FACTORS CONTRIBUTING TO ADVERSE PREGNANCY OUTCOMES IN PUBLIC HEALTH FACILITIES IN KEIYO DISTRICT, KENYA.

By

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DECLARATION

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DEDICATION

To my loving parents Mr and Mrs Daniel Cheptum since their encouragement and inspiration made the impossible possible.

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LIST OF ACRONYMS AND ABBREVIATIONS

AIDS - Acquired Immune Deficiency Syndrome

ANC – Antenatal Care

APH – Antepartum Haemorrhage

APRHC - African Population and Health Research Centre

BMI - Body Mass Index

BOC - Basic Obstetric Care

C/S - Caesarean Section

CDC – Centre for Disease Control

CI - Confidence Interval

CWC - Child Welfare Clinic

df - Degrees of freedom

DRH - Division of Reproductive Health

EmOC - Emergency Obstetric Care

FANC - Focused Antenatal Care

FGM - Female Genital Mutilation

FP - Family Planning

HF - Health Facility

HIV - Human Immuno-deficiency Virus

IMR – Infant Mortality Rate

IPT - Intermittent Preventive Treatment

IREC – Institute of Research and Ethics

ITMN - Insecticide Treated Mosquito Nets

IUGR – Intra –Uterine Growth Restriction

KDHS - Kenya Demographic Health Survey

KII – Key Informant Interview

KSPA - Kenya Service Provision Assessment

KU – Kenyatta University

LBW – Low Birth Weight

LGA - Large for Gestational Age

MDG – Millennium Development goal

MMR – Maternal Mortality Rate

MOMS - Ministry of Medical Services

MOPHS - Ministry of Public Health and Sanitation

NCPAD - National Coordinating Agency for Population and Development

NHS - National Institute for Health and Clinical Excellence

NMR – Neonatal mortality Rate

NRHP – National Reproductive Health Policy

OR - Odds Ratio

PET - Pre-Eclampsia Toxaemia

PIH – Pregnancy Induced Hypertension

PMR – Perinatal Mortality Rate

PNC – Post Natal Care

PPH – Post Partum Haemorrhage

PROM - Premature Rupture of Membranes

ROK - Republic of Kenya

SGA - Small for Gestational Age

SRH – Sexual Reproductive Health

TBA - Traditional Birth Attendant

TFR - Total Fertility Rate

TT - Tetanus Toxoid

UNAIDS - United Nations Programme on HIV and AIDS,

UNFPA - United Nation Population Fund

UNICEF – United Nations Children Education Fund

VDRL - Venereal Disease Research laboratory

WHO – World Health Organization

DEFINITION OF TERMS

Abortion is the expulsion of the fetus before 24 weeks gestation or less than 500 grams.

Adverse pregnancy outcomes refers to poor pregnancy results.

Gravidity refers to the number of times that a woman has been pregnant.

Intra-Uterine Growth Restriction is failure of the fetus to gain weight corresponding to the gestational age.

Live-born infant describes an infant born at any gestational age with a heartbeat or respiratory effort.

Low Birth Weight is birth weight less than 2500g irrespective of the gestation the baby is born.

Maternal death - the death of a woman while pregnant or within 42 days of termination of pregnancy irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.

Miscarriage is expulsion of the fetus that occurs between 12-24 weeks gestation.

Neonatal mortality refers to the number of children dying under 28 days of life.

Obstetric emergency is a life-threatening condition that occurs in pregnancy or during or after labor and delivery necessitating immediate action.

Parity - refers to delivery that occurs after viability of the pregnancy, usually after 28 weeks.

Poor pregnancy outcome - refers to pregnancy or reproductive wastage.

Perinatal mortality is number of stillbirths and deaths occurring in the first week of life.

Pre-existing condition is a medical condition which is already present before the woman becomes pregnant.

Pregnancy induced hypertension – It is the development of new arterial hypertension in a pregnant woman after 20 weeks gestation, which the symptoms include high blood pressure, proteinuria and oedema.

Preterm birth is any birth occurring between 24 – 37 weeks gestation.

Still birth is any fetus born at 24 weeks' gestational age or more with no heartbeat or respiratory effort.

Vacuum extraction implies the application with vacuum of a suction cup to the head of the baby, and traction in the cup in synchronisation with the mother's own contractions.

Vulnerability refers to the susceptibility of a person to physical or emotional injury or attack.

ABSTRACT

Addressing poor pregnancy and childbirth outcomes such as still births, preterm births and neonatal deaths have continued to be a major global challenge. Nations and organizations have invested much effort and resources to promote safe pregnancy and childbirth. Despite this, maternal and perinatal mortalities and morbidities remain high. Though several risk factors predisposing women and their infants to adverse outcomes during pregnancy have been documented, little is known on the factors contributing to poor pregnancy outcomes in Keiyo District of Kenya. This was a descriptive cross-sectional study targeting women of reproductive age (15 – 49 years) utilizing maternal and child health services in public health facilities in Keiyo district of Kenya, to identify factors contributing to adverse pregnancy outcomes. Data collection tools employing both qualitative and quantitative parameters were used in the study. A multistage sampling approach was used. The district hospital was purposively selected while the sub-district hospital and health centre were randomly selected considering the levels of care provision in Kenya. Data was obtained from a total of 384 women using interviewer-administered questionnaire. Key informant interviews on health facility in-charges were used to provide additional information. Data was presented using tables, graphs and cross tabulations, while association between variables was assessed using Chi-square statistics and Odds Ratio. Thematic analysis was done on qualitative data. Findings showed that low education level significantly affected pregnancy outcome, none schooling [Unadjusted OR 5.63, 95% CI (1.34, 23.66), p=0.018] and primary school level [(Unadjusted OR 2.09, 95% CI (1.828, 5.004) p=0.029]. Low gestational age at birth was associated with poor pregnancy outcome, (20-28 weeks [(unadjusted OR 50.6, 95% CI (11.3, 225.6) p<0.0001) and 28-37 weeks (Unadjusted OR 4.6, 95% CI (2.72, 7.83), p<0.0001]. Pre-existing medical conditions were associated with poor pregnancy outcomes [Unadjusted OR 4.48, 95% CI (2.653, 7.571) p<0.0001), adjusted OR 3.97, 95% CI (2.653, 7.571), p= 0.023]. Illnesses occurring during pregnancy also showed association with poor pregnancy outcome [Unadjusted OR 3.025, 95% CI (1.828, 5.004), p<0.0001]. Obstetric emergencies were significantly associated with poor pregnancy outcome [Unadjusted OR=2.982, 95% CI (1.751, 5.0791), p<0.0001]. Those who attended the health centre facility for care had significantly poor pregnancy outcomes compared to those who attended the hospital [Unadjusted OR 0.314, 95% CI (0.216, 0.683) p=0.001]. There is need to address health facility factors that contribute to delays in obtaining care, and putting in place a well defined referral system to enable early identification and timely care for women at risk. Findings from this study will be used by the policy makers in focusing interventions aimed at improving maternal and child health, ultimately contributing to attainment of the millennium development goals.

CHAPTER 1: INTRODUCTION

1.1 Background to the study

While most pregnancies and births are uneventful, all pregnancies are at risk. Pregnancy is a time of joy and excitement; however, it can also be full of anxiety and concern (Lawn, 2005). Pregnancy and childbirth have an enormous impact on the physical, mental, emotional, and socioeconomic health of women and their families (CDC, 2008). The successful transition of the newborn baby from life in utero to life at birth is based on a complex balance between the health of the mother, the course of the pregnancy, and the process of delivery and immediate postnatal care (Lancet, 2005). Poor pregnancy outcome may be lethal outcomes which include fetal and infant losses including abortion, stillbirth, neonatal deaths and few postneonatal deaths related to pregnancy and labour (Ziyo *et al*, 2009). Sub lethal outcomes; no fetal losses, but the live born suffers morbidity arising from exposure to risk during pregnancy and labour, including congenital anomalies, mental retardation nerve palsies, organ injuries and LBW (Ziyo *et al*, 2009). The risk of maternal death is greatest during labour, delivery, and the 24-hour period after delivery (Lancet, 2006).

Pregnancy outcome is classified into three distinct categories: pregnancy wastage (Abortions and stillbirths), preterm births and live full term births (Magadi, 2004). Adverse pregnancy outcomes, including preterm birth, low birth weight (LBW), intrauterine growth restriction (IUGR), and preeclampsia, are important events determining neonatal morbidity and mortality (Siqueira, 2007). Perinatal mortality, comprising of still births and early neonatal deaths is one of the sensitive indices of the quality of prenatal, obstetric and early neonatal care available to women and newborns (KDHS, 2008).

Adverse pregnancy outcomes are influenced by a myriad of biologic, social, economic and environmental factors (WHO, 2003). Many of the 3 million deaths of babies each year in the

first week of life and 2.7 million stillbirths are related to poor health of the mother and to inadequate care during pregnancy, childbirth and the period immediately after birth (WHO, 2003). It is estimated that nearly two-thirds of the 8 million infant deaths that occur each year result largely from poor maternal health and hygiene, inadequate care, inefficient management of delivery, and lack of essential care of the newborn (WHO, 2001). Parent's socio-economic and cultural factors such as education (both maternal and paternal), work status, wealth and religion as well as mother's habitat and environment (depicted by region of residence) are likely to influence perinatal mortality through maternal health status as depicted by nutritional status of the mother (Khasakhala, 2003).

A baby's death whenever or however it occurs is a profound loss. The prevalence of stillbirth is on average three times more common in the less developed areas of the world than in the more developed areas (Say *et al*, 2006). The vast majority of the world's 3.2 million annual stillbirths occur in low- and middle-income countries (Stanton, 2006). Globally, two-thirds to three-quarters of stillbirths may occur antenatally, before labour begins (WHO, 2006). Those intrapartum deaths are closely linked to place of, and care at, delivery and are largely avoidable with skilled care (Rosmans, 2007). In developing countries, just over 40% of deliveries occur in health facilities and little more than one in two with the assistance of a doctor, midwife or qualified nurse (WHO, 2006). The stillbirth rate is a reflection of health status and policies, socioeconomic indicators relate to health and access and adequacy of health care (Rayamajhi *et al*, 2009).

Raising awareness of the need for women to reach emergency care without delay if complications arise during delivery is particularly critical. To address the problems of maternal and neonatal health in developing countries, a standard of care is required to define level of performance, improve quality of services provided and, ultimately, reduce maternal and newborn deaths (ROK, 2007).

1.2 Problem Statement

Many factors including diseases, health service factors, reproductive factors and socio – economic factors have been linked with maternal and neonatal mortality risks (Magadi, 2001). Every year, at least 536,000 women and 2 million babies worldwide die from complications of pregnancy and childbirth (WHO, 2006). Each day in Africa, 700 women die of pregnancy-related causes, 3,100 newborns die and another 2,400 are stillborn (WHO, 2006). Up to half a million African babies die on the day they are born – most at home and uncounted (WHO, 2006).

Adverse pregnancy outcomes such as still births, preterm births, and miscarriages account for a large proportion of perinatal loses (Ziyo, 2009). Each year, an estimated 904 000 intrapartum-related neonatal deaths occur, accounting for approximately one-third of the early neonatal deaths (Lawn *et.al*, 2005). Early neonatal deaths occur during the perinatal period, and have obstetric origins and are largely avoidable (WHO, 2006). Preterm birth and low birth weight are leading causes of neonatal and infant mortality, as well as short- and long-term morbidity (Miranda, 2009). Maternal demographic characteristics such as age, parity, and birth order and pregnancy interval may directly influence perinatal mortality (Khasakhala, 2003). High stillbirth and early neonatal mortality rate have been associated with unattended deliveries compared with hospital based deliveries (Archibong *et al*, 2002).

There is limited documentation of factors contributing to adverse pregnancy outcomes in Keiyo District. Most parts of Keiyo District have poor terrain which makes accessibility to health facilities difficult especially during emergency situations thus most maternal and neonatal deaths may go unreported. This is also a district with a TFR of 7.2 (District strategic plan, 2005-2010) compared to the country's TFR of 4.6 (KDHS, 2008). The district has a Doctor – Patient ratio of 2: 156, 471 (District strategic plan, 2005-2010) whereas the WHO

recommends 1:600 (WHO, 2005). Doctors provide maternal and neonatal care especially during emergency situations. According to the 2009 Keiyo District Health statistics, there were 100 maternal deaths per 100 000 and child mortality rate was 57 per 1000. There were 39 stillbirths and 113 (4.13%) low birth weight babies. These are alarming figures in which the factors leading to this need to be identified. Therefore this study seeks to identify the factors that contribute to adverse pregnancy outcomes in public health facilities in Keiyo District of Kenya.

1.3 Justification of the Study

Childbirth is the time of greatest lifetime risk of mortality for a mother and her baby (Lawn, 2000). There has been much effort to reduce maternal mortality; however, there have been little studies to find out the factors that contribute to adverse pregnancy outcomes. Reducing the global total of 3.82 million neonatal deaths, particularly the 3 million who die in the first week of life (UNICEF, 2009), is crucial to meeting MDG 4. The solutions to reduce neonatal deaths, especially early neonatal deaths, are intimately linked to maternal health and to provision of effective maternal and neonatal health services (Rosmans, 2006). Therefore, addressing current global gaps for care at birth is critical to achieving both MDG 4 and MDG 5 (*Appendix 8*).

This study contributes to efforts to reduce maternal and child mortality rates which may occur as a result of the adverse pregnancy outcomes thus realization of MDG 4 and 5. In order for this goal to be attained, a substantial reduction in perinatal and maternal deaths is required (WHO, 2006). The understanding about the factors that contribute to adverse pregnancy outcomes helps the policy makers and health administrators to improve the health care services through review of the failures of the ongoing interventions. It also helps in improving maternal and child health basing on the factors identified during the study.

1.4 Research Questions

i. What socioeconomic and demographic factors contribute to adverse pregnancy outcomes among women seeking health care at public health facilities in Keiyo District?

ii. What pre-existing conditions and obstetric emergencies affect pregnancy outcomes?

iii. What health facility factors contribute to women's vulnerability to adverse pregnancy outcomes among women seeking health care in public health facilities in Keiyo District?

1.5 Null Hypothesis

HO_1: There are no factors contributing to women's vulnerability to adverse pregnancy outcomes among women seeking care in public health facilities in Keiyo district.

1.6 General Objective

The general objective of the study was to identify factors that contribute to adverse pregnancy outcomes among women seeking care in public health facilities in Keiyo District.

1.6.1 Specific Objectives

The specific objectives were:-

i. To identify the socio- economic and demographic factors which contribute to adverse pregnancy outcomes.

ii. To establish the pre-existing conditions and obstetric emergencies that affect pregnancy outcome.

iii. To assess the health facility factors which contribute to women's vulnerability to adverse outcomes among women seeking care in public health facilities.

1.7 Significance and Anticipated Output

Failure to prevent maternal and newborn deaths is a social injustice that violates human rights (UNFPA, 2007). Sustainable improvements in maternal and child health status are best achieved through multiple strategies that address different factors contributing to poor pregnancy outcome (Lawn, 2006). The study has enabled the identification of the factors which have contributed to adverse pregnancy outcomes leading to maternal and perinatal mortality. It has sought to establish ways of preventing the adverse outcomes from occurring thus target meeting MDG 4 and 5. This will eventually assist policy makers in planning and decision-making.

1.8 Delimitations and Limitations of the study

1.8.1 Limitations

This study was based at public health facilities in Keiyo District, thus other health facilities such as private institutions or faith-based organizations were excluded. This was a limitation because some women seek health care in such other facilities. There was recall bias among the respondents especially about complications experienced or reasons for caesarean section during the previous pregnancies. The study focused on factors contributing to poor pregnancy outcomes therefore it was unable to identify the causal factors to the poor pregnancy outcomes. The study did not focus on other factors which may contribute to poor pregnancy outcomes such as FGM, alcohol abuse and nutritional status of the respondents. It was difficult to get data involving maternal mortalities as this was not a cohort study despite it being an adverse pregnancy outcome. The study was carried out among women of reproductive age excluding the men who play a key role in reproductive health.

1.8.2 Delimitations

There had not been a similar study in the district to identify factors contributing to poor pregnancy outcomes. This kind of study enabled identification of such factors therefore will enable policy makers in the district to strategize and plan in order to meet MDG 4 and 5 (*Appendix 8*).

1.9 Assumptions

The assumption of this study was that the respondents gave information that was true based on their knowledge.

1.10 Conceptual Framework

Several factors play a role in determining the pregnancy outcome among women. These factors may be inter-related and may contribute to adverse pregnancy outcomes which in turn are eventually reflected by indicators such as Stillbirth Rate, Maternal Mortality Rate, Infant Mortality Rate and Perinatal Mortality Rate. The independent variables; socio-demographic and economic factors affect the other factors such as affordability of the health facility costs leading to other factors such as delay in seeking health care. This delay may eventually affect the health of both the mother and the baby. Pre-existing conditions and obstetric emergencies contributes to poor pregnancy outcomes since they compromise the life of both the mother and the baby. Health facility factors also have a major role in determining the outcome of the pregnancy basing on the provision and quality of health services. This relationship between the factors is illustrated on figure 1.1 below.

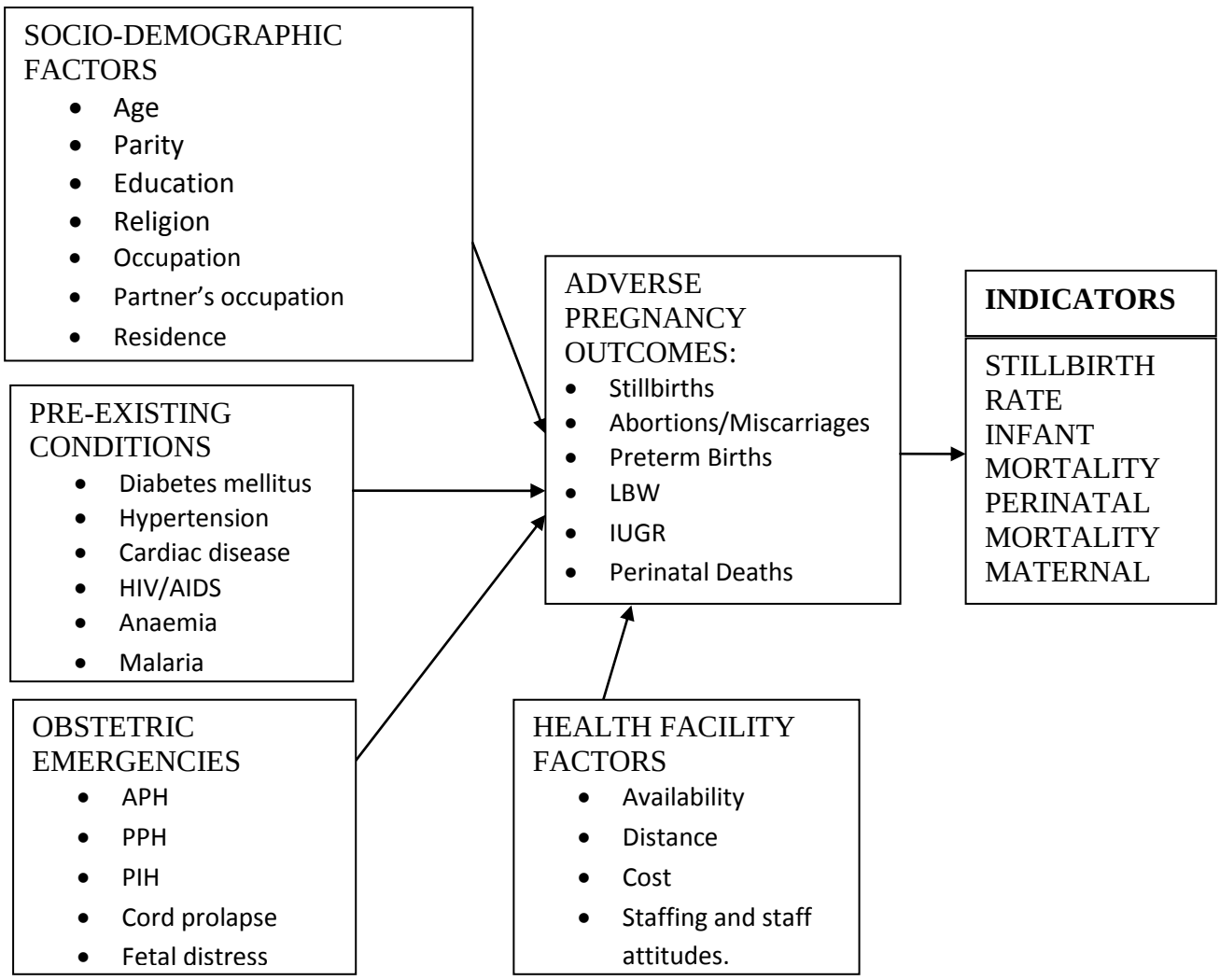

Figure 1.1: Diagrammatic representation of the Conceptual Framework

Source: Constructed from literature review.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Mother and child outcomes are associated across the whole life-cycle and into the next generation, however, the most radical effects of maternal mortality on child survival are in the pregnancy and neonatal period (Lancet, 2006). Each year, an estimated 904 000 intrapartum-related neonatal deaths occur worldwide, accounting for approximately one-third of the early neonatal deaths (WHO, 2006). Closely linked are an estimated 1.02 million intrapartum or "fresh" stillbirths (Lawn *et.al,* 2005). Perinatal mortality, comprising still births and early neonatal deaths is one of the sensitive indices of the quality of prenatal, obstetric and early neonatal care available to women and newborns (Khasakhala, 2003). Over the past 20 years, under-five mortality in Africa has hovered around 175-200/1,000 live births (Lancet, 2006). Infant mortality is also the highest worldwide. Maternal mortality and morbidity is a global health emergency and a serious public health problem.

2.2 Global situation of adverse pregnancy outcome

Several risk factors predispose a woman to risk of death during pregnancy, labor, or the immediate postpartum period (Mills *et al*, 2007). Globally, an estimated 42% of maternal deaths are intrapartum related, defined as deaths during birth or the first day after delivery. There were an estimated 535 900 maternal deaths worldwide in 2005 (Lancet, 2005). One Latin American study of adolescent pregnancy found that, after adjustment for 16 major confounding factors, adolescents aged 15 years or younger had higher risks of death during childbirth and anaemia compared with women aged 20 to 24 years (Mills *et al*, 2007). Moreover, all adolescents have a higher risk of obstructed labour requiring assisted birth, episiotomy, postpartum hemorrhage, and serious infections (Magadi, 2004). Pregnancy at extreme advanced maternal age is associated with increased maternal and fetal risk (Yariv *et al*, 2010).

Recent studies of pregnancy in women in the United Kingdom with type 1 diabetes have shown a fourfold to tenfold increased risk of congenital malformation and a fivefold increased risk of perinatal mortality compared with non-diabetic women (Casson *et al*, 2002). Pre-eclampsia is estimated to affect 8 370 000 women worldwide every year (Parikh, 2007). In the UK, it complicates approximately 4% to 6% of all pregnancies (approximately 33 500 per annum) and remains a major cause of maternal, fetal, and neonatal morbidity and mortality, contributing a significant healthcare economic burden (Villar et.al, 2003). Early gains in female literacy played an important role in MMR declines in Malaysia and Sri Lanka (Pathmanathan, 2003). Illiterate women face a relative risk of maternal death 3.25 times higher than literate women (Pathmanathan, 2003). Maternal morbidity and "near miss" are also closely linked to adverse fetal and neonatal outcomes.

Intrapartum-related neonatal deaths ("birth asphyxia") are a leading cause of child mortality globally, outnumbering deaths from malaria (Lawn, 2005). Between 60 and 90 percent of newborn deaths globally are low birth weight babies. Previous fetal and neonatal deaths are strongly associated with pre-term low birth weight (LBW) and small for gestational age (SGA) (WHO, 2006). Preterm labour and delivery remains the pre-eminent problem in modern obstetric practice. Around 6% of babies are delivered preterm in the UK and other developed countries (WHO, 2006). Preterm birth has serious short- and long-term health, psychologic, and economic consequences and it has now overtaken congenital anomaly as the single biggest cause of perinatal mortality and morbidity (Shah *et al*, 2009). Although stillbirth is infrequent, it occurs 10 times more often than sudden infant death. In the United States, stillbirth accounts for a large proportion of all perinatal losses, although its causes remain incompletely understood (Stanton, 2006). In developing nations, preterm births and stillbirths are grossly underreported, thus making international comparisons difficult.

2.3 Adverse pregnancy outcome in Sub – Saharan Africa

In Africa high rates of maternal and neonatal morbidity and mortality are a consequence of multiple causes including endemic infectious diseases (malaria, HIV/AIDS, tuberculosis), malnutrition and micronutrient deficiencies, child-birth complications, newborn illness and inadequate antenatal and perinatal care due to financial and logistic constraints in these resource poor regions (Kinney, 2010; Adenika, 2006; Ramharter, 2005)The lifetime risk of maternal death in the developing world as a whole is 1 in 76, compared with 1 in 8,000 in the industrialized world (UNICEF, 2009). In Sub-Saharan Africa, an estimated 900,000 babies die as stillbirths during the last twelve weeks of pregnancy (WHO, 2010). Perinatal mortality reflects the quality and utilization of prenatal, delivery and immediate post-delivery care available to women and their newborn infants. Each year at least 1.16 million newborns die in Sub-Saharan Africa within the first 28 days of life, making the region the world's most dangerous to be born in (WHO, 2006). According to the UN report, 3,100 newborns die, another 2,400 are stillborn, 9,600 others die after their first month and before their fifth birthday, and 700 women succumb to pregnancy-related causes on any given day in Sub-Saharan Africa (WHO, 2006). In South Africa, 39% of direct maternal deaths and 42% of perinatal deaths are directly intrapartum related—the largest causal group for either maternal deaths or perinatal deaths (Moodley, 2003). It is rare for babies whose mothers die of an intrapartum cause to survive.

2.4 Kenyan situation of adverse pregnancy outcome

High maternal and child mortality has been a particular source of concern in reviews of health circumstances in Kenya (Population Health, 2002). A Kenyan woman faces 1 in 35 lifetime risk of maternal death, the most critical time being during childbirth and in the first 24 hours postpartum (UNFPA, 2006). A striking finding in a study on pregnancy outcome among the adolescents in South Nyanza is the unusually high rate of pre-term deliveries,

especially in cases of unintended pregnancies (Magadi, 2004). In a study carried out in Kilifi District, it was observed that complications of labour such as haemorrhage, premature rupture of membranes/premature labour, and obstructed labour/ malpresentation increased the risk of death between 8- and 62-fold, and 53% of all perinatal deaths were attributable to labour complications (Weiner *et al*, 2003).

A study on women, poverty and adverse maternal outcomes in Nairobi found out that urban poor women in Nairobi associate poverty with adverse maternal outcomes (Chimaraoke, 2010). To them, poverty primarily generates adverse maternal outcomes by exposing women to exceedingly hard and heavy workloads during pregnancy and the period surrounding it; to intimate partner violence; as well as to inhospitable and unpleasant treatment by service providers (Chimaraoke, 2010).

According to the 2008 KDHS, women with secondary education utilized the health facilities better as compared to those with primary education. For example, the infant mortality rate of children whose mothers had secondary level education was 63 per 1000 compared to those with primary education which was 127 per 1000 (KDHS, 2008). A study carried out at Pumwani Maternity Hospital, Nairobi showed that education level of a woman is the single most important determining factor in determining maternal and fetal outcome followed by the woman's individual income and marital status (Sirengo, 2007). According to a study in Korogocho and Viwandani slums in Nairobi, of the 289 deaths among women of reproductive age during 2003-2005, 29 were maternal deaths, giving a maternal mortality ratio of 630 per 100,000 live births (Chimaraoke, 2010).

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deaths were attributable to labour complications (Weiner et al., 2003). According to Magadi in a study on Pathways of the Determinants of Unfavourable Birth Outcomes in Kenya, it found out that antenatal care is identified as a central link between various socio-demographic or reproductive factors and birth outcomes (Magadi, 2004).

2.5 Antenatal care and delivery factors influencing pregnancy outcome

Timely and adequate antenatal care is generally acknowledged to be an effective method of preventing adverse outcomes in pregnant women and their babies (Alderliesten, 2007). The antenatal period clearly presents opportunities for reaching pregnant women with a number of interventions that may be vital to their health and well-being and that of their infants (Abou-zhar, 2003). Use of prenatal/antenatal and delivery care services have been recommended for the management of unfavourable birth outcomes such as perinatal deaths (Vitora and Barros, 2001; Ogunles, 2005). The onset of antenatal clinic visits during the pregnancy is very important for the health of the mother and the foetus.

Early initiation of prenatal care is important to prevent and treat obstetric and medical complications (Ziyo, 2009). Late antenatal care or inadequate attendance at antenatal clinics has been associated with poor pregnancy outcomes, such as low birthweight, prematurity and increased delivery intervention (Lazariu-Bauer *et al.* 2004; Heaman *et al.* 2008). One of the reasons ANC may have a positive association with perinatal outcomes is the association between attending ANC and behavioural decisions, including TT and IPT, use of an ITMN and decisions regarding place of delivery and who assists the delivery (Brown *et al*, 2008). Adequacy of antenatal care is strongly and consistently associated with birth outcome (Yousif, 2006). Getting late or no prenatal care is associated with a greater likelihood of having babies who are low birth weight, stillborn, or who die in their first year of life (Lule *et al*, 2005).

Basic medical interventions such as the measurement of blood pressure, testing of urine and specific tests for severe anaemia have been found beneficial for the health of pregnant women and newborns in these countries (Villar *et al*, 2001). Recent systematic reviews have emphasized health interventions such as physical examination, tetanus toxoid, detection of syphilis and pre-eclampsia, treatment of malaria and asymptomatic bacteriuria as health care components that make it possible to reduce the neonatal mortality rate in almost 10-30% (Darmstadt, 2005).

Duration of gestation is a strong predictor of infant survival, with additional information provided by considering relative birth weight (Savitz et al, 2000). Psychosocial, biological, and clinical factors all affect a woman's risk of preterm birth (CDC, 2010). The earlier the gestational age at birth and the lower the birth weight, the greater the risk of all complications and especially cerebral palsy (Goldenberg, 2003).

Vaginal delivery is the most common and safest type of childbirth. Caesarean section and vacuum delivery are other ways of delivery. Mode of delivery has also been identified as a risk factor for perinatal mortality (Khasakhala, 2003). Neonatal mortality and maternal mortality are inversely associated with coverage rates of skilled birth attendance, emergency obstetric care (EmOC), and neonatal intensive care (Lawn *et al*, 2009). High rates of caesarean delivery do not necessarily indicate better perinatal care and can be associated with harm (Villar *et al*, 2006).

2.6 Pre-existing conditions and illnesses influencing pregnancy outcome

Some conditions may already exist before a woman gets pregnant. These may include hypertension, diabetes, renal disorders, respiratory conditions like asthma, Tuberculosis (TB) and cardiac conditions. Other conditions may occur during pregnancy such as malaria,

urinary tract infections or pregnancy – induced hypertension. Hypertension and diabetes are two of the most common medical conditions to complicate pregnancy, 7%-10% and 3%-5%, respectively (Nybo, 2000).

2.6.1 Diabetes and Pregnancy Outcome

Women with diabetes have a higher risk for complications of pregnancy than do women without diabetes (OTIS, 2008). Diabetes in pregnancy is associated with risks to the woman and to the developing fetus. Miscarriage, pre-eclampsia and preterm labour are more common in women with pre-existing diabetes (NHS, 2008). Stillbirths, congenital malformations, macrosomia, birth injury, perinatal mortality and postnatal adaptation problems (such as hypoglycaemia) are more common in babies born to women with pre-existing diabetes (NHS, 2008). For pregnant women with poor diabetic control, the risk of a baby to be born with birth defects is about 6-10%; this is about twice the chance of birth defects if the mother's diabetes is well controlled (OTIS, 2008).

2.6.2 Hypertension and Pregnancy Outcome

Hypertension is the most common medical disorder during pregnancy. It affects 6 - 8% of all pregnancies while chronic hypertension complicates 1-3% of all pregnancies (Villar, 2003). It has been estimated that of all pregnancies among women suffering from PIH and eclampsia, 11.5 – 30% end up as stillbirths or perinatal deaths (Parikh, 2007). Pre-eclampsia is a major cause of maternal and fetal mortality and morbidity. The disease not only affects pregnancy outcome, but also predisposes mother and child to long-term health complications such as cardiovascular disease (Bellamy *et al*, 2007).

Pregnancy Induced Hypertension, besides putting the mother at a high risk of eclampsia, also adversely affects the growth, development and survival of the fetus and newborn (Parikh,

2007). This often manifests as IUGR, prematurity and in many instances stillbirths or neonatal deaths (Parikh, 2007). Patients with chronic hypertension in pregnancy are at increased risk for maternal and perinatal morbidity. IUGR affects 15 – 25% of pregnancies with chronic hypertension (Say *et al*, 2006). Approximately 5-9% patients with chronic hypertension develop abruption placentae and fetal outcome is poor in severe abruption placentae (Parikh, 2007).

2.6.3 Cardiac disease and pregnancy outcome

The presence of maternal heart disease has an adverse effect on pregnancy outcomes (Gelson and Johnson, 2010). First, the risk of spontaneous miscarriage and therapeutic abortion is increased in women with heart disease (Gelson and Johnson, 2010). Also, neonatal morbidity and mortality due to fetal growth retardation and prematurity are markedly increased (Gelson *et al*, 2008). In a prospective study of 562 pregnant women with heart disease, poor fetal outcomes occurred in 20% (Siu, 2001). Poor maternal functional class, cyanosis, and pulmonary hypertension have been previously identified to be associated with maternal and fetal complication (Siu, 2001).

2.6.4 Malaria and Pregnancy Outcome

Africa bears the highest burden of malaria in the world, with approximately 800,000 child deaths and 300 million malaria episodes per year (WHO, 2006). Pregnant women are particularly vulnerable to malaria. Malaria-related anaemia in pregnancy, LBW, and pre-term births are estimated to cause 75,000 to 200,000 deaths per year in Sub-Saharan Africa (Worrall, 2007). To reduce maternal morbidity and mortality and better health for the baby, focused ANC package advocates for the timely and appropriate care during pregnancy and timely attendance at ANC clinics is a key factor for the effective delivery of IPT services (Hotz *et al*). A study in Ethiopia found out that placental parasitemia was associated with

premature births (Naseem, 2008). Recent research on the interaction between malaria and HIV infection shows that pregnant women with HIV and malaria are more likely to be anaemic and the baby is at high risk of LBW, preterm birth and death (WHO, 2006). The same studies suggest that malaria infection may also result in an increased risk of postpartum sepsis for the mother (WHO, 2006).

2.6.5 Anaemia and Pregnancy Outcome

Anaemia is a life-threatening complication for women during pregnancy and puts them at risk of dying from even small amounts of blood loss during pregnancy and postpartum period (Rasmussen, 2001). Women with severe anemia are particularly at risk and have a 3.5 times greater chance of dying than women without anemia (Lule *et al*, 2005). Iron-deficiency anemia leads to an economic loss of about US$147.8 million due to maternal death and reduced labor capacity (Rasmussen, 2001). It is also linked to intrauterine growth retardation (IUGR) of the baby, thus contributing to infant deaths. There is a substantial amount of evidence showing that maternal iron deficiency anemia early in pregnancy can result in low birth weight subsequent to preterm delivery (Allen, 2000).

2.6.6 HIV/ AIDS and Pregnancy outcome

HIV positive women are confronted with the fear of vertical transmission of HIV as well as the possible risk of an adverse pregnancy outcome (Aebi-Popp et al, 2010). HIV impacts on direct (obstetrical) causes of maternal mortality by an associated increase in pregnancy complications such as anaemia, post-partum haemorrhage and puerperal sepsis (UNAIDS/ WHO, 2002). Several opportunistic infections associated with HIV infection may complicate pregnancy and cause maternal mortality (UNAIDS/ WHO, 2002). Anaemia in pregnancy, intrauterine growth restriction, preterm labour and birth weight less than 2,500 g are important complications among HIV positive pregnant women (Olagbuji *et al*, 2010).

2.7 Obstetric emergencies affecting Pregnancy Outcome

At the time of an obstetric emergency, every moment of delay in seeking and receiving skilled obstetric care increases the risk of stillbirth, neonatal or maternal death, or disability (Nwobodo, 2006). For some emergencies such as antepartum hemorrhage, even minutes can be the difference between life and death for mother and fetus (Mills, 2007). Most of the direct obstetric causes of maternal deaths are intrapartum related including obstetric hemorrhage, puerperal sepsis, some hypertension complications, and anesthetic related (WHO, 2005). The second stage of labor is a dynamic event that may require assistance when maternal efforts fail to effect delivery or when there are non-reassuring fetal heart tones (Hook and Damos, 2008).

2.8 Health facility factors influencing Pregnancy Outcome

2.8.1 Access to health facility

Studies clearly indicate that countries with high maternal, perinatal and neonatal mortality have inadequate and poor quality health services and this can be associated with reduced utilization of health care services (WHO, 2005). Lack of access to appropriate obstetric care, especially during labor, compounds the risk of adverse fetal outcomes such as death or disability (Lule *et al*, 2005). Social, culture norms and tradition customs also influence pregnancy outcome because of the ability of women to seek for health care services (Murray, 2006). Women are likely to opt for the health centre strategy as long as barriers of inadequate skilled staff, cost, distance, and cultural acceptability are addressed (Lancet, 2006). Recognizing early warning signs of pregnancy problems and referring the woman to a health facility with resources to handle a complicated delivery can reduce perinatal and neonatal mortality (WHO, 2006). Poor patient-provider relationships and provider inattention to health seekers' needs are foremost barriers to the uptake of formal care services and frequently-mentioned factors in poor maternal outcomes in developing societies (Chimaraoke, 2010).

2.8.2 Delays in seeking health care

There are three types of delay that may occur in seeking care. Delay may occur due to late in recognizing dangers signs and deciding to seek care, late in reaching health facilities and late in receiving care at health facilities (ROK, 2005). Delays in deciding to seek care may be caused by failure to recognize signs of complications, failure to perceive the severity of illness, cost considerations, previous negative experiences with the health care system, and transportation difficulties (Nandan, 2009). Poor women with low status in the family tend to delay decision making when complications arise. Poor families often have to borrow money to pay up front for treatment of obstetric complications (Lule *et al*, 2005). Frequently, the families do not have sufficient cash in time which leads to delay in receiving appropriate care including needed supplies, medication, and services at health facilities (Murray, 2006).

Delays in reaching care may be created by the distance from a woman's home to a facility or provider, the condition of roads, and a lack of emergency transportation (WHO, 2005). Delays in receiving care may result from unprofessional attitudes of providers, shortages of supplies and basic equipment, a lack of health care personnel, and poor skills of health care providers (Murray, 2006). The causes of these delays are common and predictable. These factors are influenced by a woman's knowledge of complications and complication signals in prenatal, natal, and postpartum periods (WHO, 2005).

Referral is another important aspect of quality maternal care, and should aid access to the most appropriate care and improve the efficiency of services facing resource constraints (Koblinsky *et al*, 2006). There is evidence that great gains can be made in maternal health by ensuring that women with pregnancy complications can quickly reach a facility where they can receive high-quality obstetric care (Murray, 2006).

CHAPTER 3: METHODOLOGY

Introduction

This chapter specifies the materials and methods used in assessing the factors contributing to adverse pregnancy outcomes in public health facilities in Keiyo District, Kenya.

3.1 Study Design

This was a descriptive cross-sectional study. The study design employed both quantitative design through the use of an interviewer – administered questionnaire and qualitative design through the use of a key informant interview guide.

3.2 Study Variables

The independent variables were socio – economic and demographic factors, health facility factors, pre-existing conditions and obstetric emergencies. The dependent variables were neonatal mortality, perinatal mortality, infant mortality and stillbirth rate which are indicators of adverse pregnancy outcome.

3.3 Study Area

The study was conducted in Keiyo District in Rift Valley Province. Keiyo District is one of the Seventeen (17) districts in the Rift Valley. It is bordered by Marakwet District to the North, Uasin Gishu District to the West, Baringo District to the East and Koibatek District to the South-East. It extends from Latitude 0^{0} 10" to 0^{0} 52" North and Longitude 35^{0} 25" to 35^{0} 45" East. The total area of the District is 1439.30 Sq. km. It has Five (5) administrative divisions namely Tambach, Kamariny, Chepkorio, Soy and Metkei. The five divisions are further subdivided into twenty-six locations as shown on table 3.1 (Keiyo District Strategic Plan, 2005-2010).

Table 3.1: District administrative units, area, population size and density

Division	Area in Sq km	Population	Population density	Location
Kamariny	210.5	37,773	179	5
Tambach	330.8	18,676	56	4
Chepkorio	312.9	42,129	135	6
Metkei	206.2	24,933	121	6
Soy	378.9	20,354	54	5
Total	**1,439.30**	**143,865**	**100**	**26**

Source: District Statistics Office, Iten, 2001.

There are two political units namely, Keiyo North and Keiyo South Constituencies. Keiyo North is made up of Tambach and Kamariny Divisions while Keiyo South comprises of Chepkorio, Metkei, and Soy Divisions. The district has two local authorities namely Keiyo County Council and Iten-Tambach Town Councils. There are 2 roads which are tarmacked. These are Iten-Kabarnet road and Kaptagat-Kipsaos road covering 88 Km only whereas the rest of 206 Km earth road and 4680.8 Km of minor and rural access roads are impassable during the rainy season. It has 33 public health facilities, one district hospital, three sub-district hospitals, six health centres and twenty three dispensaries. The health facilities selected for data collection were Chepkorio Health Centre, Kaptarakwa Sub-district hospital and Iten District hospital (Keiyo District Strategic Plan, 2005-2010).

3.4 Target Population

The target population was women of reproductive age (15 - 49) attending public health facilities in Keiyo District, Rift Valley Province.

3.5 Study Population

Women of reproductive age meeting the inclusion criteria seeking maternal health services in Keiyo District of Kenya.

3.6 Research Instruments

Interviewer - administered questionnaire was to collect demographic data and information on socio-economic factors, pre-existing conditions and obstetric emergencies.

Key – Informant Interviews were used to collect data on pre-existing medical conditions, obstetric emergencies and health facility factors.

3.7 Sampling Technique

The district hospital was selected purposively because it was the only district hospital in the district, then one sub-district hospital was randomly selected from the three sub-district hospitals in the district. One health centre was also selected randomly from the six health centres in the district making a total of three health facilities for the study. The proportion of the respondents to be interviewed in each facility was obtained basing on the mean of the total number of women seeking maternal health services in the health facility for the two months preceding the study. This led to 122 respondents at Chepkorio Health Centre, 109 respondents at Kaptarakwa Sub-district hospital and 153 respondents at Iten District hospital.

3.8 Sample size

The total population size was greater than 10 000 thus the formula below was used to determine the sample size (Kothari, 2004).

$$n = \frac{z^2pq}{d^2}$$

Where:

n= the desired sample size

z= the standard normal deviate, which corresponds to 95% confidence level (1.96).

p= the proportion in the target population estimated to have a particular characteristic.

q= 1.0 – p

d= degree of accuracy desired, usually set at 0.5

In this study, p was the proportion of women who are vulnerable to adverse pregnancy outcomes. Therefore, it was at 50% since the estimate was not known.

Basing on the resources available, convenient sampling was used to select the clients to be interviewed as they walked into the unit. To ensure that repetition was not done, a sticker was put on the patient's card indicating that the client had been recruited to the study.

$$n = \frac{1.96^2 \, x \, 0.50 \, x \, 0.50}{0.50^2} = 384$$

Therefore 384 respondents were recruited in this study.

3.9 Inclusion/ Exclusion Criteria

Inclusion: All women of reproductive age who attended public health facilities for ANC, delivery and PNC services. In addition, all those who were para one or more and those who consented were included.

Exclusion: All women who were attending other health facilities for ANC, delivery and PNC services and all nulliparaous or primigravidas. Also, the women who did not consent for the study were excluded.

3.10 Pre-test study

A pre-test study was carried out at Uasin Gishu District Hospital, which is an equivalent of Iten District Hospital since it is a public health facility. It offers similar services like the Iten District hospital and receives a similar kind of clients.

3.11 Validity

Validity of the research instrument was ensured through the use of a well – designed questionnaire. A pre-test study was done to check on the accuracy of the questionnaire so that the answers obtained from the study were true and accurate.

3.12 Reliability

Questionnaire was designed to ensure that consistent results are achieved. Reliability was also ensured through selection and training of research assistants, engaging them in the pilot study and supervising them during the data collection process. Completed questionnaires were checked daily and errors were corrected.

3.13 Data collection techniques

Data collection was carried out using the interviewer-administered questionnaire. The questionnaire was used to collect data from the women. An interview guide was used to collect information from health workers pertaining to accessibility of health services and obstetric emergencies.

3.14 Data analysis and presentation

Data was analyzed using Predictive Analytic Statistics (PAS) and Stata computer packages and presented in form of tables, figures and narration. Chi – square statistics and odds ratio was used to test hypothesis. Significance level was $p< 0.05$ at 95% CI. To examine individual effects of various explanatory variables on pregnancy outcome logistic regression analysis was performed separately for each explanatory variable (Univariate model) and then all the variables. Explanatory variables were fitted in one model (Mutivariate model) to remove confounding effects among these variables. Descriptive and univariate analyses and multivariate logistic regression tests were performed. Descriptive statistics such as means and frequencies were calculated for respective characteristics whereas statistical significance of association was determined by chi-square statistics and odds ratio. Graphs and tables have been used to present the findings where appropriate and also narration has been used. The results of each of the three objectives are presented under the following headings: socio-demographic characteristics of the population, pre-existing conditions and obstetric

emergencies associated with poor pregnancy outcome and health facility factors associated with poor pregnancy outcomes. Additional information was obtained from three key informant interviews at the health facilities from where the study was conducted. The persons interviewed were the facility in-charges.

3.15 Ethical Considerations

Permission was sought from KU Graduate School and the Ministry of Higher education, Science and Technology (MoHEST). Permission was also sought from the administration of the health facilities where research was carried out. A consent form was given to the participants. They were informed about the study objectives, benefits and risks. They were assured that should they agree to participate in the study, they had the right to withdraw at any point in time. If they did not wish to participate they were assured that it would have no implications for them and even on the services they were seeking. Care was taken to ensure that respondents' confidentiality was maintained throughout the study. Names or any other form of identification were not used on the questionnaire. All data collected was stored, analyzed and reported in formats that did not allow identification of the individual participant.

CHAPTER 4: RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results and discussion of the study collected from the respondents and key informants in the study area. A number of variables show significant association with adverse pregnancy outcome (Tables 4.1, 4.2, 4.5, 4.8, 4.10, 4.13 and 4.17).

4.2 Socio - demographic characteristics in the study population

Some socio-economic factors were significantly associated with poor pregnancy outcome on univariate model only while others were significant both in the univariate and multivariate analysis.

4.2.1 Age of the respondents

Majority of the women 111(28.9%) attending the health facilities for maternal health services who were interviewed in this study were aged between 30-34. This was followed by 96(25%) who were aged between 25-29. There was a notable 20(5.21%) young women aged between 15-19 years and 19(4.9%) were in the 45-49 age category (*Figure 4.1*). The fertility peaked among the study population between 30-34 years. There was a steady upward trend of fertility in reproductive life in the early years which started declining from age group 35-39. Age of delivery was not significantly associated with poor pregnancy outcome in this study (χ^2=5.3590, P- value= 0.499) as shown on table 4.3.

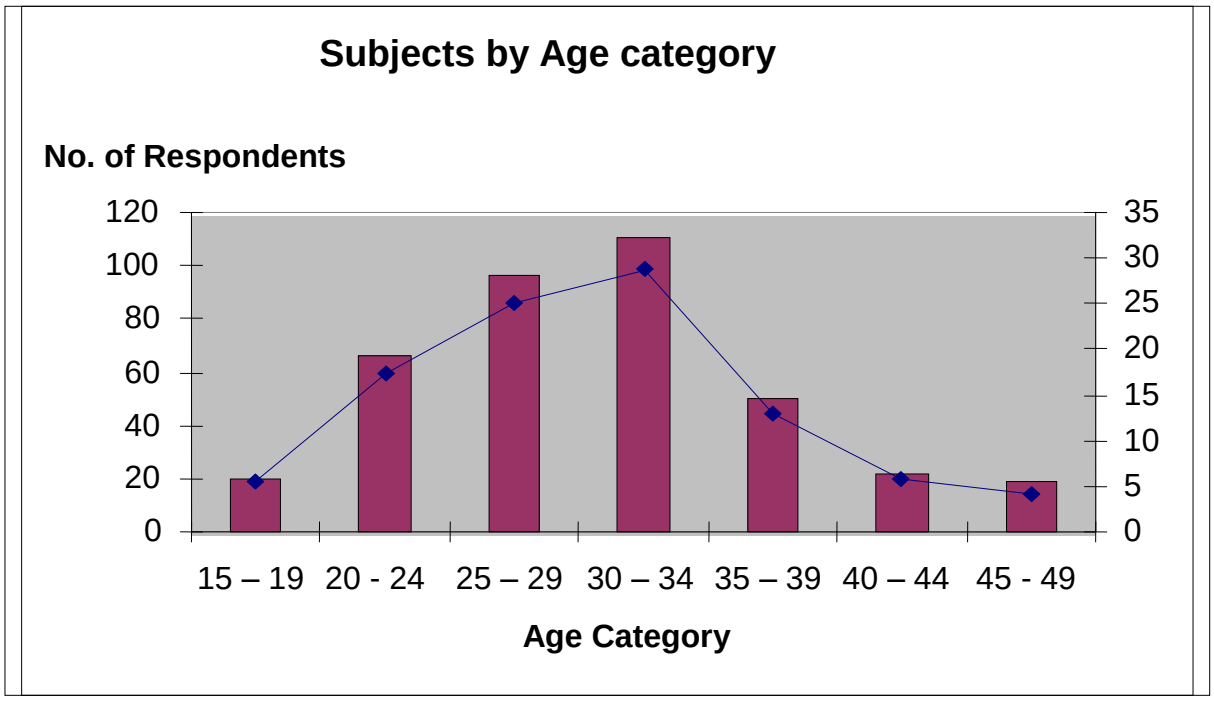

Figure 4.1: Age of the respondents

4.2.2 Marital status of the Respondents

On marital status, 285(74.2%) of the respondents were married, 76(19.8%) were single and 23(6%) of them were separated. Those who were separated were more likely to get poor pregnancy outcome as compared to the married respondents. On univariate analysis, those who were separated were significantly associated with poor pregnancy outcomes, [unadjusted OR 2.68 P-value=0.002, 95% CI (1.6, 9.32)] however, this was not significant on multivariate analysis as shown on table 4.1.

Table 4.1: Marital status associated with Adverse pregnancy outcome

Variable	**Univariate**		**Multivariate**	
	OR	**(95% CI) P-Value**	**OR**	**(95% CI) P-Value**
Marital status				
Separated	3.92	(1.6, 9.32) 0.002*****		
Single	1.23	(0.699,2.158) 0.475		
Parity				
3-4	0.416	(0 .234,0.741) 0.003*****	0.376	(0 .143,0 .996) 0.049*
>5	1.06	(0.626, 1.798) 0.83	0.406	(0.115, 1.43) 0.162

4.2.3 Parity

The respondents who were para 1 and 2 were 144(37.5%), 131(34.1%) were multiparas whereas 109(28.4%) were grandmultiparas as shown on figure 4.2. High parity was associated with poor pregnancy outcomes. Those who were para 3-4 had significantly poor pregnancy outcomes both in the univariate analysis [OR 0.416, 95% CI (0.234, 0.741), p= 0.003] and multivariate analysis [OR 0.376, 95% CI (0 .143, 0.996), p= 0.049] as compared to those who had a lower parity. These findings are shown on table 4.1.

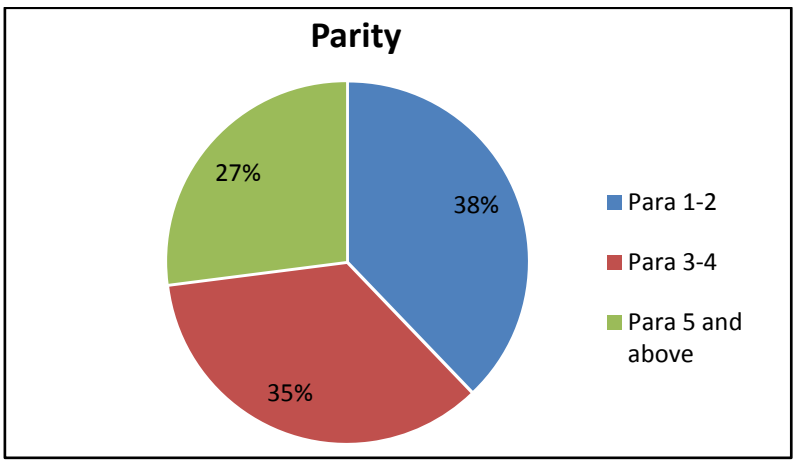

Figure 4.2: Parity of the respondents

4.2.4 Education level of the Respondents

Most of the respondents 167(43.5%) had attained primary school education, 131(34.1%) had attained secondary education, 77(20.1%) had college/university education while only 9(2.3%) did not have any formal education as shown on figure 4.3.

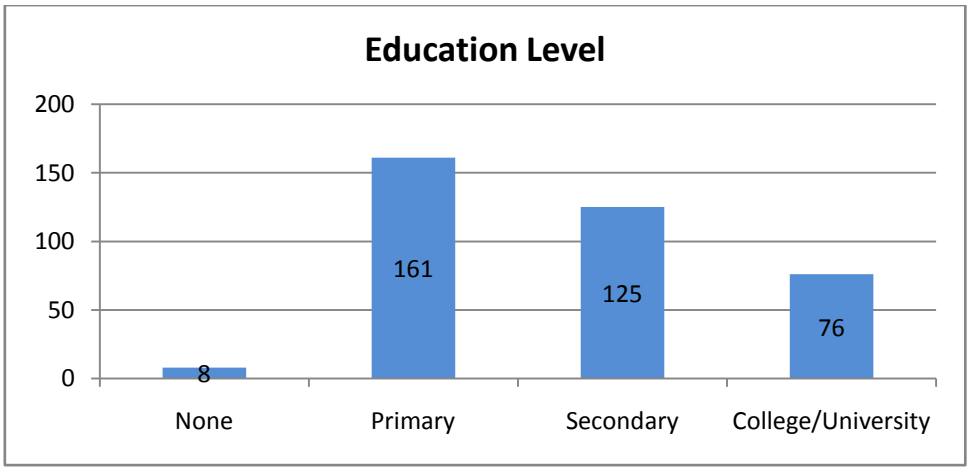

Figure 4.3: Educational level of the respondent

Low education level was associated with poor pregnancy outcome, none schooling [OR 5.63 95% CI (1.34, 23.66), p= 0.018] and primary school level [OR 2.09, 95% CI (1.076, 4.066) p=0.029] as shown on table 4.2.

Table 4.2: Education Level associated with adverse Pregnancy Outcome

Variable	**Univariate**		**Multivariate**	
	OR	**(95% CI) P-Value**	**OR**	**(95% CI) P-Value**
Education				
None	5.63	(1.34, 23.66) 0.018*****	15.82	(0.268, 1.17) 0.128
Primary	2.09	(1.076, 4.066) 0.029*****	3.118	(0.87, 28.2) 0.050*
Secondary	1.57	(0.784, 3.17) 0.201	2.84	(0.023, 3.91) 0.360

4.2.5 Age at first birth

The age at first birth for 169(44.0%) women was 20-24, 142(37.0%) were between 15-19 years, 45(11.7%) were between 25-29 years, 11(4.4%) were below 15 years and only 11(2.9%) were above 30 years. Age at first birth was not associated with poor pregnancy outcome (χ^2 = 7.744 df = 4 p- value = <0.101) as shown on table 4.3.

Table 4.3: Age group and age at first birth of the respondents

Age group and Age at first birth		
Independent Variables	Frequency	P-Value
Age Group (Yrs)		
15-19	20(5.4%)	
20-24	64(17.3%)	0.499
25-29	93(25.2%)	
30-34	106(28.7%)	
35-39	48(12.9%)	
40-44	21(5.7%)	
45-49	18(4.9%)	
Age at 1st Birth		
• 15 - 19	140(37.8%)	
• 20 - 24	162(43.8%)	<0.101
• 25 – 29	42(11.4%)	
• <15	15(4.1%)	
• >30	11(3.0%)	

4.2.6 Occupation of the Respondents and their Partners

On occupation of the respondents, 157(40.9%) were unemployed, 85(22.1%) were self-employed, 61(15.9%) had a salaried job while 81 (21.1%) did casual jobs. The respondent's partners who had a salaried job were 108 (35.0%), 101(32.7%) were self employed, 61(19.7%) did casual jobs while 39(12.6%) were unemployed as shown on figure 4.4. Occupation of both the respondent and the partner was associated with poor pregnancy outcome on univariate analysis, however this was not significant on multivariate analysis. The respondents who were casual labourers had significant association with poor pregnancy outcome [unadjusted OR 2.401, 95% CI (1.081, 5.33), p-value= 0.031]. Self employment among the partners of the respondents was associated with poor pregnancy outcome [unadjusted OR 2.885, 95% CI (1.492, 5.35), p=0.001] as compared to the employed. This is shown on table 4.4.

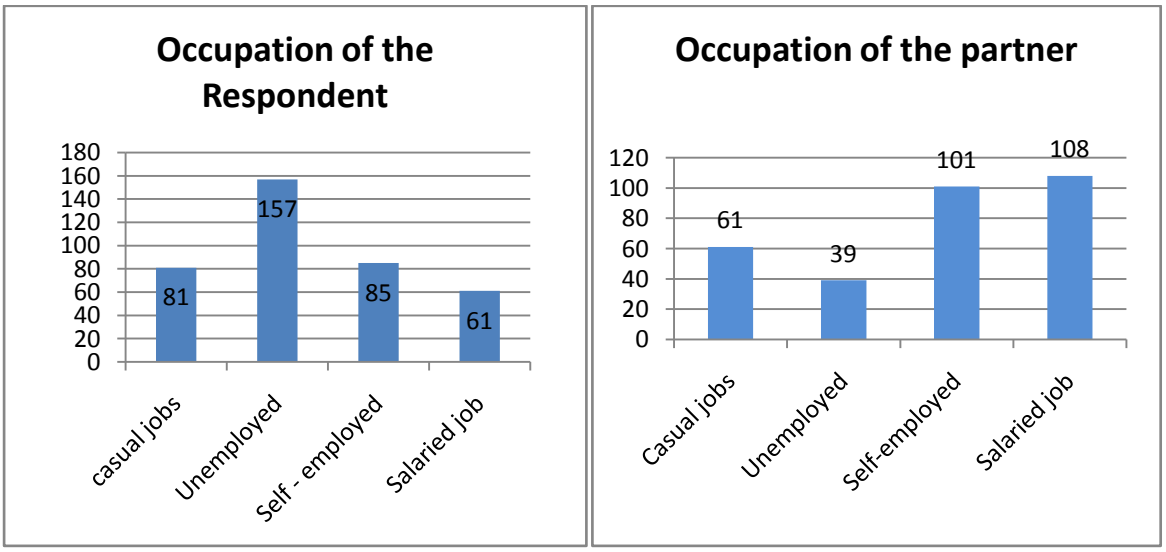

Figure 4.4: Occupation of the respondent and the partner

4.2.7 Type of residence

Majority of the population resided in a rural setting 296(77.1%), whereas 88(22.9%) resided in an urban setting. The respondents who lived in their own homes were 241(62.8%) with majority of them 222(58%) living in semi-permanent houses. Only 69(18%) lived in temporary houses while 92(24%) lived in permanent homes. The respondents who lived in

rental houses had significantly poor pregnancy outcomes [unadjusted OR 1.075, 95% CI (1.045, 2.781), p=0.033] as compared to those who lived in their own homes. This was not significant on multivariate analysis as shown on table 4.5.

4.2.8 Total Monthly Family Income

The respondents who had a total monthly family income of 1000-5000 Ksh were 164(42.7%), 56(14.6%) below 1000 Ksh, 75(19.5%) earned between 5000 – 10 000 and 89(23.7%) had an income of above 10 000 Ksh per month. Table 4.4 illustrates total monthly family income among the respondents. The total monthly income was not associated with adverse pregnancy outcome.

Table 4.4: Total Family Monthly Income

Total Monthly Income	**Frequency**	**Percentage (%)**
Less than 1000	56	14.6
1000 – 5000	164	42.7
5000 – 10 000	75	19.5
Above 10 000	89	23.2
Total	**384**	**100**

4.2.9 Religion

The dominant religion was catholic 207(53.9%) and protestant 161(41.9%). Only 12(3.1%) were Muslims and 4(1%) belonged to other religions. No form of religion was associated with poor pregnancy outcome as illustrated on table 4.5.

Table 4.5: Socio-economic factors associated with Adverse pregnancy outcome

Variable	Univariate		Multivariate	
	OR	**(95% CI) p-Value**	**OR**	**(95% CI) p-Value**
Religion				
Muslim	1.169	(0.34, 4.027) 0.804		
Protestant	0.698	(0.435, 1.119) 6.136		
Others	7.016	(0.716, 68.775) 0.094		
Occupation				
Casual job	2.401	(1.081, 5.33) 0.031*		
Self-employed	1.788	(0.799, 4.002) 0.157		
Unemployed	1.714	(0.817, 3.597) 0.154		
Partner's occupation				
Casual job	1.665	(0.782, 3.545) 0.186		
Self-employed	2.885	(1.492, 5.35) 0.001*		
Unemployed	1.405	(0.577, 3.44) 0.456		
House ownership				
Rental	1.705	(1.045, 2.781) 0.033*		
Others	0.754	(0.313, 1.815) 0.529		

4.3 Antenatal Care factors associated with adverse Pregnancy Outcome

4.3.1 ANC Attendance

Most of the respondents 364 (94.8%) attended ANC during their most recent pregnancy while only 20 (5.2%) did not attend. The decision to attend ANC was made by the women themselves 188 (50.9%), and decision was made by the partner among 131 (35.5%) while for 28 (7.6%) the decision to attend ANC was made by their friends or relatives 22 (6%). On ANC booking, 54.7% booked during the second trimester, 29.3% in the first trimester while only 16.0% started during the third trimester (*Figure 4.5*). Most of the women 307 (83.7%) attended public facility for ANC, 60 (15.7%) attended private facilities while 1 (0.3%) were attended to by TBAs and other 1 (0.3%) by other providers.

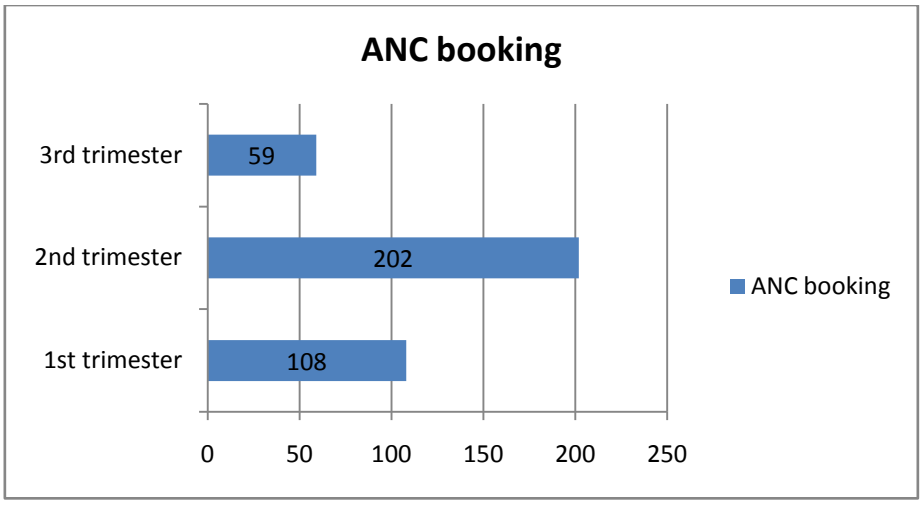

Figure 4.5: Trimester on ANC booking

ANC attendance was significant as those who never attended ANC during their entire pregnancy period were associated with poor pregnancy outcomes (χ^2 = 5.295 df = 1 p= 0.021). Decision making made by the spouses was associated with poor pregnancy outcomes (χ^2 = 9.3255 df = 3 p= 0.025). The type of health facility attended for ANC during the most recent delivery also was associated with poor pregnancy outcome (p= 0.015) as shown in table 4.6.

Table 4.6: Chi square values on Antenatal Care attendance

Variable	**Number (%)**	**Chi Square (df)**	**p-value**
Antenatal Clinic Attendance Attended ANC Not attended	 364(94.8%) 20(5.2%)	5.295(1)	p-value = 0.021
Decision on ANC attendance Self Spouse Friend Others	 186(51%) 130(35.5%) 27(7.5%) 21(6%)	9.3255(3)	p-value = 0.025
Type of Facility Private Public	 59(16.3%) 305(83.7%)	10.5139(3)	p-value = 0.015

4.3.2 ANC Parameters

Investigations for the ANC profile was done for 340 (92.4%) of the respondents, however it was not done for 29 (7.6%) of them. Among those who had ANC profile done, some of the investigations were incomplete. 329 (86.7%) had haemoglobin level done. Serology for HIV was done among 350 (91.3%) of the respondents, blood group among 343 (90.0%) of them, while VDRL was done on 279 (74.0%) of the respondents. Urinalysis was done to 264 (69.7%) of the respondents while 119 (30.4%) did not have it done. Observation of blood pressure was done to 331 (86.5%) of the respondents. Weight was taken among 353 (91.3%) of the respondents while height was only taken among 110 (28.7%) of the respondents. Figure 4.6 illustrates the ANC investigations and observations done. The respondents who received TT vaccine were 359 (93.8%), while 25 (6.2%) did not receive. For those who received, 281 (78.5%) of them received during the first visit while it was given during the second visit among 80 (21.5%) of the respondents.

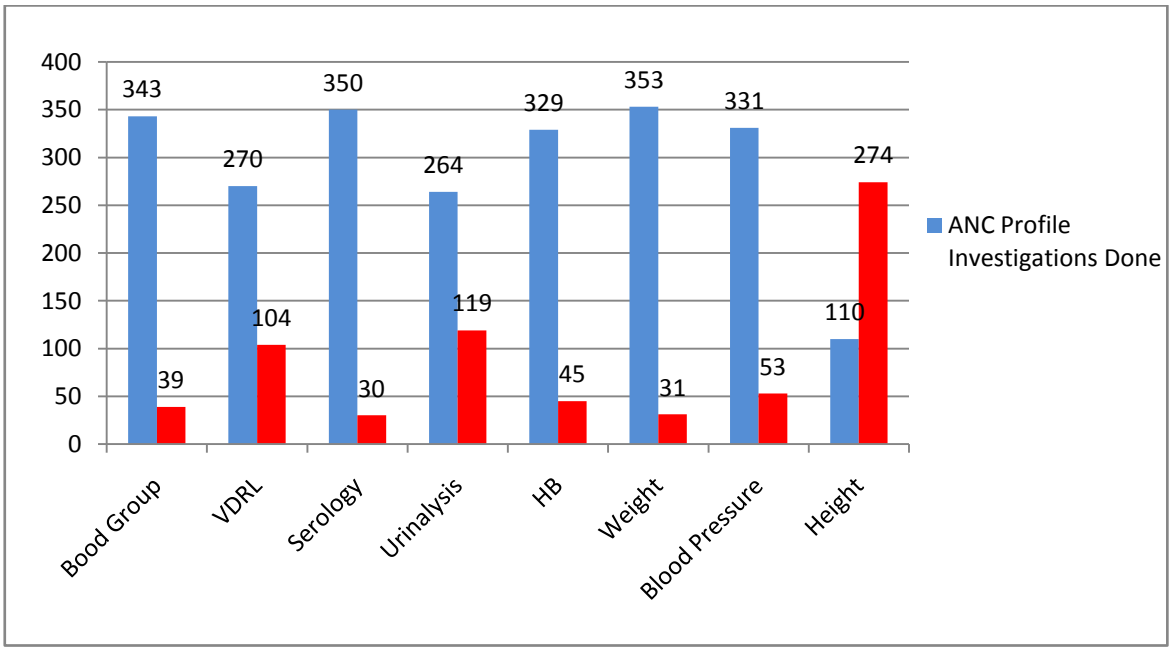

Figure 4.6: ANC Profile Investigations and parameters

Some investigations and parameters of the ANC profile were significantly associated with poor pregnancy outcome. This included VDRL (χ^2=6.8833 df =1, p-value = 0.009) and weight taking (χ^2=15.6567 df=1, p-value = 0.000). The timing of Tetanus Toxoid inoculation

during pregnancy and the number of doses received was also associated with poor pregnancy outcomes (χ^2=4.9101 df=1 p-value= 0.027 and χ^2=9.0141, df=3, p-value = 0.029) respectively as shown on table 4.7.

Table 4.7: Chi square values on ANC Profile parameters

VARIABLE	N (%)	Chi square (df)	p-value
ANC Profile done			
ANC Profile done	355(92.5%)	1.6740(1)	p-value = 0.19
ANC profile not done	29(7.5%)		
Haemoglobin			
Not done	54(14.1%)	1.7708(1)	p-value = 0.183
Done	329(85.9%)		
Blood Group			
Not done	39(10.2%)	0.7449(1)	p-value = 0.388
Done	343(89.8%)		
VDRL			
Not done	104(27.2%)	6.8833(1)	p-value = 0.009
Done	279(72.8%)		
Serology			
Not done	33(8.6%)	0.0029(1)	p-value = 0.95
Done	350(91.4%)		
Urinalysis			
Not done	119(31.1%)	3.0403(1)	p-value = 0.08
Done	264(68.9%)		
BP			
Not done	53(13.8%)	1.2438(1)	p-value = 0.265
Done	331(86.2%)		
Tetanus toxoid			
Not Given	23(6.2%)	4.9101(1)	p-value = 0.152
Given	347(93.8%)		
Weight			
Not done	31(8.1%)	15.6567(1)	p-value = 0.000
Done	353(91.9%)		
Height			
Not done	274(71.4%)	0.0257(1)	p-value = 0.873
Done	110(28.6%)		
Tetanus Toxoid Received			
No	25(6.5%)	2.0561(1)	p-value = 0.152
Yes	359(93.5%)		
When received TT			
First visit	281(77.8%%)	4.9101(1)	p-value = 0.027
Second visit	80(22.2%%)		
No. of TT doses given			
1	202(55.7%)	9.0141(3)	p-value = 0.029
2	137(37.7%)		
3	24(6.6%)		

On univariate analysis, those who attended the public facility for services were likely to get poor pregnancy outcomes [Unadjusted OR 0.48 p=0.002 95% CI (0.229, 0.724)]. This was still significant on multivariate analysis [OR 0.4, 95% CI (0.0027, 0.606), p =0.002]. Those who did not have VDRL done were associated with poor pregnancy outcome [unadjusted OR 0.527 95% CI (0.325, 0.854) p=0.009] as shown on table 4.8 below. This was still significant on multivariate analysis [adjusted OR 0.16, 95% CI (0.0297, 0.832), p=0.030]. Lack of weight taking was significantly associated with poor pregnancy outcome [unadjusted OR 0.239, 95% CI **(**0.113, 0.509), p=<0.000] however, this was not significant on multivariate analysis. Those who received the first dose of TT during the second visit were more at risk [unadjusted OR=1.816, 95% CI (1.066, 3.09), p=0.028] compared to those who received it during the first visit on univariate analysis (*Table 4.8*).

Table 4.8: Univariate and Multivariate factors on type of health facility attended for ANC services

Variable	**Univariate**		**Multivariate**	
	OR	**95% CI p-value**	**OR**	**95% CI p-value**
ANC attendance				
Yes	0.358	(0.146, 0.887) 0.027 *****		
Facility attended				
Public	0.408	(0.229, 0.724) 0.002*****	0.4	(0.0027,0.606) 0.002*
When TT was given				
Second visit	1.816	(1.066, 3.09) 0.028 *****		
No. of times TT given				
2	0.591	(0.358, 0.975) 0.04*****		
3	0.234	(0.053, 1.04) 0.056		
VDRL				
No	0.527	(0.325, 0.854) 0.009*****		
Weight				
No	0.239	(0.113, 0.509)<0.000*****	0.16	(0.0297, 0.832) 0.03*

4.4 Delivery factors associated with adverse pregnancy outcome

4.4.1 Gestation at birth

Delivery for 264 (68.6%) of the respondents was above 37 weeks gestation, 93 (24.2%) was between 28-37 weeks, 20 (5.2%) between 20-28 weeks and only 7 (1.8%) delivered below 20 weeks gestation (*Figure 4.7*).

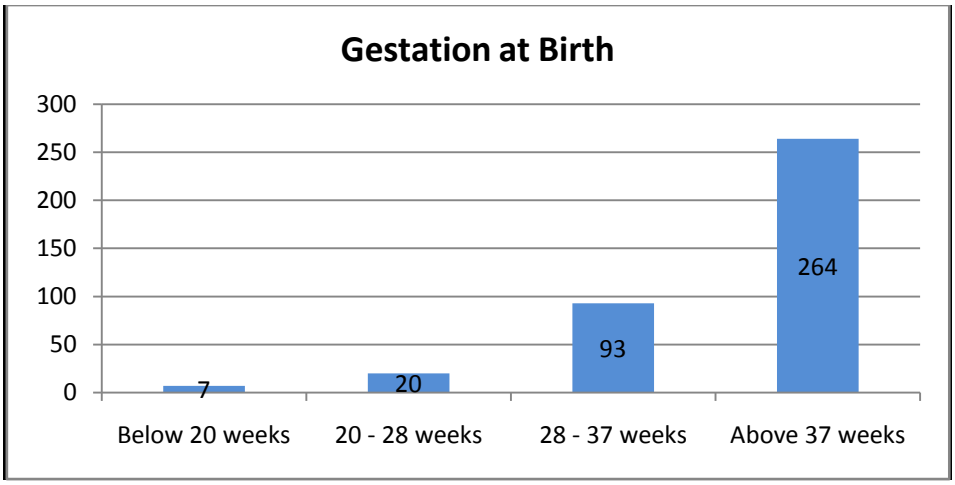

Figure 4.7: Gestation at birth

Low gestational age at birth was associated with poor pregnancy outcome in both univariate and multivariate analysis as shown on table 4.8 below. Below 20 weeks [unadjusted OR 33.6 95% CI (3.94, 286.60), p=0.001], [adjusted OR 33.5, 95% CI (2.21, 50.23), p=0.01], 20-28 weeks [(unadjusted OR 50.6, 95% CI (11.3, 225.6), p <0.0001], adjusted OR 181.2, 95% CI (27.5,119.2), p<0.0001] and 28-37 weeks [Unadjusted OR 4.6, 95% CI (2.72, 7.83), p<0.0001, [adjusted OR 6.9, 95% CI (3.192,15.1), p<0.0001].

4.4.2 Mode and Place of delivery

The respondents who had normal deliveries were 329 (86.5%), 46 (11.4%) had caesarean section done while 9 (2.2%) had vacuum delivery done. The respondents who had a hospital delivery during the most recent pregnancy were 285 (74.2%), 50 (13%) delivered at the health centre whereas 49 (12.8%) delivered at home. The place of delivery was not significant (χ^2 =1.2989, df=3, p=0.792) as illustrated on table 4.9.

Among the respondents who delivered in a health facility, 270 (70.3%) were assisted by a nurse midwife while 64 (16.7%) were assisted by a doctor. Those who delivered at home were assisted by the TBAs 47 (12.2%) while 3 (0.8%) delivered alone.

Delivery at home, for example, is more than twice as common in rural as in urban areas, and the proportion of births with a skilled attendant ranges from only 29 percent in Western Province to 79 percent in Nairobi (KDHS 2003).

> A Nursing officer said *'In most instances, women especially those with high parity try to deliver at home may be because they feel they have the experience. Also those with low socio-economic status deliver at home because they fear the costs incurred at hospital. These are the clients who may have complications such as obstructed labour or retained placenta leading to poor outcomes'.*

The women who had Caesarean Section done were more likely to develop poor pregnancy outcome on univariate analysis [unadjusted OR 1.94, 95% CI (1.081, 3.682), p= 0.044] however this was not significant on multivariate analysis as shown on table 4.10. There was significant association with poor pregnancy outcomes among those who had a vacuum delivery on univariate analysis [unadjusted OR=6.02, 95% CI (1.473, 24.632), p=0.012] but this was not significant on multivariate analysis as shown on table 4.10. The delivery assistant was not significant on multivariate analysis however on univariate analysis, those delivered by the nurse/midwife were significantly associated with poor outcomes [unadjusted OR 0.317, 95% CI (0.179, 0.568), p=<0.000] as compared to those who were assisted by the doctor (*table 4.10*).

Table 4.9: Delivery factors affecting pregnancy outcome

Variable	N (%)	Chi – Square (df)	p-value
Mode Delivery			
Normal delivery	329 (85.7%)		
C/S	46 (12%)	11.1125(2)	p-value = 0.004
Vacuum delivery	9(2.3%)		
Place of delivery			
Health centre	51(13.3%)		
Home	48(12.5%)	1.2989(3)	p-value = 0.729
Hospital	285(74.2%)		
Who assisted Delivery			
TBA	47(12.2%)		
Alone	3(0.8%)		
Doctor	64(16.7%)	17.3878(3)	p-value = 0.001
Nurse/Midwife	270(70.3%)		
Complications			
Fetal complications	25(23.8%)		
Obstructed labor	33(31.4%)		
Preterm birth	39(37.2%)	35.2256(3)	p-value <0.0001
Others	8(7.6%)		
Outcome delivery			
Abortion/Miscarriage	15(3.9%)		
Live birth	278(72.4%)		
Preterm	48 (12.5%)	384.00(4)	p-value <0.0001
Still birth	29(7.5%)		
Neonatal Mortality	14(3.7%)		
Baby weight			
2500 -3500g	245(66.9%)	158.8492	p-value <0.0001
>3500g	45(12.5%)		
<2500g	76(20.7%)		

Table 4.10: Univariate and Multivariate Delivery factors associated with Adverse pregnancy outcome

Variable	Univariate		Multivariate	
	OR	**95% CI p-value**	**OR**	**95% CI p-value**
Gestation(Wks)				
20-28	50.4	(11.3, 225.6) <0.0001*****	181.2	(27.5,119.2) <0.0001*
28-37	4.6	(2.72, 7.83) <0.0001*****	6.9	(3.192,15.1) <0.0001*
<20	33.6	(3.94, 286.60) <0.001*	33.5	(2.21, 50.23) 0.011*
Mode of delivery				
C/ section	1.94	(1.081, 3.682) 0.044*		
Vacuum	6.02	(1.473, 24.632) 0.012*		
Delivery Assistant				
Nurse/midwife	0.317	(0.179, 0.568) <0.000*****		
Alone	0.567	(0.049, 6.568) 0.65		
TBA	0.585	(0.269, 1.273) 0.177		
Baby weight				
Above 3500g	0.896	(0.328, 2.448) 0.830		
Below 2500g	38.22	(18.506,78.942) <0.000*****		

4.4.3 Outcome of Previous and Recent Deliveries

On the outcome of previous pregnancies, 45 (31.9%) had previously had abortions and miscarriages, 33 (23.4%) had stillbirths, 40 (28.4%) had preterm deliveries while 23 (16.3%) had neonatal mortalities (*Figure 4.8*). The outcome of the recent delivery among 278 (72.4%) of the respondents was a live birth. Poor pregnancy outcomes of recent pregnancies were 106 (27.6%) which included 48 (12.5%) preterm births, 29 (7.5%) stillbirths, 14 (3.6%) neonatal mortalities and 15 (3.9%) abortions/ miscarriages (*Figure 4.8*).

A proportion test was done to compare poor pregnancy outcome in the previous and recent pregnancies. A higher proportion was experienced in the previous pregnancies (0.37) compared to the recent pregnancies (0.28). The difference was statistically significant (p-value = 0.007).

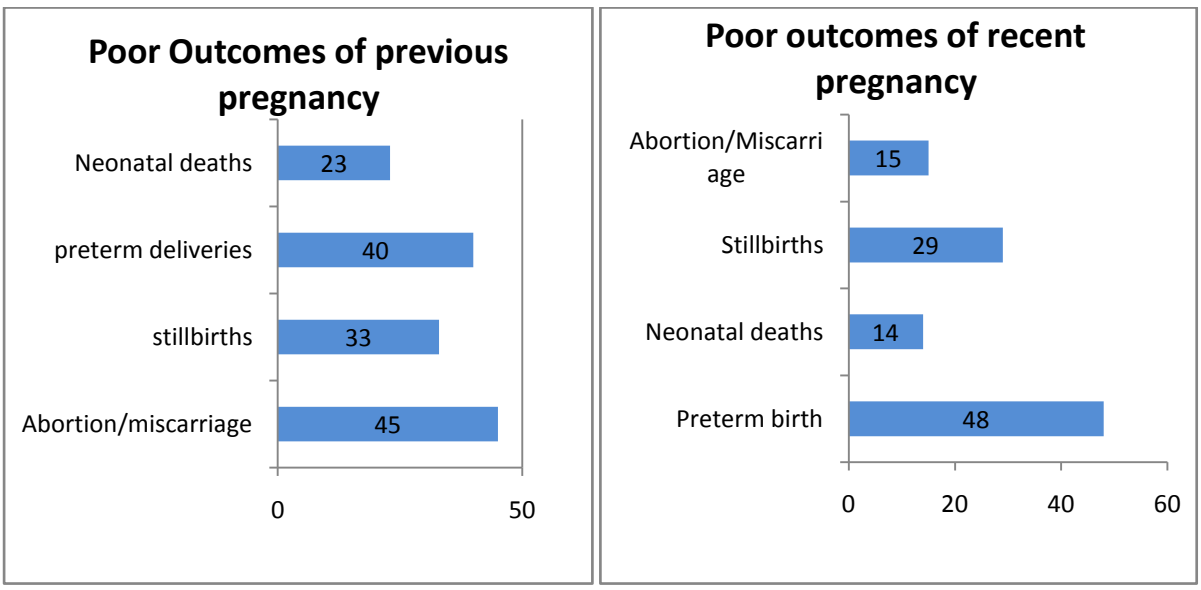

Figure 4.8: Outcome of previous and recent pregnancies

4.4.4 Baby's Birth Weight

The babies born to 245(66.9%) of the respondents weighed between 2500g – 3500g, 76(20.8%) weighed below 2500g while 45(12.3%) weighed above 3500g as shown on figure

4.9. The odds of having a poor pregnancy outcome among babies weighing below 2500g at birth was 38.22 times as compared to those who had a normal birth weight [unadjusted OR 38.22, 95% CI (18.506, 78.942), p=<0.000]. There was no significance of birth weight on multivariate analysis as shown on table 4.10.

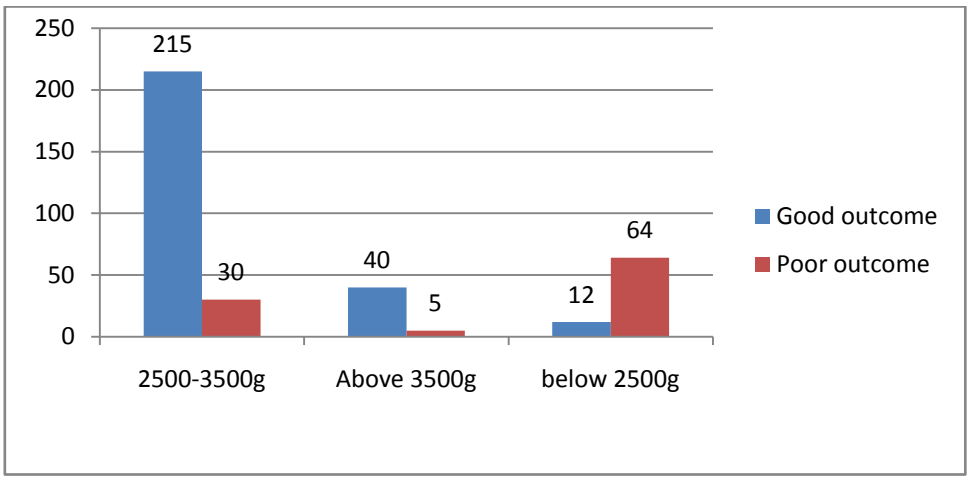

Figure 4.9: Baby's Birth Weight and pregnancy outcome

4.4.5 Complications experienced during delivery

The complications experienced during the most recent delivery among the respondents included preterm births 39(37.1%), 33(31.4%) had obstructed labour, 25(23.8%) had fetal complications while 8(7.6%) had other complications as shown on figure 4.10. There was significant association of those who developed complications during the process of delivery with poor pregnancy outcome (χ^2 =35.2256 df =3 P-value <0.0001) as shown on table 4.9.

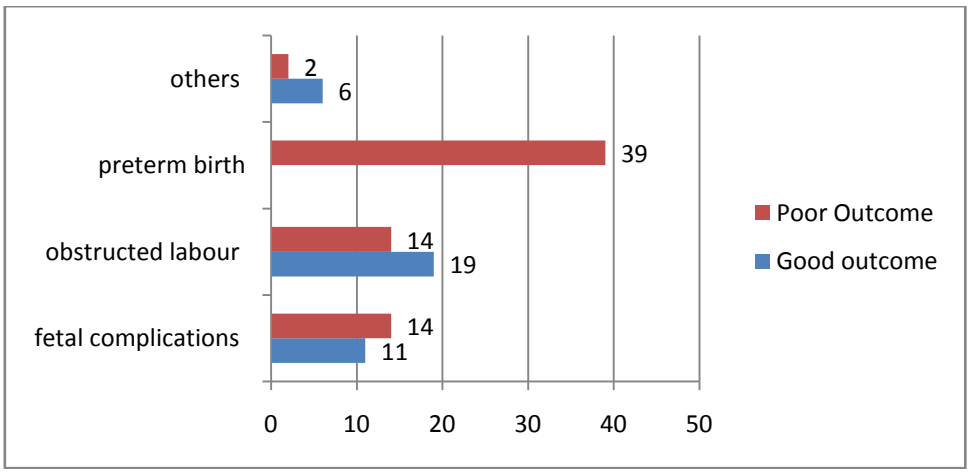

Figure 4.10: Complications experienced during delivery

4.4.6 Family Planning Use

Family Planning use was evident among 223(57.8%) of the respondents while 162(42.2%) did not use. The common methods used were the Injectables 77(34.8%) and pills 69(31.2%). Other methods used were implants 46(20.8%), IUCD 23(10.4%) and 6(2.8%) used other methods. Some respondents did not use FP methods due to lack of partner's consent 35(19.3%), fear 34(18.6%), side effects 27(14.8%), cultural factors 20(10.9%) while 48(26.2%) did not use FP due to other reasons.

Family Planning use was associated with poor pregnancy outcomes (χ^2 = 6.7997 df= 1 p= 0.009**)**, however the FP method used was not significantly associated with poor pregnancy outcomes as shown on table 4.11 below. There was no significance associated with those who did not use FP on poor pregnancy outcomes (χ^2 = 9.9003 df= 5 p= 0.078**)** as shown on table 4.11.

Table 4.11: Family Planning use, methods and reasons for lack of FP use

Variable	**N (%)**	**Chi-square (df)**	**p value**
FP USE			
No	162(42.2%)	6.7997(1)	p-value = 0.009
Yes	222(57.8%)		
FP METHOD			
IUCD	23(10.4%)		
Implants	46(20.8%)		
Injectables	77(34.8%)	7.1291(4)	p-value =0.13
Pills	69(31.2%)		
Others	6(2.8%)		
LACK OF FP USE			
Cultural factors	20(10.9%)		
Fear	34(18.6%)		
Lack of partners consent	35(19.3%)	9.9003(5)	p-value = 0.078
Side effects	27(14.8%		
Unavailable	19(10.4%)		
Others	48(26.2%)		

4.5 Pre-existing conditions influencing pregnancy outcome

4.5.1 Pre- Existing conditions

The respondents who had pre-existing conditions were 78(20.4%). These included Hypertension 29(37.2%), HIV/AIDS 22(28.2%), Diabetes Mellitus 14(17.9%), 7(9%) had cardiac diseases while 6(7.7%) had other conditions (*figure 4.11*). Among those who had pre-existing conditions, 73(93.5%) of them were on treatment. Among them, 29(39.7%) of them had been on treatment for less than one year, 27(37%) for 1-5 years, 13(17.8%) had been on treatment for 5-10 years while 4(5.5%) for over 10 years. Pregnancy worsened the pre-existing condition among 44(56.4%) while it did affect 34(43.6%) of the respondents. Among those whose conditions worsened, 21(47.7%) had the pregnancy terminated while 23(52.3%) carried on with the pregnancy.

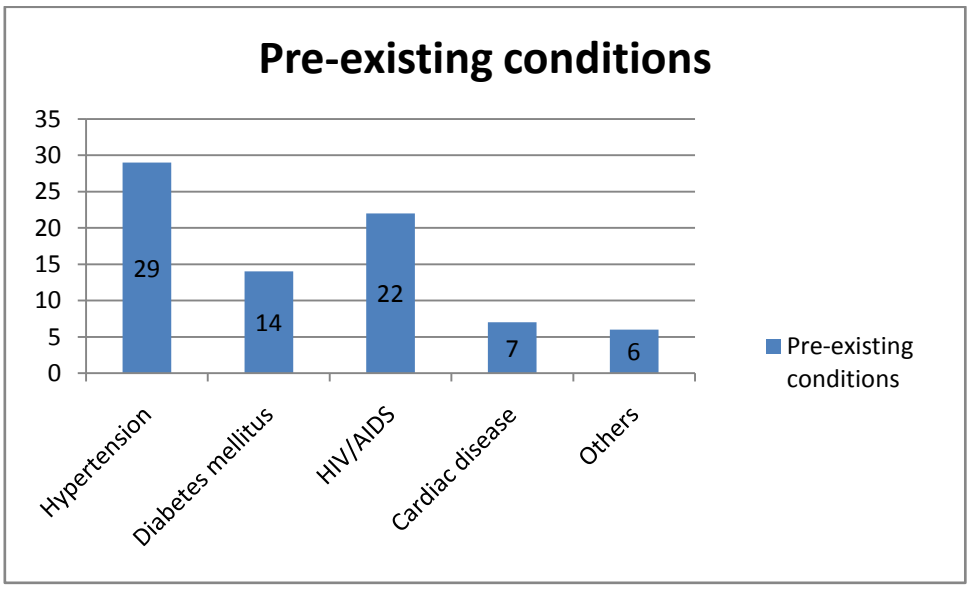

Figure 4.11: Pre-existing medical conditions

Pre–existing medical conditions were significantly associated with poor pregnancy outcomes [Unadjusted OR 4.48, 95% CI (2.653, 7.571), p<0.000]. On multivariate analysis, there was still significance of poor pregnancy outcome [adjusted OR 3.97, 95% CI (1.21, 13.07), p= 0.023] as illustrated on table 4.13.

The patients with pre-existing medical conditions but were not on treatment were more likely to develop poor pregnancy outcomes compared to those who were on treatment (χ^2=39.4658

df= 1 p<0.0001). However, the duration of treatment was not significant (χ^2 = 1.6504 df= 3 p= 0.648) as shown on table 4.12 below. Among some respondents who had pre-existing medical conditions, the pregnancy worsened the condition and led to termination of the pregnancy. This was associated with poor pregnancy outcomes (χ^2 =31.5055 df= 1 p< 0.0001) (*Table 4.12).*

Table 4.12: Chi- square values on pre-existing medical conditions and other illnesses

Variable	**N (%)**	**Chi-square (df)**	**P value**
Pre-existing conditions			
No	305(79.6%)	34.3862(1)	p- value = <0.0001
Yes	78(20.4%)		
Medical –Conditions			
HIV/AIDS	22(28.2%)		
Cardiac disease	7(9%)	6.1152(4)	p -value =0.191
Diabetes Mellitus	14(17.9%)		
Hypertension	29(37.2%)		
Others	6(7.7%)		
On treatment			
No	5(6.5%)	39.4658(1)	p- value <0.0001
Yes	73(93.5%)		
Treatment period			
1-5Yrs	27(37.0%)		
5-10yrs	13(17.8%)	1.6504(3)	p- value = 0.648
<1yr	29(39.7%)		
>10yrs	4(5.5%)		
Pregnant worsen			
No	34(43.6%)	45.4476(1)	p- value <0.0001
Yes	44(56.4%)		
Pregnancy terminated			
No	23(52.3%)	31.5055(1)	p- value <0.0001
Yes	21(47.7%)		
Other illnesses			
No	297(77.3%)	19.4910(1)	p -value =<0.0001
Yes	87(22.7%)		

Table 4.13: Pre-existing conditions and obstetric emergencies associated with adverse pregnancy outcome

Variable	**Univariate**		**Multivariate**	
	OR	**(95% CI) p-value**	**OR**	**(95% CI) p-value**
Obstetric Emergencies				
Yes	2.982	(1.751, 5.079)<0.0001*****	13.8	(3.14, 60.1)<0.0001*
Pre-existing conditions				
Yes	4.48	(2.653, 7.571)<0.0001*****	3.97	(1.21, 13.07)0.023*
Treatment				
Yes	5.144	(2.999, 8.824)<0.0001*****		

4.5.2 Illnesses during pregnancy

The respondents who had other illnesses during the pregnancy were 87(22.7%). These illnesses included malaria 42(47.5%), anaemia 25(28.7%), PIH 16(18.8%) and other illnesses 4(5%). The illnesses acquired during pregnancy were significantly associated with poor pregnancy outcome on univariate analysis [Unadjusted OR 3.025, 95% CI (1.828, 5.004), p<0.000] as shown on table 4.14. The illnesses which significantly affected pregnancy outcome included malaria [OR 4,026, 95%CI (1.459, 12.125), p<0.008] and PIH [unadjusted OR 3.098, 95% CI (1.3228, 7.259), p<0.009]. These illnesses were significantly associated with poor pregnancy outcomes on univariate analysis as shown on table 4.14. PIH was still significantly associated with poor pregnancy outcomes on multivariate analysis [adjusted OR 6.1, 95% CI (1.30, 36.0), p=0.02] (*table 4.14*).

Table 4.14: Illnesses in pregnancy associated with poor pregnancy outcome

Variable	**Univariate**		**Multivariate**	
	OR	**(95% CI) p-value**	**OR**	**(95% CI) p-value**
Illness during pregnancy				
Yes	3.025	(1.828, 5.004)<0.0001*****		
Malaria				
Yes	4.206	(1.459, 12.125)<0.008*****		
PIH				
Yes	3.098	(1.3228, 7.259)<0.009*****		
Others			6.1	(1.30, 36.0)0.02*
Yes	8.068	(0.829, 78.432)<0.072*****		

4.6 Obstetric emergencies influencing Pregnancy Outcomes

4.6.1 Awareness of Obstetric Emergencies

On awareness of obstetric emergencies, 55.3% were aware of some obstetric emergencies while 44.7% were not aware. Awareness of Obstetric emergencies was not associated with poor pregnancy outcome [χ^2 = 0.1081, df=1 p- value = 0.742] as indicated on table 4.15.

Table 4.15: Awareness of Obstetric Emergencies

Variable	Number (%)	Chi-Square (df)	p-value
Aware of obstetric emergencies			
• No	173(45.2%)	0.1081(1)	p-value = 0.742
• Yes	210(54%.8)		
APH			
• No	210(54.7%)	1.3311(1)	p-value = 0.249
• Yes	174 (45.3%)		
PPH			
No	292(76.0%)	0.1841(1)	p-value = 0.668
Yes	92(24%)		
Eclampsia			
• No	316(82.3%)	0.1351(1)	p-value = 0.713
• Yes	68(17.7%)		
Cord prolapse			
• No	281(73.2%)	1.304(1)	p-value = 0.253
• Yes	103(26.8%)		
Fetal distress			
• No	327(85.2%)	0.1651(1)	p-value = 0.684
• Yes	57(14.8%)		

4.6.2 Experience of Obstetric Emergencies

The respondents who experienced obstetric emergencies were 72(18.7%). the emergencies included PPH 43(56.6%), fetal distress 16(21.1%) APH 8(10.5%), eclampsia 4(5.3%), cord prolapse 4(5.3%) while 1(1.3%) experienced other emergencies (*Figure 4.12*). There was a strong association among the respondents who had experienced an obstetric emergency during their pregnancies with poor pregnancy outcome (χ^2 = 17.0660 df = 1 p-value <0.0001), however, there was no specific obstetric emergency associated with poor pregnancy outcome as indicated on table 4.16.

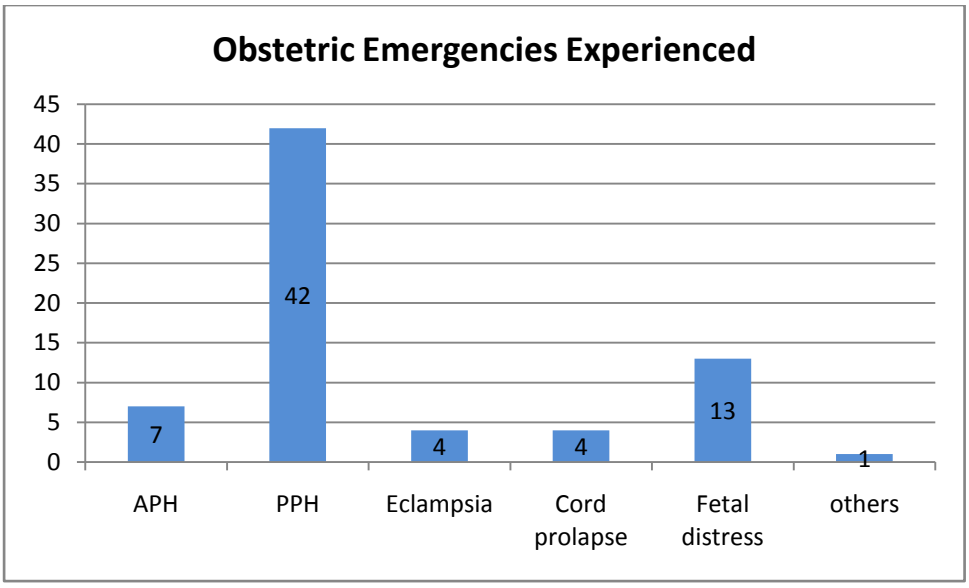

Figure 4.12: Obstetric emergencies experienced

Obstetric emergencies were significantly associated with poor pregnancy outcome on univariate analysis, [unadjusted OR=2.982, 95%CI (1.751, 5.0791), P=<0.000]. On multivariate analysis, obstetric emergencies significantly affected pregnancy outcome [adjusted OR 13.8, 95% CI (3.14, 60.1), p<0.0001] as illustrated on table 4.13.

Table 4.16: Obstetric emergencies experienced

Variable	**Number (%)**	**Chi-square (df)**	**p -value**
Experience in obstetric Emergencies			
No	312(81.3%)	17.0660(1)	p-value <0.0001
Yes	72(18.7%)		
Obstetric Emergencies			
APH	8(10.5%)	10.3822(5)	p-value = 0.065
PPH	43(56.6%)		
Cord Prolapse	4(5.3%)		
Eclampsia	4(5.3%)		
Fetal distress	16(21%)		
Others	1(1.3%)		

'The women who experience obstetric complications in the health centre and the sub-district hospital are few but they are referred as early as possible once the diagnosis for referral is made. When an obstetric emergency occurs, we always want to prevent a bad outcome, thus we refer as quickly as possible. However, sometimes the road is

impassable due to the rains and this might cause delay and also sometimes we do not have a ready vehicle forcing the relatives to look for their own means to refer the patient' as said by a Nursing Officer in-Charge.

Achievement of MDG 4 and 5 requires strengthening the health systems in order to improve and increase access to EmOC by ensuring that for every 500 000 people, there should be at least four basic EmOC facilities and one comprehensive EmOC facility (WHO, 2003).

4.7 Health Facility Factors in the study population

4.7.1 Health Facility type and Services

The respondents who attended the district hospital for various services were 141(36.7%). A proportion of 122(31.8%) attended the sub-district hospital and 121(31.9%) attended the health centre. Most of the clients 330(85.9%) received the services they were looking for in the health facilities. The reasons for not receiving all the services were lack of equipments 21(38.9%), lack of staff 11(20.4%) and unavailability of the services 22(40.7%) as shown on figure 4.13.

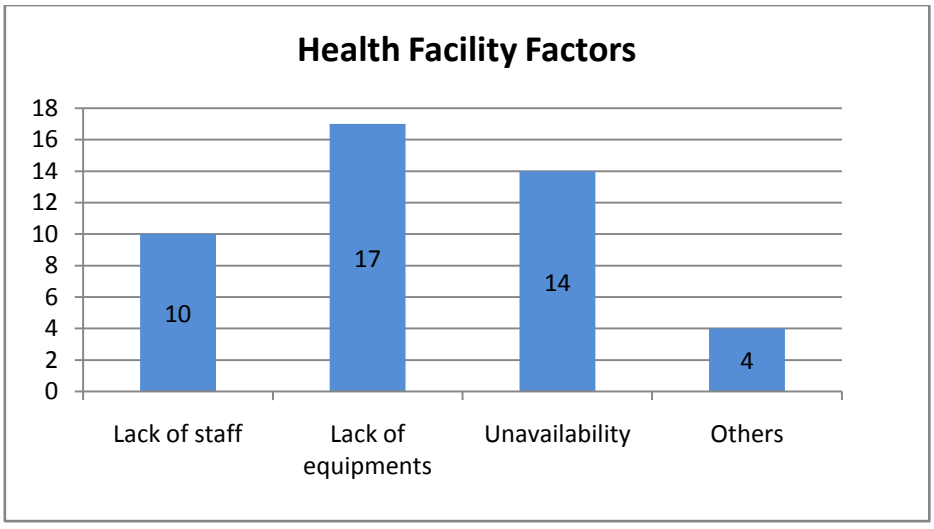

Figure 4.13: Health Facility factors leading to lack of services

Those who attended the health centre facility had significantly poor pregnancy outcomes [unadjusted OR 0.384, 95%CI (0.216, 0.683), p-value =0.001] as compared to those who

attended the district or sub-district hospital. This was still significant on multivariate analysis [adjusted OR 0.03 p=0.012 CI 95% (0.118, 0.771)] as shown on table 4.17 below. The type of services provided was significantly associated with poor pregnancy outcome (χ^2 =15.7359 df = 3 p–value = 0.001). Also, those who did not receive all services had significant association with poor pregnancy outcome (χ^2 =8.9171 df = 1 p-value= 0.003). However, the reasons for not receiving the required services were not significantly associated with poor pregnancy outcome as shown on table 4.17 below.

Table 4.17: Health facility factors affecting pregnancy outcome

VARIABLE	NUMBER (%)	CHI-SQUARE (df)	p –VALUE
Health Facility			
▪ District Hospital	141(36.7%)		
▪ Health centre	121(31.5%)	11.5607(2)	p- value = 0.003
▪ Sub district	122(31.8%)		
Services			
▪ ANC	90(23.4%)	15.7359(3)	p- value = 0.001
▪ CWC	96(25%)		
▪ FP	86(22.4%)		
▪ Delivery	112(29.2%)		
Received all services			
▪ No	54(14.1%)	8.9171(1)	p- value = 0.003
▪ Yes	330(85.9%)		
Not received all Services			
▪ Lack of equipments	21(38.9%)	0.6591(2)	p- value = 0.719
▪ Lack of staff	11(20.4%)		
▪ Un available	22(40.7%)		
Distance to HF			
▪ 1-5KM	187(48.7%)	2.6455(2)	p- value = 0.266
▪ <1KM	45(11.7%)		
▪ >5KM	152(39.6%)		
Staff attitude			
▪ Bad	9(2.34%)	14.1071(4)	p- value = 0.009
▪ Extremely good	68(17.7%)		
▪ Fair	66(17.2%)		
▪ Good	241(62.8%)		
Waiting time			
▪ 1-2hrs	122(31.7%)	15.3957(2)	p- value =<0.0001
▪ <30mins	241(62.8%)		
▪ >2hrs	21(5.5%)		

Key Informant Interviews revealed that the clients admitted to the health centre and sub-district were mainly self referrals from home.

> A clinical officer said *'These clients sometimes come very late after trying to deliver at home for a long time with TBAs who are not trained but they have not managed, so we refer them to the district hospital because we do not have facilities like the theatre. These are the clients who develop poor outcomes like stillbirths. The clients try to deliver at home because they lack the hospital fee and most of them do not have a medical cover or a health insurance'.*

Late referral is one of the predisposing factors to poor pregnancy outcomes because it leads to delay in management.

> *'In some situations, it is possible to have delays because a client can be referred from a dispensary or health centre to the sub-district hospital then to the district hospital. We are equipped with the common drugs but we lack a theatre and a vehicle for referral. Sometimes, the relatives have to fuel the hospital vehicle because there is no money for fuel. We do cost sharing'* as said by a Nursing Officer in-Charge.

4.7.2 Distance to the health facility

The distance to the health facility among 187(48.7%) of the clients was between 1-5KM, for 152(40.0%) it was more than 5KM while 45(11.9%) lived less than 1KM from the health facility. Distance to the health facility was not significantly associated with poor pregnancy outcome (χ^2 =2.6455, df = 2, p-value = 0.266). This is shown on table 4.17.

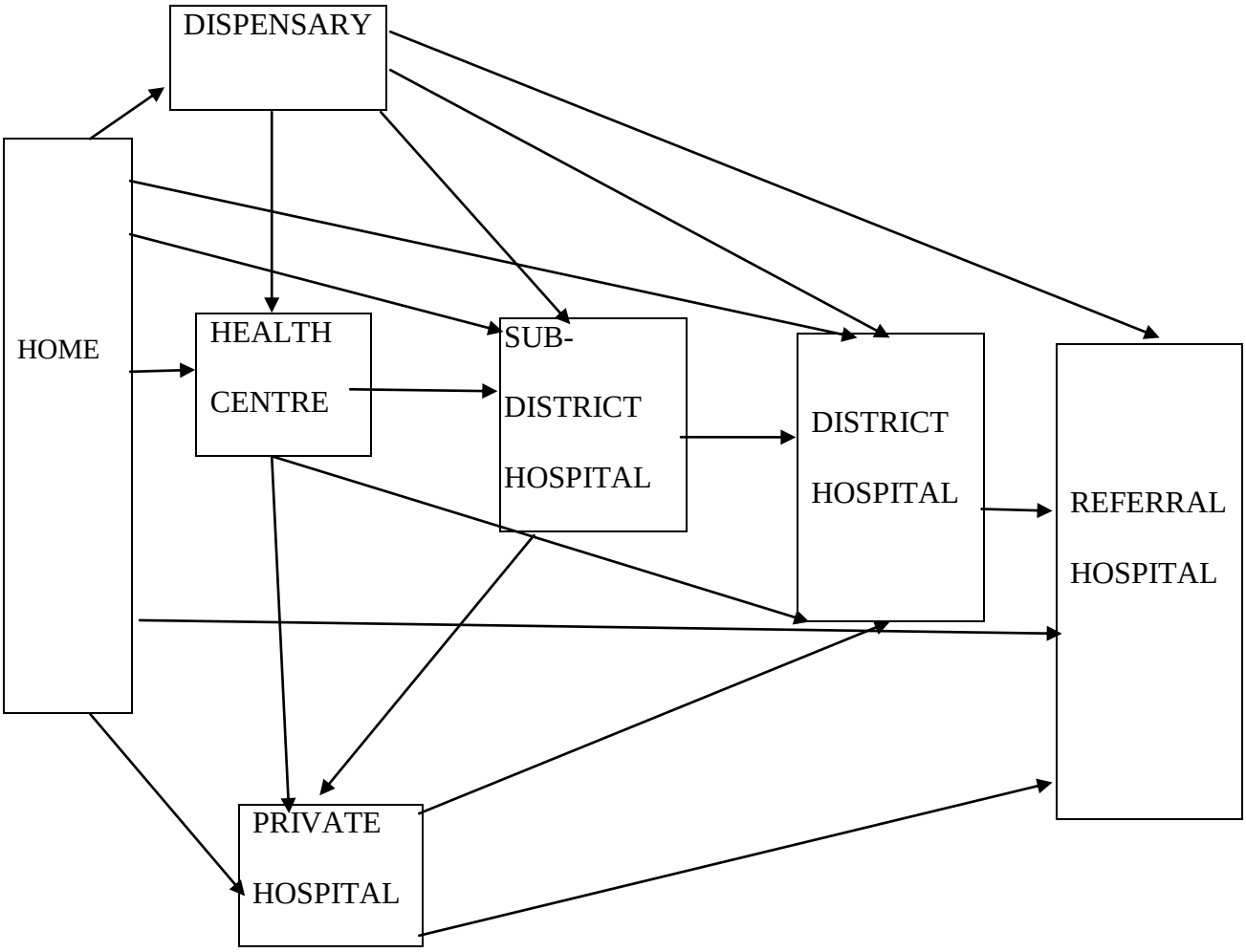

Figure 4.14: Referral patterns in the study area

Source: Constructed from study findings

From the figure above, it was noted that there were clients who would go directly to the sub-district, district or the referral hospital while others went through various health facilities before getting the services. The district hospital would still refer patients to the referral hospital owing to lack of some equipments or skilled health care like the consultant specialists. There was notable criss-crossing in the referral pattern.

'The patients we get usually might have passed through more than one health facility before they are finally here' as said by a Nursing Officer.

A clinical officer said '*In order to have safe deliveries and minimize adverse pregnancy outcomes in the district at community level, it is of paramount importance to provide health education to the community at large on pregnancy and child birth. At facility level, adequate staffing and provision of adequate supplies is very important in preventing poor pregnancy outcomes'.*

4.7.3 Waiting time

Time taken to be attended in the health facility was less than 30 minutes among 241(62.7%) respondents, 1-2 hours among 122(31.7%) and more than 2 hours for 21(5.2%) of the respondents. Those who spend more time waiting to be attended were at a higher risk of developing poor pregnancy outcomes compared to those who took only less than 30 minutes to be attended. Those who waited for 1-2 hours were significantly at risk [unadjusted OR 2.394, 95%CI (1.482, 3.8667), p<0.000] and more than 2 hours (unadjusted OR 2.865, 95%CI (1.143, 7.179), p-value =0.025]. However, waiting time was not associated with poor pregnancy outcome on multivariate analysis. Table 4.18 illustrates health facility factors associated with poor pregnancy outcome on univariate and multivariate analysis.

Table 4.18: Health facility factors associated with adverse pregnancy outcome

Variable	**Univariate**		**Multivariate**	
	OR	**(CI 95%) p- value**	**OR**	**(CI 95%) p- value**
Health Facility type				
Health Centre	0.384	(0.216, 0.683) 0.001*****	0.03	(0.118,0.771) 0.012*
Sub-district hospital	0.608	(0.358, 1.033) 0.066	1.09	(0.518, 2.30) 0.82
Time taken in HF				
1 – 2 Hours	2.394	(1.482, 3.866) <0.000*****	1.85	
More than 2 hours	2.865	(1.143, 7.179) 0.025*****	1.78	

4.7.4 Staffing and Staff Attitude

The staffing in the health facilities was inadequate as evidenced by the report from the key informants.

> A Nursing Officer in one of the health facilities said, '*We do not have enough staff, in fact sometimes there is only one midwife to man the unit during one shift'.*
>
> A Clinical Officer in-charge said, *'In this health centre, we lack some of the staff like the Health information Officer, pharmaceutical technologist and nutritionist thereby forcing the available staff to double up their jobs to cover the shortage').*

As per the likert scale, 68 (17.7%) of the staff were rated extremely good, 241 (62.8%) were good, 66 (17.2%) were fair, whereas 9 (2.3%) were rated to be bad. Staff attitude was significantly associated with poor pregnancy outcome ($\chi 2=14.1468$, df = 4, p-value = 0.007) as shown on table 4.17.

4.8 DISCUSSION

4.8.1 Socio-economic factors associated with poor pregnancy outcome

The study findings show that age at delivery or age at first birth were not associated with poor pregnancy outcomes. This however is not in agreement with a study by Bettiol where maternal age, particularly the limits of reproductive age (<16 and >35 years), was pointed out as a risk factor for adverse pregnancy outcomes (Bettiol, 2000). According to a study by Rajaee, maternal age in the two extremes affects pregnancy outcome (Rajaee, 2010). Another study on pregnancy outcomes among the adolescents in South Nyanza revealed that relatively higher incidence of pregnancy wastage is observed among first pregnancies, pregnancies outside marriage and very young maternal age (Magadi, 2004).

Multiparity was associated with poor pregnancy outcomes. The results of this study are consistent with data from KDHS (2008) findings which found out that there is generally an increased risk of death for higher-order births. This could be attributed to risks of complications associated with multiparity which include malpresentation, uterine atony, precipitate labour and PPH among others which could lead to poor pregnancy outcome. A population based retrospective cohort study by Smith found out that second births in women aged 15-19 were associated with an increased risk of moderate and extreme prematurity and stillbirths (Smith, 2001). The findings of a study by Bondagji revealed that there is a significant increase in the perinatal mortality, the rate of caesarean section, antenatal maternal medical complications and the incidence of postpartum hemorrhage among the grand-multiparas (Bondagji, 2005).

There was association between the separated and divorced respondents and poor pregnancy outcome. These findings agree with the findings of a study which revealed out that with respect to pregnancy wastage, marital status seems to be the significant factor (Magadi,

2004). This could be attributed to the social stress that come about with the status or other cultural practices which may affect the fetal well-being and even the up-bringing of the baby which could lead to neonatal mortality as a result of poor nutrition or infection especially in situation where the parent does not have a stable source of income. Similar findings were obtained in another study by Kirchengast which found out that the rate of preterm births and low birth weight babies at term were higher among the unmarried compared to the married population (Kirchengast *et.al* (2007). Another study by Miranda found out that mothers who are unmarried are at increased risk of adverse birth outcomes compared to married women (Miranda, 2009).

Low education level was associated with poor pregnancy outcome. This could be attributed to lack of knowledge on health care for themselves and the babies. A mother's education can exert a positive influence on children's health and survival (KDHS, 2008). Under-five mortality is noticeably lower for children whose mothers either completed primary school (68 deaths per 1,000 live births) or attended secondary school (59 deaths per 1,000 live births) than among those whose mothers have no education (86 deaths per 1,000 live births) (KDHS, 2008). A large number of studies look at the effect of women's education on infant mortality or children's schooling in Pakistan and other countries and show consistent results: higher levels of women's education are associated with a higher probability of infant and child survival and with higher levels of school attendance among children (Agha, 2000). A mother's education, income, and empowerment have a significant impact on lowering perinatal mortality (KDHS, 2008). Educated women are able to get medical insurance on their health thus be able to get better health care.

Casual labour was associated with poor pregnancy outcome at p=0.031. This could be attributed to low income which may lead to inability to seek medical care as a result of lack

of finances. Poor pregnancy outcomes was also observed among those whose partners were self – employed, p=0.001 compared to those who had other occupations. This could be attributed to low incomes which could be as a result of meager earnings from their occupation. From the Kenya Human Development Report, 2006, Keiyo District is ranked 5th with Human Poverty Index of 53.3%. This shows that a high population lives below poverty line thus the low socio-economic status. A study by Ziyo found out that as regards to women's occupation, professional and semiprofessional women had better fetal outcome as compared to others (Ziyo, 2009).

On house ownership, those who lived in rental houses had significantly poor pregnancy outcomes p=0.003 on univariate analysis. This could be attributed to poor housing conditions which could be as a result of low incomes thus will lead to inability to seek medical care leading to poor pregnancy outcomes. A study on housing conditions as a social determinant to low birth weight and low preterm birth weight in Rio De Jenairo found out that poor housing conditions were associated with low birth weights and low preterm birth weights (Vetorre *et al*, 2009`).

4.8.2 Antenatal factors associated with poor pregnancy outcome

Antenatal care is more beneficial in preventing adverse pregnancy outcomes when it is sought early in the pregnancy and is continued through delivery (KDHS, 2008). World Health Organization (WHO) recommend a minimum of four antenatal care visits during pregnancy, the minimum needed to provide the most important services, which can include treatment of hypertension to prevent eclampsia, tetanus immunization, intermittent preventive treatment (IPT) for malaria and distribution of insecticide-treated nets (ITN), prevention of mother-to-child transmission (PMTCT) of HIV, micronutrient supplementation, and birth preparedness, including information about danger signs during pregnancy and childbirth

(UNICEF, 2008). On ANC attendance, those who did not attend were more likely to develop poor pregnancy outcome (p=0.027). This could be attributed to lack of early detection and diagnosis of complications which could lead to poor pregnancy outcome. Similar findings were obtained by a study on effect of antenatal care on newborn survival which found out that the rate of stillbirths is high among women who do not attend ANC (Yousif, 2006). According to the literature reviewed, use of prenatal/antenatal and delivery care services have been recommended for the management of unfavourable birth outcomes such as perinatal deaths (Vitora and Barros, 2001; Ogunles, 2005).

The first appointment to ANC should be at 9 – 11 weeks gestation (WHO, 2006). Study findings showed that majority of the women booked for ANC services during the second trimester instead of the WHO recommended first trimester. From the study, those who began attending ANC during the second trimester had significantly poor pregnancy outcomes (P=0.023). Late entry to ANC or non-adherence to providers' recommendations regarding the schedules of visits among women, limits provision of disease prevention components such as IPT prophylaxis and TT immunization which depends on early entry to ANC (WHO, 2006).

Decision making made by the spouses of the respondents was associated with poor pregnancy outcomes (p-value = 0.025). This could be attributed to delays owing to lack of birth preparedness in terms of decision-making. A birth-preparedness package promotes active preparation and assists in decision-making for healthcare seeking in case of complications (McPherson, 2006). Men can influence health care utilization during pregnancy and thereby the outcome of an obstetric emergency by contributing to development of the birth plan (Dudgeon, 2004). From the study, it is evident that in situations where women are empowered, poor pregnancy outcomes can be prevented.

Those who attended public institutions for ANC care were more at risk of acquiring poor outcomes (p=0.002). This could be attributed to lack of equipments which may be evidenced in public health facilities coupled with poor staffing as evidenced from the health facilities of study. These results are consistent with a statement in KDHS (2008) which states that resources for health are scarce (Glenngård and Maina, 2007).

Weight gain in pregnancy is also known to influence pregnancy outcomes including LBW, preterm delivery, Small for Gestational Age delivery (SGA) and caesarean delivery (Kalanda, 2007). From the study, those whose weight was not taken during ANC visits were significantly associated with poor pregnancy outcomes (p<0.000). Excessive weight gain could be attributed to oedema which could be as a result of PIH, polyhdramnious or diabetes mellitus. Weight loss on the other hand could be due to poor nutrition, anaemia or cardiac disease. These factors could lead to poor pregnancy outcome since both the life of the baby and the mother are at risk owing to the underlying factors. In developing countries, low pre-pregnancy body mass indexes are on the other hand predictors of adverse pregnancy outcomes (Kalanda, 2007).

4.8.3 Delivery factors associated with Poor Pregnancy Outcome

The low gestational age at birth was associated with poor pregnancy outcome. This could be attributed to complications associated with prematurity. According to a study by Magadi, particularly striking is the strong association between desirability of a pregnancy and premature delivery (Magadi, 2004). A study on analysis of etiology and outcome of preterm labor found out that irrespective of the use of a course of betamethasone, neonatal mortality was significantly high among babies delivered before 34 weeks as compared to that in babies delivering after 34 weeks (Singh, 2007). Low birth-weight was strongly associated with

perinatal death according to a study on perinatal mortality in Northern Rural Tanzania (Hinderaker *et al,* 2003).

Kenya's institutional delivery rates are low, compared with other countries (KDHS, 2008) where only 44% of women deliver under skilled health care. The place of delivery is highly correlated with the skilled birth attendance as very few deliveries at home are attended by medical professionals if any (KDHS, 2008). In addition to place of birth, assistance during childbirth is an important variable that influences the birth outcome and the health of the mother and the infant (KDHS, 2008). The study findings show that the deliveries which were assisted by the nurses/midwives were associated with poor pregnancy outcomes. This could be attributed to lack of current knowledge on management of complications which may arise during labour and delivery owing to lack of updates and continuous professional development in the rural settings.

A child's birth weight and size are important indicators of the child's vulnerability to childhood illness and chance of survival (KDHS, 2008). There was strong association between babies born before term and poor pregnancy outcome. This could be attributed to the fact that babies born before term were not yet fully developed thus were at risk of complications which could lead to poor outcomes. In good hospital settings, once the diagnosis of preterm labour is made, the patient is put on antenatal corticosteroids so as to assist in formation of surfactant fluid in the babies' lungs, thus preventing birth asphyxia which is a leading cause of deaths in premature newborns (Singh, 2007).

Birth weight remains an extremely powerful predictor of a newborn's chance for survival (Adegnika *et al,* 2006). Low birth weight is a strong predictor of infant mortality especially during the first weeks of life (APHRC, 2002). The babies born below 2500g were

significantly at risk of developing poor outcomes (p=<0.000). Low birth weight exposes babies to neonatal deaths in that they may not yet be fully developed thus have poor adaptation to the environment. According to a document by WHO, low birth weight is associated with the death of many newborn infants, but is not considered a direct cause (WHO, 2010). The respondents who had preterm deliveries (28-37 weeks gestation) were 38.4%. Premature babies are at risk since they are not yet fully developed to adapt to the external environment. Also lack of facilities such as the incubator makes nursing preterm babies more difficult thus exposing them more.

The women who had complications and ended up delivering by either vacuum delivery or Caesarean section had significantly poor outcomes (p=0.012 and 0.044) respectively. This could be attributed to complications such as prolonged labour, obstructed labour or delayed second stage which may affect the well being of the baby. However, this study did not seek to establish the reason for C/S or vacuum delivery. These findings are similar to those of a study carried out in Kilifi District which observed that complications of labour such as haemorrhage, premature rupture of membranes/ premature labour, and obstructed labour/ malpresentation increased the risk of death between 8- and 62-fold, and 53% of all perinatal deaths were attributable to labour complications (Weiner *et al*, 2003).

There was association of poor pregnancy outcome among clients who did not use FP. Effective FP services are critical for the attainment of MDG 4 and 5 (WHO, 2005). Reducing the number of unwanted pregnancies will also reduce the risk of maternal death over the course of a woman's reproductive years (WHO, 2010). One MDG indicator is the contraceptive prevalence rate, or the percentage of women aged 15–49 currently married or in union using a method of contraception (UNICEF, 2009). Family planning was utilized among some of the respondents; however there is need to increase the uptake as there were still

reasons such as cultural factors which hindered other clients from seeking these services. These findings correspond to the findings of KDHS 2008, where the data show that method-related reasons—especially fear of side effects were the most commonly cited reasons for not intending to use FP in the future. This study also found out that there are other factors that lead to lack of use of FP. Family Panning is known to be a cost - effective strategy to enhance MNH, reduce MMR and newborn mortality (KDHS, 2008). It is also one of the prongs of PMTCT (MOMS & MOPHS, 2010). It helps in child spacing, thus enable the mother regain good health as well as have good time to take care of the newborn baby well.

4.8.4 Pre- existing conditions and illnesses occurring during pregnancy

Maternal health is not just a women's issue; the mother's health has a direct bearing on the health of her newborn (KSPA, 2004). Pre – existing conditions which include Hypertension, Diabetes mellitus, HIV/AIDS and cardiac diseases were significantly associated with poor pregnancy outcome $p=0.023$. Illnesses acquired during pregnancy such as malaria, PIH, anaemia and others like pyelonephritis or urinary tract infections were also significantly associated with poor pregnancy outcomes, $p<0.000$.

The study findings show that Malaria was associated with poor pregnancy outcome ($p<0.008$). This could be attributed to the complications associated with the condition such as placental parasitaemia which could affect the fetus, thus leading to poor pregnancy outcome. Malaria infection during pregnancy is a major public health problem in tropical and subtropical regions throughout the world (Africa Malaria Report, 2003). Malaria infects the placenta making it unable to provide sufficient oxygen and nutrients to the foetus, leading to a range of adverse effects (CDC, 2004). The results of this study are consistent with another study carried out in rural Kenya, where it was observed that most perinatal complications increased significantly by maternal and environmental factors. Another study on Impact of

Malaria during Pregnancy on Low Birth Weight in Sub-Saharan Africa showed that Malaria during pregnancy can result in low birth weight (LBW), an important risk factor for infant mortality (Guyat, 2008). Among these were poor pregnancy care, malaria and anaemia during pregnancy (Ondimu, 2001). Another study by Saba *et al* found out that maternal malaria adversely affects the pregnancy outcome since it increases the risk of spontaneous abortion, stillbirths, premature delivery and low birth weight (Saba *et al*, 2008). In this study, the poor pregnancy outcome could be attributed to the endemicity of malaria in the region.

Maternal anaemia (haemoglobin <10 g/dl) is one of the most commonly prevalent pregnancy complications, which has been associated with an array of adverse pregnancy outcomes, including preterm birth, restricted fetal growth, and perinatal death (Rasmussen, 2001). A study seeking to find out the relationship between maternal hemoglobin and perinatal outcome showed association of maternal anemia in pregnancy with increased risk of delivery of premature and LBW babies, intrauterine death and low Apgar score at one minute (Bakhtiar *et al*, 2007). Another study by Zhang found out that maternal anemia early in pregnancy is associated with increased risk of preterm PROM and anemia throughout pregnancy is associated with increased risk of spontaneous preterm labor (Zhang, 2008). However, the findings of this study did not show any association between maternal anaemia and poor pregnancy outcome. In consistence with these results, a study by Kusiako did not find an association between maternal anaemia and perinatal mortality (Kusiako, 2000).

Hypertensive disorders, whether pre-existing or arising during pregnancy, may result in uteroplacental insufficiency, decreased blood flow to the uterus, fetal hypoxia and growth retardation (Kieffer, 2003). Pre-eclampsia and eclampsia was significantly associated with poor pregnancy outcomes (p=0.009) on this study. This could be attributed to the complications of these conditions on both the mother and the baby. PIH puts the life of the

mother at risk of eclampsia and also adversely affects the growth, development and survival of the fetus and newborn by causing chronic placental insufficiency leading to chronic fetal hypoxia (Kieffer, 2003). This leads to IUGR, prematurity, stillbirths or neonatal deaths (Parikh, 2007). These findings are consistent with the findings of a study which was evaluating Clinico-social Factors associated with Antepartum and Intrapartum Stillbirths at Kathmandu Medical College Teaching Hospital and the findings indicate that Hypertensive disorders of pregnancy and IUGR were the leading causes of stillbirths (Rayamajhi *et al*, 2009). In another study carried out in a hospital in Saudi Arabia, Pre - Eclampsia was encountered at a high percentage in women at the extreme of their reproductive age (< 20 and >40 years) with regard to being a risk factor for maternal and perinatal outcomes (Al-Mulhim *et al*, 2003). This study, however did not establish the relationship between age and PIH.

Gestational diabetes is associated with large-for-gestational age infants, preeclampsia, preterm delivery, and stillbirth (Miranda, 2009). The fetus of a diabetic mother remains at risk for perinatal asphyxia and the frequency of preterm delivery before 35 weeks gestation (Konar, 2006). Babies born to diabetic mothers are also at risk of hypoglycaemia because they are usually born Large for Gestational Age. The findings of this study are consistent with a study by Addo which showed that maternal and neonatal outcomes which were more significant in the overweight and obese were macrosomia, stillbirth, perineal trauma, post-partum haemorrhage and retained placenta (Addo, 2010). Recent studies of pregnancy in women in the United Kingdom with type 1 diabetes have shown a fourfold to tenfold increased risk of congenital malformation and a fivefold increased risk of perinatal mortality compared with non-diabetic women (Casson, 2002).

In a Prospective study of HIV-infected women by Mehta *et al*, it was found out that anaemia, poor weight gain during pregnancy, and low BMI in HIV-infected pregnant women are associated with increased risks of adverse infant outcomes and MTCT of HIV (Mehta *et al*,

2008). These results are consistent with the findings of this study which found out that HIV was associated with poor pregnancy outcome. This could be attributed to the fact that HIV/AIDS causes poor maternal health by lowering immunity and especially during pregnancy when immunity is compromised. It could also be as a result of opportunistic infections which may be experienced during pregnancy thus the well-being of the fetus is affected. Another study on Pregnancy Outcomes in HIV-Infected and Uninfected Women in Rural and Urban South Africa found out that HIV-infected women are at a significantly increased risk of adverse pregnancy outcomes and Low-birth-weight infants (Rollins, 2007). HIV-infected women are at substantially increased risk of dying (Rollins, 2007).

4.8.5 Obstetric Emergencies affecting pregnancy outcome

Obstetric emergencies significantly affected pregnancy outcome ($p<0.001$). This could be attributed to complications which put the life of the mother or the baby at risk. The FANC guideline recommends that ANC women should be given information on how to recognize danger signs at pregnancy, delivery and thereafter (ROK, 2006). Similar findings were revealed by a study carried out by Nwobodo (2006) on obstetric emergencies as seen in a tertiary health institution in North-Western Nigeria: maternal and fetal outcome showed that obstetric emergencies were responsible for 96.7% and 87% of the maternal and perinatal mortality respectively. From the study, it was found out that most respondents were not aware of obstetric complications which may arise antenatally, during labour or post-delivery. Data from West Africa, Bangladesh, and Guatemala also confirm high perinatal mortality following prolonged labour or malpresentation (Khasakhala, 2003). PPH is one of the leading causes of maternal mortality. From the study, it was one of the leading complication which occurred among the respondents. PPH puts the life of the mother at risk and it leads to maternal mortality if action is not taken immediately (Mills *et al*, 2007). The causes of PPH

are mostly preventable and manageable. In case of a maternal mortality, the life of the baby left by the mother is also at risk and this may lead to neonatal mortality.

4.8.6 Health Facility factors influencing pregnancy outcome

Health worker preparedness to provide EmOC is the most critical element in the provision of quality care, in that they must have the knowledge and skills to recognize an obstetric emergency and then respond appropriately (NCAPD, 2005). The health centre is the first contact point in most rural settings, however it lacks facilities such as an operational theatre or adequate staffing such as a medical doctor thus clients with complications are often referred to bigger health facilities.

The respondents who attended the health centre for services were significantly at risk of adverse pregnancy outcomes as compared to their counter parts who attended the district or sub-district hospital. This could be attributed to poor referral systems which would lead to delays in attaining care. A functioning referral system is generally considered to be a necessary element of successful Safe Motherhood programmes (Murray, 2006).

From the study, longer waiting time before attendance in the health facilities was significantly associated with poor pregnancy outcomes. According to the standards of maternal care in Kenya (MOH/DRH, 2002), every pregnant woman or a woman in the puerperium seeking health care should be attended to by a skilled health care provider within 30 minutes of arriving at the health facility. The delays in providing services could be attributed to inadequate staffing or lack of equipments as evidenced from the key informant interviews. In addition, these delays may also be the causes of poor pregnancy outcomes since the presenting condition may worsen even within a few minutes.

Staff attitude was also significantly associated with adverse pregnancy outcomes (p-value = 0.003). In a situation where the staff are unapproachable, the clients will tend to fear looking for services as they will fear coercion and bad language which may be used to condemn them especially in case of any complication which may arise. This fear in the process will lead to delays which eventually worsen complications thus poor pregnancy outcome. A study by in Calabar teaching hospital, Nigeria had similar results (Asuquo *et al*, 2000). It found out that negative attitudes of hospital staff towards patients stood as a barrier to utilization of available obstetric care. Staff attitude was significantly associated with poor pregnancy outcomes. Another study found out that women sometimes avoid visiting a medical institution because of previous unfriendly treatment or lack of trust (Shaffer *et al*, 2007).

According to WHO, Kenya is one of the 57 countries with acute shortage of health care workers (WHO, 2006). The health workers' shortage has serious repercussions for health care delivery, and impedes attainment of the Millennium Development Goals, especially in low and medium income countries (Stilwell & Evans, 2006). A typical health centre is staffed by: At least one Clinical officer, Nurses, Health administration officer, Medical technologist, Pharmaceutical technologist, Health information officer, Public health officer, Nutritionist, Driver, Housekeeper and Supporting staff (ROK, 2004).

CHAPTER 5: SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter gives a summary of the findings on factors affecting contributing to adverse pregnancy outcome in Keiyo district of Kenya.

5.1 Summary of findings

5.1.1 Socio – demographic characteristics

Study findings show that the study population represented a rural population as evidenced by a majority (77.1%) residing in the rural area. Various socio-economic and demographic factors were associated with poor pregnancy outcomes. Low education level and lack of formal employment evidenced means the women would depend on the spouses or family for decision making and financial support and this may eventually lead to delay in seeking care. On marital status, separation and widowhood contributed to poor pregnancy outcomes indicating the role of partner involvement in reproductive health. Multiparity was associated with poor pregnancy outcome as this may lead to obstetric complications which eventually affect pregnancy outcome.

5.1.2 Antenatal Care Factors

Most women attended ANC however; those who never attended had significant association with poor pregnancy outcomes. Late entry to ANC might have made it difficult to provide FANC. Decision of when ANC should be booked and the type of the facility to be attended was done by both the woman and their partners in some cases. Those who attended the public health facility were likely to get poor pregnancy outcomes, an observation that would indicate the quality of services offered in the facilities. Other parameters including lack of weight taking, VDRL investigation and TT immunization given during the second visit was significantly associated with poor pregnancy outcome indicating that quality ANC would improve pregnancy outcome.

5.1.3 Delivery Factors

The low gestational age evidenced from study findings indicates a risk factor for neonatal survival due to prematurity. Skilled birth attendance was observed however, those assisted by the nurse/midwife were likely to have poor pregnancy outcomes. Some complications such as obstructed labour which arose during labour and delivery called for delivery interventions such caesarean section and assisted vacuum delivery. These were associated with poor pregnancy outcomes since both fetal and maternal health had been compromised. Low birth weight was also an indicator of adverse pregnancy outcome meaning the baby may poorly adapt to the environment. Family planning utilization was hindered by cultural factors and this contributed to poor pregnancy outcome.

5.1.4 Pre-existing conditions, illnesses in pregnancy and obstetric emergencies

Evidently, those with pre-existing medical conditions despite being on treatment depicted adverse pregnancy outcome. Illnesses during pregnancy like malaria and PIH significantly associated with adverse pregnancy outcomes owing to the complications that may arise during the illness. Most of the women were aware of PPH as the only obstetric emergency, indicating a knowledge gap on other obstetric emergencies which would contribute to adverse pregnancy outcome.

5.1.5 Health facility factors

Various MCH services were provided in the health facilities, however at times the clients could not receive the services they required due to poor staffing or lack of equipment. This may be a reflection of the quality of services provided in the health facilities. Good quality care is one which is in line with WHO set standards and meets client needs. The referral system was notably long and not understood by the women especially those at risk, suggesting the weaknesses in this system. Inadequate staffing could explain longer waiting

time in the health facility which contributed significantly to poor pregnancy outcome. Women's rating of staff as good or bad was used to assess the staff attitude which was a factor contributing to adverse pregnancy outcome.

5.2 Conclusion

Adverse pregnancy outcome is a contribution of socio-economic and demographic factors such as low education level, marital separation and divorce and unemployment. It is encouraging to note that a good proportion of women utilized ANC services, however some services were lacking. Other factors which contributed to poor pregnancy outcome were low gestational age at birth, caesarean section and vacuum deliveries, pre – existing medical conditions, illnesses during pregnancy and experience of obstetric emergencies. Though most women sought skilled care attendance at birth, qualitative data indicated delays in seeking care and late referrals as a contributory factor to poor pregnancy outcome. Poor staffing and negative staff attitudes played a role in contributing to adverse pregnancy outcome in the health facilities.

5.3 Recommendations

- Social mobilization of the community on reproductive health issues should be done through health education to enhance proper FANC, FP, BOC and EmOC.
- Women should be educated on factors that may lead to low gestation delivery so as to avoid preterm births.
- The community should be educated on birth preparedness and the importance of having a birth plan to prevent delays in seeking care.
- Health facilities should be well staffed and well equipped in order to avoid adverse pregnancy outcomes which may occur as a result of delays owing to lack of staff or services.

- There is need for concerted effort by all the stakeholders to enlighten the community on the importance of a well defined referral system so as to enable timely referrals.
- Women at risk should be well informed and advised to go directly to the main hospital for services to avoid complications which may arise through the lengthy pattern of referral.

5.4 Further Research

1. There is need to identify the causal factors of perinatal and neonatal mortalities and other poor pregnancy outcomes as this study only identified factors contributing to adverse pregnancy outcomes.
2. There is need to establish how several factors such as women's status in society, their nutritional status at the time of conception, inter-pregnancy interval and child spacing lead to adverse pregnancy outcomes.
3. There is need to establish the role of partner involvement in prevention of adverse pregnancy outcomes.
4. There is need to establish the role of socio – cultural factors such as Female Genital Mutilation (FGM) on pregnancy outcome.

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APPENDIX 2: INFORMED CONSENT

This was read to the respondents before the interview so that their consent was sought.

My name is Joyce Jebet Cheptum. I am a Public Reproductive Health student at Kenyatta University carrying out a study to find out the factors affecting vulnerability of women to adverse pregnancy outcomes among women attending public health facilities in Keiyo district.

I would like to spend 20 minutes to ask you a few questions pertaining your pregnancy and child birth history. Whatever information you provide will be kept strictly confidential, and will not be shown to any other person or used for any other purpose other than for analysis. You are free to stop answering questions at any point if you don't feel like. The findings of this study will help in the management of women who are at risk of experiencing adverse pregnancy outcomes and it will also help in district planning and policy making.

Do you have any questions?

May I ask you questions that relates to the study?

I agree to take part in the above study (Tick) [ ]

Name of Respondent----------

Signature: ---------- Date: ----------

Name of Researcher----------

Signature: ---------- Date: ----------

APPENDIX 3: AUTHORIZATION LETTER FROM MINISTRY OF HIGHER EDUCATION, SCIENCE AND TECHNOLOGY

REPUBLIC OF KENYA

NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telegrams: "SCIENCETECH", Nairobi
Telephone: 254-020-241349, 2213102
254-020-310571, 2213123.
Fax: 254-020-2213215, 318245, 318249
When replying please quote

P.O. Box 30623-00100
NAIROBI-KENYA
Website: www.ncst.go.ke

Our Ref: NCST/RRI/12/1/MED-011/55

Date: 18th May, 2011

Cheptum Joyce Jebet
Kenyatta University
P.O Box 43844
NAIROBI

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on **"Factors affecting vulnerability of women to adverse pregnancy outcomes in public health facilities in Keiyo District, Kenya"** I am pleased to inform you that you have been authorized to undertake research in **Keiyo District** for a period ending ***31st July, 2011.***

You are advised to report to **the District Commissioner and the District Education Officer of Keiyo District** before embarking on the research project.

On completion of the research, you are expected to submit **one hard copy and one soft copy** of the research report/thesis to our office.

P. N. NYAKUNDI
FOR: SECRETARY/CEO

Copy to:

The District Commissioner
Keiyo District

The District Education Officer
Keiyo District

APPENDIX 4: AUTHORIZATION LETTER FROM KEIYO DISTRICT

ITEN DISTRICT HOSPITAL
P.O BOX 332
ITEN.
8TH JULY 2011.

MEDICAL OFFICER OF HEALTH
08 JUL 2011
P. O. Box 332 TEL. 05342240, ITEN

TO WHOM IT MAY CONCERN

RE: AUTHORITY TO CARRY OUT RESEARCH IN KEIYO DISTRICT

JOYCE JEBET CHEPTUM ID NO 20154655

The above named is a student at Kenyatta University pursuing a Masters Degree in public Reproductive Health. She has been given permission by MOH to carry out research in the following facilities:- ITEN DISTRICT HOSPITAL, KAPTERAKWA SDH and CHEPKORIO HC.

Please accord her the necessary cooperation

Thank you in advance

Yours faithfully

JOSEPH K BUNEI MD MPH
FOR DMOH
KEIYO DISTRICT

MEDICAL OFFICER OF HEALTH
08 JUL 2011
P. O. Box 332 TEL. 05342240, ITEN

APPENDIX 5: AUTHORIZATION LETTER FROM KU GRADUATE SCHOOL

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: kubps@yahoo.com
dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

Our Ref: P57/12160/09

Date: 8th April, 2011

The Permanent Secretary,
Ministry of Higher Education, Science & Technology,
P.O. Box 30040,
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION
MS. JOYCE JEBET CHEPTUM - REG. NO. P57/12160/09

I write to introduce Ms. Joyce Jebet Cheptum who is a Postgraduate Student of this University. She is registered for a M.P.H. degree programme in the Department of Public Health in the School of Health Sciences.

Ms. Cheptum intends to conduct research for a Thesis entitled, **"Factors Affecting Vulnerability of Women to Adverse Pregnancy Outcomes in Public Health Facilities in Keiyo District, Kenya".**

Any assistance given will be highly appreciated.

Yours faithfully,

KENYATTA UNIVERSITY
OFFICE OF DEAN
13 APR 2011
GRADUATE SCHOOL
P. O. Box 43844 - 00100, NAIR

JOHN M. ODONGI
FOR: DEAN, GRADUATE SCHOOL

JMO/cww

APPENDIX 6: QUESTIONNAIRE

Code No._____
Facility_____

SOCIO - DEMOGRAPHIC DATA

1. AGE

a) 15-19 b) 20-24 c) 25-29 d) 30-34 e) 35-39 f) 40-44 g) 45-49

2. PARITY----------

3. GESTATION AT BIRTH

a) Below 20 weeks b) 20 – 28 weeks c) 28 – 37 weeks d) above 37 weeks

4. MARITAL STATUS

a) Married b) single c) separated d) widowed e) Others (Specify)

5. AGE AT FIRST BIRTH

a) Below 15 b) 15-19 c) 20-24 d) 25-29 e) 30 and above

6. RESIDENCE

a) Urban b) Rural c) Others (Specify)

7. EDUCATION

a) None b) Primary c) Secondary d) College/University

8. RELIGION

a) Protestant b) Catholic c) Muslim d) Other (Specify)

9. OCCUPATION

a) Unemployed b) Casual job c) Self- employed d) Salaried job

10. Husband/partner's occupation

a) Unemployed b) Self- employed c) Casual job d) Salaried job

11. Type of housing

a) Temporary b) Semi-permanent c) Permanent

12. Ownership of house

a) Own home b) Rental c) Others (Specify)

13. Total monthly family income

a) Less than 1000 Ksh b) 1000 – 5000 Ksh c) 5000 – 10 000 Ksh d) Above 10 000 Ksh

ANTENATAL CARE

14. Did you attend ANC during your recent or current delivery? a) Yes b) No

If Yes, which facility did you attend?

a) Public facility b) Private facility c) TBA d) Others (Specify)

15. Who decided on where you will attend ANC?

a) Self b) Husband/partner c) Friend d) Others (Specify)

16. When did you start attending ANC?

a) First trimester b) Second trimester c) Third trimester

17. Were the ANC profile investigations done? a) Yes b) No

If Yes, Which ones were done? (**Check in ANC card and indicate the parameters)**

a) Haemoglobin level b) Blood group c) VDRL

d) Serology e) Urinalysis

18. What other parameters were observed during your ANC visits?

a) Blood pressure b) Weight c) Height d) Others (Specify)

19. Did you receive Tetanus Toxoid injection? a) Yes b) No

If Yes, When? a) First visit b) Second visit c) Others (Specify)

If No, Why? a) Not available b) Allergic c) Others (Specify)

20. How many times did you receive Tetanus Toxoid? _____

21. Have you ever had a pregnancy that miscarried, aborted or stillbirth?

	YES	NO
Miscarried		
Aborted		
Stillbirth		
Premature		
Neonatal mortality		

DELIVERY

22. What was the mode of recent delivery?

a) Normal Vaginal delivery b) Vacuum delivery c) Caesarean Section

23. Where did you deliver your baby?

a) Hospital b) Health centre c) Home d) Others (Specify)

24. Who assisted you during delivery?

a) Nurse/Midwife b) doctor c) TBA d) Alone e) Others (Specify)

25. If complications, what was the nature?

a) Obstructed labour b) Preterm birth c) Fetal complications d)Others (Specify)

26. What was the outcome of your last delivery?

a) Abortion/ Miscarriage b) Preterm birth c) Live birth

d) Stillbirth e) Neonatal mortality f) Others (Specify)

27. What was the weight of the baby at birth?

a) Below 2500g b) 2500g – 3500g c) 3500g and above

PRE – EXISTING CONDITIONS

28. Did you have any pre-existing medical conditions before pregnancy? a) Yes b) No

If Yes, which ones?

a) Diabetes mellitus b) Hypertension c) Cardiac disease

d) HIV/AIDS e) Others (Specify)

29. Were you on treatment? a) Yes b) No

If yes, for how long? a) Less than one year b) 1 – 5 years c) 5 – 10 years

d) More than 10 years e) Others (specify)

30. Did the pregnancy worsen the condition? a) Yes b) No

If Yes, did the pregnancy have to be terminated? a) Yes b) No

31. Have you had any other illnesses during the recent pregnancy? a) Yes b) No

If Yes, which ones?

a) Malaria b) Anaemia c) PIH d) Others (Specify)

32. Have you ever used any Family Planning methods? a) Yes b) No

If Yes, which ones?

a) Pills b) Injectables c) Implants d) IUCD e) Others (Specify)

If No, why?

a) Cultural factors b) Lack of partner's consent c) fear d) Side effects

e) Unavailable f) Others (Specify)

OBSTETRIC EMERGENCIES

33. Are you aware of any obstetric emergencies? a) Yes b) No

If yes, which ones?

a) APH b) PPH c) Eclampsia

d) Cord prolapse e) Fetal distress f) Others (specify)

34. Did you experience any obstetric emergencies? a) Yes b) No

If yes, which ones?

a) APH b) PPH c) Eclampsia

d) Cord prolapse e) Fetal distress f) Others (specify)

HEALTH FACILITY FACTORS

35. What type of health Facility did you attend?

a) District hospital b) Sub-district hospital c) Health centre

36. What services were you going for?

a) ANC b) Delivery c) FP d) CWC

37. Did you receive all the services you were looking for? a) Yes b) No

If No, why? a) Unavailable b) Lack of staff c) Lack of equipment d) Others (specify)

38. What is the distance from your home to the heath facility?

a) Less than 1KM b) 1 – 5KM c) More than 5KM

39. What do you think of the health facility staff?

a) Extremely good b) Good c) Fair d) Bad e) Extremely bad

40. How long did it take for you to be attended to at the health facility?

a) Less than 30 minutes b) 1 – 2 hours c) More than two hours

APPENDIX 7: KEY INFORMANT INTERVIEW GUIDE

1. How is the staffing in your facility?
2. How many clients do you receive who have had adverse pregnancy outcomes?
3. Are the clients referred early enough before developing complications?
4. What is the state of the clients as they arrive in your facility?
5. What is the state of the referring health facilities?
6. What proportion of women who experience obstetric emergencies are referred to your facility?
7. How equipped are you to handle obstetric emergencies as they arise?
8. In your own opinion what can be done to help women have safe deliveries and minimize adverse pregnancy outcomes in this district at:

a. Community level

b. Facility level?

APPENDIX 8: MILLENIUM DEVELOPMENT GOALS (MDGs) AND TARGETS

1 Eradicate extreme poverty and hunger

(i) Halve, between 1990 and 2015, the proportion of people whose income is less than $1 a day.

(i) Halve, between 1990 and 2015, the proportion of people who suffer from hunger.

2 Achieve universal primary education

(i) Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling.

3 Promote gender equality and empower women

(i) Eliminate gender disparity in primary and secondary education, preferably by 2005, and at all levels of education no later than 2015.

4 Reduce child mortality

(i) Reduce by two thirds, between 1990 and 2015, the under-five mortality rate.

5 Improve maternal health

(i) Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio

- Maternal mortality ratio
- Proportion of births attended by skilled health personnel: Achieve by 2015, universal access to reproductive health
- Contraceptive prevalence rate
- Adolescent birth rate
- Antenatal coverage
- Unmet need for family planning

6 Combat HIV/AIDS, malaria and other diseases

(i) Have halted by 2015 and begun to reverse the spread of HIV/AIDS.

(ii) Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases.

7 Ensure environmental sustainability

(i) Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources.

(ii) Halve, by 2015, the proportion of people without sustainable access to safe drinking- water and basic sanitation.

(iii) Have achieved, by 2020, a significant improvement in the lives of at least 100 million slum dwellers.

8 Develop a global partnership for development

(i) Develop further an open, rule-based, predictable, non-discriminatory trading and financial system (includes a commitment to good governance, development and poverty reduction - both nationally and internationally).

(ii) Address the special needs of the least developed countries (includes tariff-and quota-free access for exports enhanced programme of debt relief for heavily indebted poor countries and cancellation of official bilateral debt, and more generous official development assistance for countries committed to poverty reduction).

(iii) Address the special needs of landlocked countries and small island developing states (through the Programme of Action for the Sustainable Development of Small Island Developing States and the outcome of the twenty-second special session of the General Assembly).

(iv) Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term.

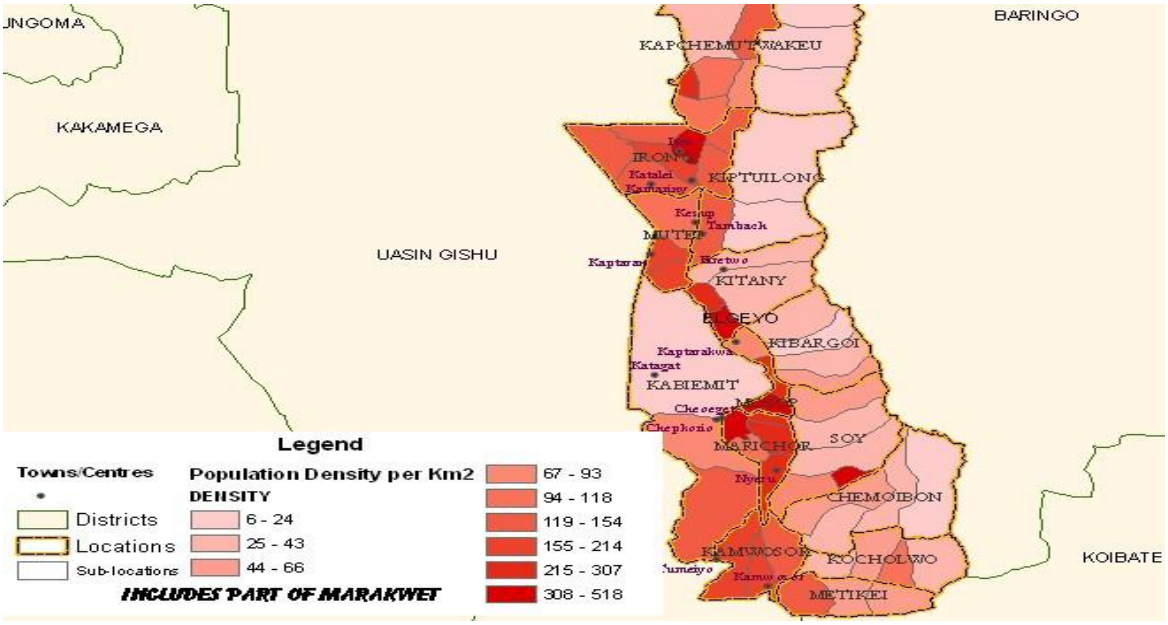
(v) In cooperation with developing countries, develop and implement strategies for decent and productive work for youth.

(vi) In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries.

(vii) In cooperation with the private sector, make available the benefits of new technologies, especially information and communications.

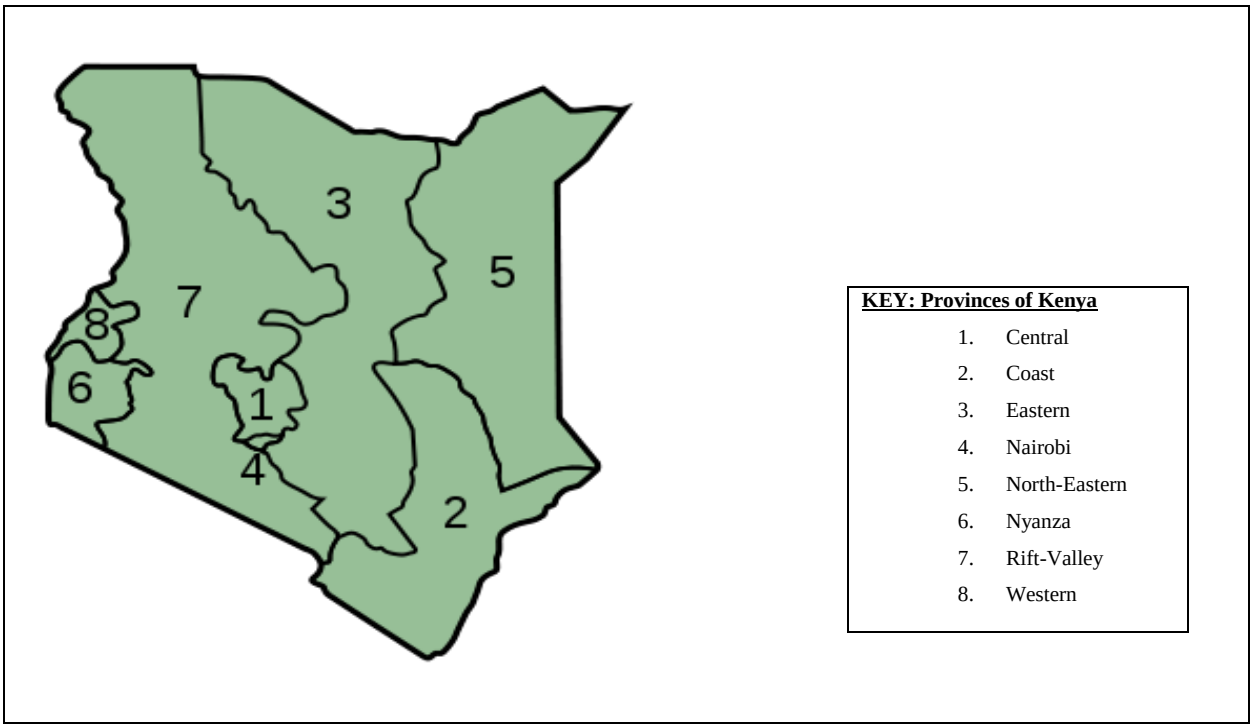
Source: *WHO (2008). Road Map for Accelerating the Attainment of Millennium Development Goals Related to Maternal and Newborn Health in Africa. World Health Organization.*

APPENDIX 10: MAP OF STUDY AREA



Source: *Keiyo District Strategic Plan 2005-2010*

Map of Kenya



Adapted from National Geographic Society