go	50	66.7%	59	62.8%
The best medical service	10	13.3%	30	31.9%
The cheapest service to go	12	16.0%	5	5.3%
Best transport	3	4.0%	0	0%
Total	75	100%	94	100%

From Table 4.13, 66.7% of the women attending ANC sought for maternal services from the facilities because they were the nearest possibilities to go, 13.3% indicated that they offered the best medical services, 16% indicated that it was the cheapest service to go while only 4%

chose the best transport as the main reason. These results concurred with the medical staff whose majorities (62.85%) were for the nearest possibility to go option, 31.9% were for the best medical service, 5.3% were for the cheapest service while none was for the best transport for why the women attending the ANC chose their health facilities.

Therefore from the findings, it is clear that women go to health facilities which are near their destinations to avoid delay and due to their financial abilities. Very few of the respondents chose best transport option which might be suggesting that the transport facilities are not up to standard. This is closely followed by other medical services being offered.

4.3.2 Occupation of mothers seeking maternal services at the facility

A cross tabulation was done between occupation of women attending antenatal health services and the transport they use to go to the facilities. The results are summarized in table 4.14.

Table 4.14 Occupation of mothers seeking maternal services at the facility

		Why seek maternal services there				Total
		Nearest possibility	Best medical service	Cheapest service	Best transport	
Occupation	Unemployed	20	2	6	2	30
	Artisan	11	1	1	1	14
	Formal	6	4	5	0	15
	Trader	10	3	0	0	13
	Other	3	0	0	0	3
Total		50	10	12	3	75

More women who are unemployed tend to employ the use of facilities which are near their place as compared to those far away as shown in Table 4.15. This indicates that women who work are likely to seek maternal services from better facilities than those who don't.

4.3.3 Availability of transport for women from their communities to the health facilities

The study assessed the availability of transport for women from their communities to the

health facilities and the following are the results are as shown in table 4.15.

Table 4.15 Availability of transport for women from their communities to the health facilities

Variable	Frequency	%
Good	4	5.3%
Fair	40	53.3%
Poor	31	41.3%
Total	94	100%

From the Table 4.15, 41.3% of the women specified that the availability of transport was poor at 41 53.3% specified that it was fair while a mere 5.3% said it was good. These results can be attributed to the maternal deaths since the services are not readily available especially during emergency cases where people have to be rushed to health centres for specialized attention.

4.3.4 Emergency state in relation to linking community to health facility

The respondents were asked to give their opinion on whether emergency cases are dealt with appropriately.

Table 4.16 Emergency state in relation to linking community to health facility

Variable	Frequency	%
Good	4	5.3%
Fair	39	52.0%
Poor	32	42.7%
Total	94	100%

Table 4.16 shows that the state of emergency by linking the communities to health facilities was poor at 42.7%, fair at 52% and good at a mere 5.3%. This poor state of emergency causes delay in accessing maternal services hence making transportation unreliable. This discourages most women who sometimes decide not to seek care at the health institutions and

this contributes to why they choose to deliver at home rather than at a health facilities as supported by Chisembele, 2001; Bale et al. 2003.

4.3.5 Means of calling for ambulance in case of emergency

The research sought to know the means used by women and medical staff to call for ambulance in case of emergency.

Table 4.17 Means of calling for ambulance in case of emergency

Group	Women attending ANC		Medical staff	
Variable	Frequency	%	Frequency	%
Through network system	6	8.0%	32	34%
Through personal mobile phones	52	69.3%	60	63.8%
Sending for a health staff	12	16.0%	2	2.1%
Other	5	6.7%	0	0%
Total	94	100%	94	100%

The Table 4.17 shows that 8% of the women used network system to call for ambulance, 69.3% called through personal mobile phones, 16% send for health staff while 6.7% use other means. Since ambulances are either few or not available in most facilities, the women might not be able to get the contacts which are only shared with the medical staff in health facilities that own the ambulances. This reduces their chances of calling for them in case of emergency especially if they are not within such facilities. Therefore other transport means are used instead of ambulances.

4.3.6 Transport means used VS the number of trips made

The study sought to assess other means of transport that could be used to access the maternal services and their relationships with the number of trips made by the pregnant women. The findings are as shown in table 4.18.

Table 4.18 Transport means used VS the number of trips made

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19.594	6	.003
Likelihood Ratio	19.385	6	.004
Linear – by – Linear Association	4.360	1	.037
N of Valid Cases	75		

Table 4.18 shows that the association between the transport means used to access maternal services and the number of trips made was significant; $\chi^2 = 19.594, p < 0.05$. That can be attributed to the exhaustion that comes as a result of using means like walking which discourages women from making many trips and hence opting for local solutions.

4.3.7 Correlation between Availability of transport and its use in accessing maternal health

Correlations were done to find out the relationship between the availability of transport and its contribution in influencing maternal health services. The results are displayed in the table 4.19

Table 4.19 Correlation between Availability of transport and its use in accessing maternal health

		Availability of transport	Transport used mostly to access maternal health
Availability of transport	Pearson Correlation	1	.272*
	Sig. (2-tailed)		.018
	N	75	75
Transport used mostly to access maternal health	Pearson Correlation	.272*	1
	Sig. (2-tailed)	.018	
	N	75	75

** . Correlation is significant at the 0.05 level (2-tailed).

From the Table 4.19, there is a relationship between the availability of transport and its use in accessing maternal health. This is because the most available transport means are mostly used by the pregnant women.

4.3.8 Relationship between the availability of transport and the transport used to access maternal health services

To prove the existence of relationship between them, a chi-square test was performed and the following were the findings.

Table 4.20 Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	19.261 ^a	6	.004

The Table 4.20 shows that there exists a relationship between the availability of transport and the transport used to access maternal health services since the p-value 0.004 is less than 0.05 (level of significance). Therefore the relationship is significant because the available means of transport is the one that is mostly utilized by the pregnant women.

4.4 Means of Transport Used in Hospitals

The means of transport used in accessing maternal services is essential in determining the accessibility of maternal services and also delivery of medical tools and equipment and medicine.

4.4.1 Type of transport used

The research assessed the modes of transport used in hospitals within Tharaka Nithi by examining the types of transport used by women attending ANC and medical staff, the relevance of poor state of vehicles as maternal hazard and relevance of unavailability of vehicles as maternal hazard. The results are shown Table 4.21.

Table 4.21 Type of transport used

Group	Women attending ANC		Medical staff	
	Frequency	%	Frequency	%
Public transport	14	18.7%	14	14.9%
Private car	5	6.7%	6	6.4%
Motorbike	37	49.3%	53	56.4%
Walk	19	25.3%	21	22.3%
Total	75	100%	94	100%

Table 4.21 shows that 18.7% of the women use public transport, 6.7% use private cars, 49.3% use motorbikes while 25.3% walk on foot. As for the medical staff opinions on the means used by women to access the health services, 14.9% suggested that women use public transport, 6.4% use private cars, 56.4% use motorbike while 22.3% walk. Therefore, most women prefer using motorbikes to go to health centres which might be due to the fact that motorbikes are readily available and are highly versatile as compared to other means of transport.

4.4.2 Relevance of poor state of vehicles as maternal hazard

The study then assessed whether poor state of vehicles contributed to maternal health hazards and found the following.

Table 4.22 Relevance of poor state of vehicles as maternal hazard

Variable	Frequency	%
Very important	54	57.4%
Important	26	27.7%
Average	14	14.9%
Total	94	100%

Table 4.22 shows that 57.4% of the medical staff members rated poor state of vehicles as maternal hazard as very important, 27.7% rated it as important while 14.9% rated poor state of vehicles to be average in contributing to maternal health services.

4.4.3 Relevance of unavailability of vehicles as maternal hazard

On the relevance of vehicles as maternal hazard, the study found the following.

Table 4.23 Relevance of unavailability of vehicles as maternal hazard

Variable	Frequency	%
Very important	75	79.8%
Important	19	20.2%
Total	94	100%

Most of the medical staff members (79.8%) specified that the unavailability of vehicles as maternal hazard was very important while the rest (20.2%) specified that the relevance was important. Therefore the unavailability of vehicles is an important factor to consider in striving to achieve the MDG 5

4.4.4 Correlation between rate of poor vehicle state and why the respondents seek maternal services

A correlation was done to determine whether a relationship existed between rate of poor state of vehicle as maternal hazard and why the mothers seek services in the health centres they go

to. The results are displayed in Table 4.24.

Table 4.24 Correlations

		Rate of poor vehicle state as maternal hazard	Why seek maternal services there
Rate of poor vehicle state as maternal hazard	Pearson Correlation	1	.427**
	Sig. (2-tailed)		.000
	N	75	75
Why seek maternal services there	Pearson Correlation	.427**	1
	Sig. (2-tailed)	.000	
	N	75	75

4.4.5 Relationship between rate of poor vehicle state and why the respondents seek maternal services

The Table 4.25 shows that there is a relationship between rate of poor vehicle state as maternal hazard and why the respondents (mothers) seek maternal services at the health centres. A chi-square test was done to support the relationship existence and the following were the results.

Table 4.25 Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	25.439 ^a	6	.000

This shows that there is a true relationship between the two variables which can be attributed to the availability of vehicles. Women attending ANC are likely to go to health facilities that are well equipped with vehicles (ambulances) which are in good state and ready to serve when necessary. This is due to emergency cases which require faster means of transport.

If the state of vehicles is bad, then they are likely to seek maternal services in other facilities somewhere else.

4.5 Roads infrastructure

Delay in seeking maternal health services is also as a result of poor transport facilities which include road conditions. Many people may not have access to paved roads and many families do not have access to vehicles.

4.5.1 State of roads linking your community to health facility

The study looked into this matter by considering the state of roads linking the communities to the health facilities and its relevance to maternal service provision and the following were the findings.

Table 4.26 State of roads linking your community to health facility

Variable	Frequency	%
Good	5	5.3%
Fair	20	21.3%
Poor	69	73.4%
Total	94	100%

Table 4.26 shows that 73.4% of the health facilities' workers indicated that the state of roads linking their communities to health facilities was poor, 21.3% said it was fair while only 5.3% said it was good. Therefore the state of roads linking various places to health facilities is alarming and should be improved to ensure timely referral and for accessibility purposes.

4.5.2 State of Road

This was supported by the group leaders whose responses are as shown in Table 4.27.

Table 4.27 State of Road

Variable	Frequency	%
Fair	12	57.1%
Poor	9	42.9%
Total	21	100%

Table 4.27 shows that 57.1% of the group leaders think the road state is fair while 42.9% are of the opinion that the state of roads is poor. This depicts that the leaders are not doing enough to improve infrastructure in their areas and this contributes greatly to maternal mortality rate.

4.5.3 Relevance of poor road state as maternal hazard

The relevance of poor road state as maternal hazard was therefore assessed and the results obtained are as shown in the Table 4.28.

Table 4.28 Relevance of poor road state as maternal hazard

Group	Women attending ANC		Medical staff	
Variable	Frequency	%	Frequency	%
Very important	55	73.3%	75	79.8%
Important	20	26.7%	19	20.2%
Total	94	100%	94	100%

Table 4.28 shows that most of the women attending ANC services were of the opinion that the relevance of poor road state as maternal hazard was very important while the rest said it was important. This was in support of medical staff opinion that it was very important at 79.8% while 20.2% specified that it was important.

4.5.4 Transport management challenge

The medical staff members were asked to give their opinion on most transport management

challenge and the results are displayed in the table 4.29.

Table 4.29 Transport management challenge

Variable	Frequency	%
Inadequate vehicles	19	20.2%
Aged vehicles	2	2.1%
Poor road network	70	74.5%
Lack of skills	3	3.2%
Total	94	100%

Table 4.29 shows that 20.2% of the staff members were of the opinion that inadequate vehicles post a major management challenge, 2.1% specified that the vehicles were aged, a majority said it was due to poor road network while 3.2% said it was due to lack of skills. Poor road network therefore qualifies to be a major threat to the provision of quality maternal care.

4.5.5 Transport management challenge vs Ability to achieve zero maternal death by 2015

The most transport management challenge and ability to achieve zero maternal mortality by 2015 were assessed and the results summarized as follows.

Table 4.30 Transport management challenge vs Ability to achieve zero maternal death by 2015

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	30.289	9	.000
Likelihood Ratio	28.199	9	.001
Linear – by – Linear Association	16.326	1	.000
N of Valid Cases	94		

There was a significant relationship between the most transport management challenge and ability to achieve zero maternal death by 2015 i.e $\chi^2 = 30.289$, $p <= 0.000$. The most transport management challenge was poor road network as shown in Table 4.29 and hence has been a major obstacle towards achieving zero maternal mortality by 2015.

4.6 Transport Referral System for Emergency Medical Obstetric Care

An improved and functional referral system for comprehensive emergency obstetric care is one of the major ways of curbing maternal mortality. Agencies and governments have to ensure that health facilities are able to provide these services. They are necessary to save lives. The study sought to find out the challenges pertaining to provision of maternal services and the impact improved referral system for emergency medical obstetric care will have on provision of maternal services in Tharaka Nithi.

4.6.1 Availability of transport management systems

The study first sought to know whether transport management systems existed in the facilities and the findings were tabulated in table 4.31.

Table 4.31 Availability of transport management systems

Variable	Frequency	%
Yes	6	6.4%
No	79	84.0%
Don't know	9	9.6%
Total	94	100%

The Table 4.31 shows that 6.4% of the medical staff members specified that transport management systems were available, 84% said they were not available while 9.6% said they were not aware. Transport management systems are important in ensuring organized and controlled maternal service provision and proper record keeping.

4.6.2 Transport resources managed by professionals

The research sought their opinion on whether transport resources are managed by professionals. The findings are as shown in Table 4.32.

Table 4.32 Transport resources managed by professionals

Variable	Frequency	%
Yes	10	10.6%
No	81	86.2%
Don't know	3	3.2%
Total	94	100%

Table 4.32 shows that 10.6% of the respondents agreed that the transport services were managed by professionals, 86.2% disagreed while 3.2% didn't know anything about management of transport resources.

4.6.3 Number of vehicles per facilities

The study sought to know whether the health facilities had enough vehicles for maternal services.

Table 4.33 Availability of enough vehicles for maternal services

Variable	Frequency	%
Yes	91	96.8%
No	3	3.2%
Total	94	100%

Table 4.33 shows that 96.8% of the medical staff members agreed that they had enough vehicles for maternal services, 3.2% disagreed.

4.6.4 Availability of budgeted funds

The availability of budgeted funds for running transport resources was sought and the following was realized.

Table 4.34 Availability of budgeted funds for running transport resources

Variable	Frequency	%
Yes	7	7.4%
No	27	28.8%
Don't know	60	63.8%
Total	94	100%

The table 4.34 shows that 7.4% said that budgeted funds for running transport services were available, 28.8% said they were not available while 63.8% didn't know.

4.6.5 Availability of budgeted funds for running transport resources VS the means of transport for pregnant women's timely referral

A Chi-Square to test the relationship between availability of funds and means of transport

used is given in Table 4.35.

Table 4.35 Availability of budgeted funds for running transport resources VS the means of transport for pregnant women’s timely referral

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	20.304	9	.016
Likelihood Ratio	18.268	9	.032
Linear – by – Linear Association	0.461	1	.497
N of Valid Cases	94		

The availability of budgeted funds for running transport resources and the means of transport used had a statistical significance, $\chi^2 = 20.304$, $p < 0.016$ as shown in Table 4.34. Therefore the availability of funds could have led to use of better and readily available means of transport for timely referral of pregnant women.

4.6.6 Transport management problems regarding achieving MDG 5

The existence of transport management problems regarding achieving MDG 5 was assessed and the following results obtained.

Table 4.36 Transport management problems regarding achieving MDG 5

Variable	Frequency	%
Yes	37	39.4%
No	7	7.4%
Don’t know	50	53.2%
Total	94	100%

Table 4.36 shows that 39.4% of the respondents agreed that transport management problems regarding achieving MDG 5 existed, 7.4% disagreed while 53.2% didn’t know.

4.6.7 Ability to attain zero maternal death by 2015 VS Existence of management problems

The Pearson Chi-Square test on existence of transport management problems regarding MDG5 and ability to achieve the goal and the results are summarized in the Table 4.37.

Table4.37 Ability to attain zero maternal death by 2015 VS Existence of management problems

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	18.242	6	.006
Likelihood Ratio	19.615	6	.003
Linear – by – Linear Association	10.845	1	.001
N of Valid Cases	94		

The level of association between the ability to attain MDG 5 by 2015 and the existence of management problems in the attainment is significant as shown in the Table 4.34 i.e $\chi^2 = 18.242$, $p < 0.05$.

4.6.8 Managing transport effectively with respect to maternal health services

The medical staff members then gave suggestions on what should be done most to manage transport effectively with respect to maternal health service provision and the following were the findings shown in Table 4.38

Table 4.38 Managing transport effectively with respect to maternal health services

Variable	Frequency	%
Procure more vehicles	9	9.6%
Engage transport professionals	5	5.3%
Outsource transport services	20	21.3%
Provide good road networks	60	63.8%
Total	75	100%

Table 4.38 shows that 9.6% of the staff saw it better to procure more vehicles, 5.3% said transport professionals should be engaged, 21.3% said transport services should be outsourced while majority saw it better to provide good road networks. Since the realization of MDG 5 not only relies in the hands of public stakeholders, involvement of private sector can be very useful.

4.6.9 Significance of public private partnership

The research assessed the significance of public private partnership support to achievement of MDG 5 and the results are given in Table 4.39.

Table 4.39 Significance of public private partnership support to achievement of MDG 5

Variable	Frequency	%
Very important	30	31.9%
Important	38	40.4%
Average	24	25.5%
Not at all	2	2.1%
Total	75	100%

Table 4.39 shows that 31.9% of the respondents indicated that the significance was very

important, 40.4% said it was important, 25.5% said it was average while 2.1% said it wasn't important at all.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the findings, discussions, conclusions, and recommendations arrived. The chapter is organized according to research objectives. The first section establishes the extent to which delayed transportation influence maternal mortality in Tharaka Sub County. The second examines the influence of means and mode of transport used in hospitals on maternal mortality, third section establishes how roads infrastructure influence maternal mortality and the fourth section investigates how improved referral system for emergency medical obstetric care influence maternal mortality in Tharaka Sub County.

5.2 Summary of Findings

Summary of the findings are indicated by the following objectives:

5.2.1 Delayed Transportation

The study found that 66.7% of the women attending ANC sought for maternal services from the health facilities because they were the nearest possibilities to go. This was supported by the medical staff of whom 62.85% were of the same opinion. This showed that mothers go to health facilities which are near their destinations to avoid delay and due to their financial abilities. It was also found that the availability of transport was poor as specified by 41.7% of the respondents. This meant that women had to walk for long distances to reach health facilities for maternal services.

The study also found that the emergency state in relation to linking community to health facility was poor as indicated by 42.7% of the medical staff. In case of emergency, most (69.3%) people used mobile phones to call for ambulance. The study also showed that 63.8% of women attending ANC used motorbikes mostly for timely referral because of their availability and versatility. Therefore lack of available and reliable transport revealed in the study attests to the reason why there is delay in seeking maternal health services.

5.2.2 Means and Mode of Transport Used

The research realized that accessing maternal services and making deliveries were of great importance. This depended on the means and mode of transport used. In the assessment of the type of transport used, the findings indicated that most (49.3%) of the mothers used motorbikes and 56.4% of the medical staff revealed that indeed they (mothers) used them most of the times. It was also realized that the relevance of poor state of roads was very important as indicated by 57.4% of the medical staff respondents.

The lack of reliable and available transport was revealed in the study as 75% of the respondents (management staff) indicated that the relevance of unavailability of vehicles as maternal hazard was very important.

5.2.3 Roads Infrastructure

The study revealed that the state of roads linking respondents' communities to health facilities was poor as indicated by 73.4% of the medical staff. It was also found that the relevance of poor road state as maternal hazard was very important at 73.3% for pregnant women and 79.8% for management staff. In addition it was realized that the most challenging transport management issue was the road network. Seventy four point five percent of the management staff indicated that poor road network was very challenging.

5.2.4 Improved Referral System for Emergency Medical Obstetric Care (EmOC)

Maternal mortality can be reduced by considering all its causes and complications before, during and after child birth. Various factors were considered including use of transport management systems, management of transport resources and challenges faced with a view of establishing the importance of improving maternal care services hence aiming to achieve MDG5. The study found that transport management systems were not being used in health facilities. This was indicated by 84% of the management staff. Transport resources were also not being managed by professionals and this was indicated by 86.2% of the management staff.

It was also found that proper maternal transport services could be enhanced by availability of enough vehicles for providing maternal services and this was indicated by 96.8% of management staff. Thirty nine point four percent of the management staff respondents agreed that transport

management problems regarding achieving MDG 5 existed. The most effective way to manage transport with respect to maternal health service provision was the provision of good road networks as indicated by 63.8% of the management staff. Finally, more than 72% of the management staff indicated that public private partnership support to achievement of MDG 5 was important.

5.3. Discussion of the Results

Discussions of the results are as indicated by the following objectives:

5.3.1 Delayed Transportation

The study found that delayed transport played a very important role in the delivery of health services hence was of great relevance. The availability and reliability of transport was perceived by both the pregnant women and health management staff as key link between potential accessibility and actual utilization of maternal health services.

This concurred with Lucas (2006) who reported that “hospitals and health services are being rationalized into fewer, larger units serving wide areas and located in places that are difficult to reach without a car”, accessing these facilities becomes particularly difficult for people who rely on public transport leading to failed health appointments and associated delays in medical intervention. Therefore timely access to maternal care helps reduce other long term maternal health problems including obstetric fistula caused by obstructed labour (Ban k.2010).

Similarly, an enquiry into causes of delay and death “Mothers Brought Dead” in Jinnah Post Graduate Medical Centre Karachi found that out of 118 pregnant or recently delivered women in 10 years period (1981-1990) were brought dead, 29 couldn’t reach because of unavailability of transport, in 14 cases the reason was time lost in transfer from one place to another and for 10 patients the delay was due to delay in referral by lower level facilities due to inadequate means of transport (Jafary, 1993).

Delay also caused pregnant women to seek maternal care from traditional birth attendants or relatives with less or no experience especially when complications emerged in the process.

5.3.2 Means and Mode of Transport Used

The findings revealed that most of the pregnant women used motorbikes when going to health facilities for maternal care. It was also realized that the relevance of poor state of roads was very important. This concurs with Starkey, 2008, whose research showed that motorcycles are increasingly important; they are now the most numerous means of transport on some rural spokes in Colombia, Indonesia, Nepal and Timor Leste. They can operate on poor roads, passing road blocks caused by mud, water or landslides. Rural motorcycle taxis carry men, women and children, and their goods, to link poorly served villages to conventional transport services on main roads.

The lack of reliable and available transport was of great relevance as maternal hazard. Most transport types were unavailable and at times women could be compelled to walk for long distances to hospitals hence increasing chances of developing complications. This is corroborated in a study conducted in Zambia where seventy six percent of pregnant women had to walk to the clinic to receive care and fifty percent had to walk for two hours or more to receive maternal services (Stekelenburg, 2004). Even when public transportation is available, there may be various barriers for people to use it in accessing healthcare facilities including cost, unreliable bus schedules, long traveling times, bad weather conditions and safety at bus stops.

5.3.3 Roads Infrastructure

The study found that the state of roads linking respondents' communities to health facilities was very poor. It was also found that the relevance of poor road state as maternal hazard was very important. In addition it was realized that the most challenging transport management issue was the road network. This determines whether pregnant women choose to seek for maternal care from hospitals or at home. This is in support of a survey done in Pakistan Integrated Household Survey PHIS (200).

Therefore bad roads compound the problem of transporting pregnant women hence the continued use of motorbikes. The closeness of health workers to health facility further calls for the good roads so as to transport patients from the rural areas to facilities.

5.3.4 Improved Referral System for Emergency Medical Obstetric Care (EMOC)

The study found that the provision of maternal care services faced various challenges including inadequate transport management systems, mismanagement of transport resources and the unavailability of vehicles hence leading to existence of transport management problems regarding achievement of MDG 5.

Access to EMOC is a vital component in reducing maternal death. It must be recognized as a crucial lifesaving intervention to which all women affected by the crises are entitled. Lankaran, (1994) showed that essential features of the referral system are the use of a maternity record card that is kept by the woman, effective communication among primary care providers and between the primary and secondary care levels, an efficient emergency transport system, and referral back to primary level as soon as possible.

These findings also concur with Martin et al., 2002 who showed that a good means of transport played a critical role in the delivery of and access to health services and in effectiveness of the referral process. In places where the ratio of health facilities to population is low or uneven, proper means of transport and good roads can ensure a more adequate distribution of and access to care.

5.4 Conclusion of the Findings

This study explored the role of transport in the achievement of maternal death reductions and found:

1. Delay in delivery of health services and hence maternal health services to be of great relevance in reduction of maternity.
2. The type of transport used, the accessibility and mode/means of transport employed in the provision of maternal health services played a critical role and were of great relevance.
3. Improved referral system for emergency medical obstetric care is of high importance.
4. Public private partnership can contribute significantly towards the improvement of transport in relation to the achievement of the Millennium Development Goal 5.

5.5 Recommendations of the Study

It was established that transport played a major role in influencing maternal mortality in Tharaka Sub County and relevant recommendations by the researcher made as follows.

1. There is need for all stakeholders to be on board for the strengthening of public transportation system. It should not be left only in the hands of the private sector, the government should establish string policies to provide direction and support.
2. Initiatives which build the health literacy of women, families and communities are essential in supporting women to make informed choices about reproductive health (including family planning), childbirth, nutrition and sanitation. Health education should be provided in schools and during clinic days so that women understand the importance of pre and post natal care.
3. The government should provide funds to the ministry of health and transport for the purpose of purchasing ambulances at the County level and ensure that roads in the rural areas are properly secured to enable quick transportation.
4. There is need to incorporate technology in the provision of transport through substitute transport services with the assistance of new intelligent demand responsive technology to ensure pregnant women are transported to health facilities in good time by ambulances provided by the government.

5.6 Suggestions for Further Study

Further studies should be carried out to found out the influence of socio-cultural and economic factors on maternal and child mortality other than transportation. Similar studies should be carried out in other sub counties in Kenya in order to generalize the research findings since this study was based on Tharaka Sub County in Tharaka Nithi County.

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APPENDICES

APPENDIX 1: INTRODUCTION LETTER

Samuel Ragwa,

University of Nairobi,

Dear Respondent,

Re: Request Questionnaire Responses

This is to request you to participate in this purely academic research study. I kindly request for your assistance in responding to the attached questionnaire to provide the much valued data for the research study analysis. The questionnaire is strictly for academic purposes and any information given shall be treated with strict confidentiality; please give the information as accurately as possible. Thanking you in advance.

Yours Faithfully,

Samuel Ragwa.

**APPENDIX 2: SAMPLE INTERVIEW QUESTIONS FOR PREGNANT WOMEN
INTRODUCTION**

This set of questions is to enable the researcher collect data that would enable him assess the role of Transport in the achievement of Maternity Mortality Reduction (MDG 5) in the Tharaka SubCounty – Kenya.

This exercise is purely academic. Your contribution by way of answering the questionnaire will be highly appreciated.

Questionnaire No.

Facility **Date**

NO.	QUESTION	RESPONSE	CODE	
	Category of Respondent	Pregnant Women		
PART A				
1	Age	18 – 25 yrs 26 – 30 yrs 31 – 35 yrs 36 – 40 yrs 40 – and above		
2	No. of Children	One Two Three Four and above		
3	Marital Status	Single Married		

		Divorced Co-habitation		
4	Occupation	Unemployed Artisan Formal Trader Other		
5	Income(in thousands)	KSH 10 – 50 KSH 51 -100 KSH 101 -150 KSH 151 – 200 KSH 200 & Above		
6	Educational Level	No Education Primary Secondary Post secondary University		
7	How regularly do you attend to antenatal services?	Regularly Irregularly Not at all		
8	How old is your pregnancy?	1 st Trimester 2 nd Trimester 3 rd Trimester		
PART B				

1	Which of these divisions are you coming from?	Mautini Kaguma Kanjoro Gatunga Kamaguna Nkondi Others specify		
2	Availability of transport from your community to the health facility?	Good Fair Poor		
3	Rate relevance of poor state of vehicles as Maternal hazard	Very important Important Average Not at all		
4	Why do you seek maternal services here? Because it is:	The nearest possibility to go The best medical service to go The cheapest service to go to The best transport		
5	Which type of transport do you use most of the time when accessing maternal health services?	Public Transport Private car Motorbike Walk		
6	How many transit trips do you make to reach the	One trip		

	health facility?	Two trips Three trips Four trips		
7	Rate relevance of poor state of roads as maternal hazard	Very important Important Average Not at all		
8	State of emergency by linking your community to the health facility?	Good Fair Poor		
9	In case of obstetric emergency by what means to call for an ambulance?	Through network system Through personal mobile phone Sending for a health staff Other (specify)		
10	Are you given priority for public transportation to health facilities?	Always Sometimes Never		

APPENDIX 3: INTERVIEW QUESTIONS FOR HEALTH MANAGEMENT STAFF

INTRODUCTION

This set of questions is to enable the researcher collect data that would enable him assess the role of Transport in the achievement of Maternal Mortality reduction (MDG5) in Tharaka SubCounty – Kenya.

This exercise is purely academic. Your contribution by way of answering the questionnaire will be highly appreciated.

Questionnaire No.

Facility

Date

No	Question	Response	Code	Fieldname
	Category of Respondent	Health Management Key Informant		
PART A				
1	Occupation	Medical staff Medical records Other (Specify)		
2	Length of Service	01 – 3 yrs 04 – 6yrs 06 – 8 yrs 08 – 10 yrs Above 10 yrs		
3	Educational Level	None Primary Secondary Post secondary University		
4	Age	25yrs and below 26-30yrs 31-35yrs 36-40yrs 41-45yrs Above 45 yrs		
5	Gender	Female Male		

PART B				
1	Why do pregnant women seek maternal services here? Because it is:	The nearest possibility to go The best medical service to go The cheapest service to go to The best transport		
2	Type of transport use most by pregnant women for accessing maternal health services	Public Transport Private car Motorbike Walk		
3	How many transit trips do pregnant women make to reach the health facility?	One trip Two trips Three trips Four trips		
4	Rate relevance of unavailability of vehicles as maternal hazard	Very important Important Average Not at all		
5	Rate relevance of poor state of vehicles as maternal hazard	Very important Important Average Not at all		
6	State of roads linking your community to the health facility?	Good Fair Poor		
7	Rate relevance of poor state of roads as maternal hazard	Very important Important Average Not at all		
8	In case of an obstetric emergency by what means do you call for an ambulance?	Through network system Through personal call Sending a health staff		
CHALLENGES				
1	Do you have transport management systems in place?	Yes No Don't know		
2	Are your transport resources managed by professionals?	Yes No Don't Know		
3	Do you have enough transport (ambulance) for maternal services?	Yes No Don't Know		
4	Do you have budgeted	Yes		

	funds for the running of your transport resources?	No Don't know		
5	In times of no vehicle, type of transport means of pregnant women's for timely referral?	Seek regional support Hire a car Use motorbike /bicycle Walk Other specify		
6	What is the most transport management challenge you do face?	Inadequate vehicles Aged vehicles Poor road network Lack of skills Other (specify)		
HEALTH WORKERS PERCEPTION				
1	Can zero maternal death (MDG 5) be achieved in the sub County by 2015?	Very likely Likely Not likely Impossible		
2	Do you have any transport management problems with regards to achieving MDG 5?	Yes No Don't Know		
3	What should be done most to manage transport effectively with respect to maternal health services?	Procure more vehicles Engage transport professionals Outsource transport services Provide good roads networks Other (specify)		
4	Significance of public private partnership support for transport to the achievement of MDG 5	Very important Important Average Not at all		

Thank you for your positive contribution