

**DETERMINANTS OF ADVERSE PREGNANCY OUTCOMES AMONG PREGNANT  
WOMEN ATTENDING ANTENATAL CARE IN PUBLIC HEALTH FACILITIES AT  
NYANDO SUB-COUNTY, KISUMU, KENYA**

**BY  
MARY KUIR KUOL**

**A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS  
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(EPIDEMIOLOGY AND POPULATION HEALTH)**

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**MASENO UNIVERSITY**

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**DECLARATION**

This is my original work and has not been presented for an award of a Degree or Diploma in any other university or institution.

**Mary Kuir Kual**

ESM/07091/019

Sign.......... Date 14-05-2024

**Supervisors' Approval**

This proposal has been submitted for examination with our approval as the university supervisors

**Dr. Peter Omemo PhD**

Department of Public Health

Maseno University

Sign..... Date.....

**Dr. Edna Nyang'echi PhD**

Department of Public Health

Maseno University

Sign.......... Date 16-05-2024

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## **DEDICATION**

This dissertation I dedicated it to my Almighty God who have always help me when in needs. To my dear husband Dr. Akech David and our three kids (Ebenezer Deng-wiir, Nightingale Ayen and Sabbata Amuor) for being source of support in every way. To my mother Tabitha Yar and my siblings, Deborah Ngiewei, David Ajang and his wife Deborah Aluong and Daniel Deng for their constants prayers and assurance to complete this task. This is our work family, we did it together.

## ABSTRACT

Globally, more than half a million women die in childbirth. Sub-Saharan Africa accounts for nearly 66% (196,000) of the global maternal deaths. In Kenya, the maternal mortality ratio stands at 355 deaths per 100,000 live births. In Kisumu County maternal mortality rate stands at 495 per 100,000 live births per year. Nyando Sub-County has the second-worst record of adverse pregnancy outcomes. This study intends to establish the determinants of these adverse pregnancy outcomes. Adverse pregnancy outcomes are those pregnancy outcomes other than normal live birth including socio-demographic factors such as the age of the mother, educational level, level of income, and place of residence. Obstetric factors such as the previous history of adverse birth outcome, antepartum hemorrhage, and history of abortion, gestational age, pregnancy interval, obstetric complications, and the number of parities associated with adverse birth outcome. And cultural factors such as Food Taboos, smoking, and Traditional Birth Attendance (TBAs). The broad objective of this study is to assess the determinants of adverse pregnancy outcomes among women attending an antenatal care clinic at public health facilities in Nyando Sub-County Kisumu County, Kenya. Specifically, the study determines the Obstetric factors that influence adverse pregnancy outcomes among women; assess the cultural factors that influence adverse pregnancy outcomes; assess the influence of socio-economic status on adverse pregnancy outcomes: establish the influence of ANC visits on adverse pregnancy outcomes among women attending antenatal care clinic in public health facilities in Nyando sub-county Kisumu County, Kenya. There was an analytical cross-sectional study design conducted in Nyando sub-County. Randomly generated numbers facilitated the selection procedure using Microsoft Excel and were estimated to be 301 participants according to the calculated sample size. Selection based on the lineup in the cue and with special consideration for only those who visited ANC twice or more. An interview was administered to pregnant women who have come for an ANC visit. This study shows 49.7% of adverse pregnancy outcomes. The chi-square test was used to test for significance and risk associated with a determinant of adverse pregnancy outcome. Chi-square analysis showed that <15 years of age was associated with adverse pregnancy outcomes ( $p=0.001$ ) (Table1). Logistic regression analysis was used to establish the influence of the ANC clinic on adverse pregnancy outcomes (Using 3 visits as the reference group, the study did not find any association with the number of visits OR (0.36-1.26),  $p=0.314$ ). Through this research, the community will further realize the important of promoting hospital visits, especially ANC services for para >5 pregnant women to avoid adverse pregnancy outcomes since this finding reveal an association with adverse pregnancy outcomes in this particular group. Results will be disseminated to various health facilities where this research was conducted, Nyando Sub-County Kisumu, and to Maseno university school of graduate studies.

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## **LIST OF ABBREVIATION AND ACRONYMS**

<b>ANC</b>	:	Antenatal Care
<b>APA</b>	:	American psychological association
<b>APO</b>	:	Adverse Pregnancy Outcomes
<b>CDC</b>	:	Centers for Disease Control and Prevention
<b>COVID-19</b>	:	Coronavirus Pandemic
<b>GDM</b>	:	Gestational Diabetes Mellitus
<b>HDP</b>	:	Hypertensive Disorder of Pregnancy
<b>IUFD</b>	:	Intrauterine Fetal Death
<b>KCMCH</b>	:	Kisumu County Maternal and Child Health Report
<b>KDHS</b>	:	Kenya Demographic Health Survey
<b>LBW</b>	:	Low Birth Weight
<b>LCHD</b>	:	Life Course Heart Development
<b>MMEIG</b>	:	Maternal Mortality Inter-Agency Working Group
<b>MOH</b>	:	Ministry of Health
<b>MPDSR</b>	:	Maternal and Postnatal Death Surveillance Response
<b>MMR</b>	:	Maternal Mortality Ratio
<b>NMHR</b>	:	Nyando Maternal Health Report
<b>PIH</b>	:	Pregnancy Induce Hypertension
<b>PNC</b>	:	Postnatal Care
<b>PPH</b>	:	Postpartum Hemorrhage
<b>SDG</b>	:	Sustainable Development Goals
<b>SIDS</b>	:	Sudden Infant Death Syndrome
<b>SPSS</b>	:	Statistical Package for Social Sciences
<b>TBS</b>	:	Traditional Birth Attendant
<b>UNFPA</b>	:	United Nation Population Fund
<b>UNICEF</b>	:	United Nation Children Fund
<b>WHO</b>	:	World Health Organization

## **OPERATIONAL DEFINITION OF THE TERMS**

**Pregnancy:** is the term used to describe the period in which a fetus develops inside a woman's womb or uterus.

**ANC:** Is a period were a pregnant woman is offered appointments with a midwife, or sometimes a doctor who specializes in pregnancy and birth (an obstetrician).

**Pregnancy outcomes:** refer to life events that occur to the newborn infant from the age of viability (28 weeks) to the first week of life.

**Adverse pregnancy outcomes:** are those pregnancy outcomes other than normal live birth which majorly includes preterm birth, stillbirth and low birth weight which are the major cause of neonatal morbidity, mortality and long term physical and psychological problems

**Fetal programming:** also known as pre-natal programming, is the theory that environmental cues experienced during fetal development play a seminal role in determining health trajectories across the lifespan.

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# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of Study

Suitable carefulness throughout pregnancy and birth is significant for the well-being of the mother and child KDHS (2014). Adverse pregnancy outcomes refer to gestation results other than vaginal birth, which include premature birth, miscarriage, and low birth weight, which are main causes of illness, death, and lasting physical and mental problems in children (Yeshialemet, 2017 & Vibal, 2017 ). 2014).

Adverse pregnancy outcomes are a multifaceted health problem that affects both the pregnancy and the baby. Babies with one or more adverse birth outcomes face a higher risk of death and a diversity of health and growing problems. Features such as maternal age, diabetes, miscarriage history, gestational age, anemia, and maternal malnutrition predispose mothers to adverse outcomes (Abadiga et al., 2020). Pregnancy typically takes about 40 weeks, or fair completed 9 months, from conception to birth. Healthcare call the three stages of pregnancy trimesters (Shriver, 2017).

Gestation results vary from pregnancy to pregnancy and include: normal birth, low birth weight, preterm birth, stillbirth, death in utero, premature death (Eyosiyas et al., 2017). Operational factors of adverse pregnancy results include: maternal age (Asiki et al., 2015), education (Kebede et al., 2018), social factors such as income level and residence are associated with worse outcomes (Kent et al., 2013). Obstetric factors such as history of low birth weight, history of prenatal hemorrhage and miscarriage, gestational age, interpregnancy interval, number of births associated with obstetric complications and side effects (Chaibva et al., 2019). According to a study conducted in South Korea, pregnant women with low SES were found to have worse birth outcomes due to inadequate prenatal care (Lee SH et al., 2018), having chronic diseases at the time, and other factors such as high blood pressure. Pregnancy, anemia, lack of nutrition education, lack of care during pregnancy (Hailemichael et al., 2020), substance use (Amaya et al., 2019) and malaria are also affected with negative consequences (Mikomangwa et al., 2019). Other factors associated with poor pregnancy outcomes include maternal obesity, poor parenting, and poor genetics (Aishatu and Sadiq, 2019). According to the SGS 3.1 2030 target, more than 500,000 female deaths due to childbirth worldwide occur in developing countries, with nearly

half of these occurring in sub-Saharan Africa (Statistics South Africa). 2017). The World Health Organization (WHO, 2019) reports that approximately 810 women die every day worldwide due to inadequate protection during pregnancy, childbirth, or the postpartum period.

According to World Health Organization data, more than 295,000 women died during and after pregnancy and birth in 2017. The majority of deaths (94%) occur in low- and middle-income countries such as Kenya. Approximately 66% (196,000) of maternal deaths worldwide occur in sub-Saharan Africa, while South Asia accounts for approximately 20% (58,000). There were 1,222 maternal deaths in South Africa in 2017; this includes 181 deaths in Limpopo, 5 unknowns. Of these, 28 died (South African Department of Health, 2018). Premature birth causes 1 million infant deaths every year, and approximately 15 million babies are born before the 37th week of gestation every year worldwide (World Health Organization, 2018). Most deaths occur in sub-Saharan Africa (Blencowe et al., 2015). Low birth weight (LBW) remains a significant public health problem worldwide, accounting for approximately 15% to 20% of low birth weight worldwide (UNICEF, 2014). The risk factors for these negative outcomes are many (Arsenault, 2018). The virus-19 (COVID-19) pandemic is expected to cause fertility problems all over the world. WHO-China Joint Investigation Team on Novel Coronavirus Pneumonia (2019).

The maternal mortality rate (number of women dying during childbirth) in Kenya is 355 deaths per 100,000 live births. Considering the current number of births occurring each year, this means that approximately 5,000 women and girls die each year due to complications of pregnancy and birth. While access to antenatal care has increased from 62% to nearly 70% over the past seven years, more than 80% of maternal deaths are due to inadequate care (UNFPA, 2021). Nyanza's MMR is above the national average. In Nyanza alone, there are approximately 1,300 to 2,000 deaths per 100,000 births. Kenya has the highest maternal mortality rate at 14.9% and the lowest hospitalization rate at 26% (Nyaberi and Mosinya, 2018)

## **1.2 Statement of the Problem**

SDG 3.1 aims to reduce the global maternal mortality ratio (MMR) to below 70 by 2030 and reduce the number of deaths per 100,000 live births in countries with fewer than 140 parental deaths. Maternal Mortality Inter-Agency Task Force (MMEIG) studies show that Kenya's maternal mortality rate (MMR) decreased from 353 per 100,000 births in 2015 to 342 in 2017. There are high reports of neonatal mortality rate of approximately 19.6 deaths per 1000 live

births and 11.5 low birth weight babies per 100 live births reported in 2018. Although Kenya has met its Sustainable Development Goal death target, the country is still failing. There are large regional differences in maternal and child mortality rates across 47 counties. In Kisumu County, which has a maternal mortality rate of 495 per 100,000 live births, well above the national average, progress has been made since the county received and published the National Guidelines on Maternal and Perinatal Deaths Message Response (MPDSR) in 2016. but prenatal remained high at 361 in 2021 compared to 92 in 2020. Nyando Sub-County has the second-worst record (54.4% cases in 2019 and 90.4% cases in 2020) of adverse pregnancy outcomes in Kisumu County, following Kisumu Central Sub-county as the leading in adverse pregnancy outcomes. However, despite how the nation has improved in skilled birth attendance Nyando is not among the listed counties of Kenya. And Maternal Mortality is off track as per the 2019 report, maternal deaths are increasing. This study aims to identify determinants of adverse pregnancy outcomes.

### **1.3 Justification**

The use of special services for mothers is important for the development of mothers, fetuses and newborns (Riangâa et al., 2018). It is estimated that 90% of maternal deaths during pregnancy can be prevented by timely medical intervention during antenatal care (ANC), emergency child care, abortion, and birth and postpartum care (PNC). For this reason, the World Health Organization (WHO) recommends that at least 4 ANC examinations be performed, postnatal check-ups should be performed within 2 days after birth, all births should be performed under the supervision of doctors, and ANC should be started as soon as the woman gives birth. Use simple interventions to benefit during pregnancy (World Health Organization, 2015). According to the MOH of Kisumu County, Nyando Sub-County has increased cases of poor maternal outcomes reports. And this mark it as the second highest in records (544 cases in 2019, 904 in 2020, and 714 in 2021) of adverse pregnancy outcome in the whole of Kisumu County (KCMCH, 2021), despite how the nation has improved in skilled birth attendance Nyando is not among the listed counties of Kenya. And Maternal Mortality is off track as per the 2019 report (Kenya progress report on Health and Health-related SDGS 2020). There is slight confirmation that the situation will improve in the near future, as the World Health Organization (WHO) and the United Nations Population Fund today set five key targets to help countries recover to reduce and track maternal deaths. Death. Progress towards sustainable development goals. WHO supports quality

services for mothers and newborns, particularly through guidance and support for national staff, and has developed brief guidelines on newborn care, including guidelines for infant and child care and Guidelines for postnatal care (World Health Organization, 2021).

## **1.4 Research Objectives**

### **1.4.1 Broad OBJECTIVE**

To assess determinants of adverse pregnancy outcomes in women visiting antenatal clinic in public health facilities in Nyando sub-county, Kenya

### **1.4.2 Specific Objectives**

- i. To identify obstetric factors affecting adverse pregnancy outcomes in women at the antenatal clinic of Nyando District Public Health Facility, Kisumu.
- ii. Evaluation of cultural influences on adverse pregnancy outcomes in women at the Nyando County Public Health Facility antenatal clinic, Kisumu County, Kenya
- iii. To evaluate the impact of healthcare services on adverse pregnancy outcomes among women attending the antenatal clinic at Nyando County Public Health Facility, Kisumu County, Kenya.
- iv. To evaluate the impact of ANC participation on adverse pregnancy outcomes among women attending the antenatal clinic at Nyando County Public Health Facility, Kisumu County, Kenya.

## **1.5 Research Questions**

- i. What are the reproductive factors that influence adverse pregnancy outcomes among women attending the antenatal clinic at Nyando District Public Health Facility in Kisumu?
- ii. What cultural practices contribute to adverse pregnancy outcomes among women attending the antenatal clinic at Nyando District Public Health Facility in Kisumu?
- iii. How does the health status of women attending the antenatal clinic at Nyando District Public Health Facility in Kisumu influence adverse pregnancy outcomes?
- iv. What is the impact of ANC participation on adverse pregnancy outcomes among women attending the antenatal clinic at Nyando District Public Health Facility in Kisumu?



## **1.6 Significant of Study**

Through this study, the findings are expected to provide real-time information and operational evidence on determinants of adverse pregnancy outcomes faced by pregnant women during their pregnancy journey at Nyando Sub-County Kisumu. Through this research, the community will further realize promoting hospital visits, especially ANC services for pregnant women to avoid adverse pregnancy outcomes. The information derived may be useful to the stakeholders dealing with SDGS 3.1 and to MOH, particularly Nyando Sub-County and Kisumu Counties. With results in hand, health workers will enhance the early uptake of ANC services by implementing policies and strategies for timely initiation to prevent adverse pregnancy outcomes. Furthermore, the analysis presented will act as a tool for future reference and discussion on the determinant of adverse pregnancy outcomes.

## **1.7 Scope of Study**

This study focuses on determinants of adverse pregnancy outcomes. The study was conducted within the health facilities in Nyando Sub County. Prospective respondents for the study were pregnant women.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### 2.1 Obstetric factors affecting adverse pregnancy outcomes in pregnant women

Obstetric factors include: gestational diabetes (GDM), hypertensive disorder of pregnancy (HDP), postpartum hemorrhage (PPH), cesarean section, prematurity and maternal age (<15 and >35 years) (Tamirat et al., 2021).

The World Health Organization reported that newborn deaths worldwide decreased several times in 2016. There are still estimates of 2.7 million infant deaths and 2.6 million stillbirths each year, although there have been about a dozen in the past two years; Many of these are preventable and crucial by providing well-informed, evidence-based interventions before and during pregnancy and during pregnancy and birth duration of protection and days after birth (World Health Organization, 2016). Approximately 84% of new births occur in low- and middle-income countries, including sub-Saharan Africa, where maternal health services are limited. There are also psychological costs of childbearing for women and their families, such as parental stress, economic and financial consequences, stigma, and restrictions (Tamirat et al., 2021). According to studies conducted in Asia, women diagnosed with gestational diabetes (GDM) during pregnancy have been found to be at risk for adverse pregnancy outcomes, such as increased need for caesarean section (caesarean section) delivery, hypertensive disorders of pregnancy. (HDP) and increasing age (Harling et al., 2014).

In sub-Saharan Africa, teenage pregnancy is associated with an increased risk of adverse pregnancy outcomes such as preterm birth, low birth weight (LBW), perinatal death, difficulty in labor, and maternal death (Fernando et al., 2015). Ghailani noted that age is a factor in poor pregnancy outcomes, with older women (35 and older) being associated with increased maternal risk of fertility problems and poor pregnancy outcomes, and some studies showing conflicting results about parenting. Specific influences on age and negative aspects of organizational power (Ghailani and Gowri, 2019).

A study by Ukba A showed that overall adverse pregnancy outcomes were 64.6% and 37.8% for older mothers and older mothers respectively, with a significant difference between the two groups. Studies have shown that women's older age is associated with more adverse pregnancy

outcomes. One of the main findings of this study is the relationship between maternal age and pregnancy-induced hypertension (PIH) (Ukba A and Wolde M, 2020). In a maternal emergency, any delay in finding and receiving child care from qualified personnel increases the risk of birth, infant, or maternal death. In some emergency situations, such as diabetes, even a few hours will determine the life or death of the mother and the fetus (Ehiri et al., 2018).

## **2.2 Cultural Factor that Contributes to Adverse Pregnancy Outcomes**

Cultural factors are identified as, Food Taboos, Smoking, and traditional Birth Attendance (TBAs) according to (Tamirat et al, 2021).

Globally, each year, there were 6 million pregnancies in developed countries, of which 2.2 million result in miscarriage, stillbirth, or termination of pregnancy; approximately 500,000 children were born prematurely; Approximately 120,000 children are born perfect due to age and genetics. , health, nutrition, culture, healthcare, and environmental influences all affect the ability to conceive, carry, and give birth to a healthy child (CDC, 2021). Patriarchy is important in most societies in Sub-Saharan Africa, with men being the main decision-makers, It directly or indirectly affects women's access and use of health services (Aarnio et al., 2018). Conversely, women must endure traditional practices and expectations that lead to poor health (Mkandawire et al., 2018).

Cultural practices have been found to influence decisions in South Africa (Maputle et al., 2015); for example, not telling others the status of the pregnancy or the week of pregnancy because it will result in miscarriage. ? According to tradition, high smoking among young women not only indicates a risk associated with a bad pregnancy, but smoking during pregnancy can lead to serious problems and your baby will be born prematurely, be born prematurely, or die from sudden infant death syndrome (SIDS) (CDC, 2017). In Western Ghana, some pregnant women refuse to eat healthy food because they consider certain foods to be forbidden according to their culture Foods such as eggs, some types of fish, fatty meat and some vegetables are banned by women out of fear Avoid fetal malformations, miscarriages and obese children - ( Midwife) (Joseph Adu, 2020).

In Kenya, culture has been identified as a contributing factor to the decline in fertility in coastal Kenya: More than half (50.5%) of women in the region are said to not have a contract of accession in the first two days of life after birth (Kenya National Population and Development Commission, 2016). This may be related to local laws requiring women to self-isolate for the first forty days after birth to prevent the possibility of "bad looks". Reportedly, while nearly all male participants (97.2%) felt responsible for making decisions about their health, only three-quarters (76%) of female mothers had the ability to do so (Vernon et al., 2020) Among homeborns, beach. The majority of those in the state (36.1%) believe that giving birth in a hospital is not important. Accordingly, the state has the lowest rate of women giving birth at home (32.5 percent) due to health facilities being too far away or lack of transportation. Few people (14.3%) said their home deliveries were affected by financial concerns (Wanje et al., 2020).

### **2.3 Influence of Socio-Economic Status on Adverse Pregnancy Outcomes**

Social variables such as women's education and place of residence have been shown to predict adverse pregnancy outcomes (Kaule-sabiti, Acheampong, & Ngake, 2014); Rahman, 2009; Kulkarni and Nimbalkar, 2008; Baral, Lyons, Skinner, & VanTeijlingen, 2012). Similarly, economic variables such as family wealth have also been found to predict ANC use (Jat, Nag, & Sebastian, 2011). Therefore, these findings show that the use or non-use of products affects the female population socially and economically on the safety of mothers and children during important periods of life, such as pregnancy, pre-pregnancy and poverty during pregnancy. and the financial and psychological effects of low income) harm the mother's physical and mental health, affect the development of the fetus, and increase the risk of adverse pregnancy outcomes such as stillbirth or preterm birth (Cheng et al., 2016). Measures to improve family health and children's health as quickly as possible can help break the cycle of health inequality (Cheng et al., 2016; Sow et al., 2018). Globally, economic inequality affects women, affecting their health and the survival of their children (Marmot M, 2020). Women, especially single mothers, have the greatest inequality in terms of income and health standards and are more likely to live in food-insecure households, another measure of poverty (O'Connell et al., 2018). Pregnant women of lower socioeconomic status are at increased risk for adverse pregnancy outcomes in sub-Saharan Africa. Previous studies have shown that low SES is associated with complications in pregnancy, such as miscarriage, preterm birth, preeclampsia, eclampsia, and gestational diabetes (Kim et al.,

2018 ). During pregnancy, an inadequate diet lacking essential nutrients such as iodine, iron, folate, calcium and zinc can cause anemia, preeclampsia, bleeding and maternal death. They can also cause infertility, low birth weight, weight loss, and growth failure in children. UNICEF (2020) estimates that low birth weight affects more than 20 million newborns each year. Malnutrition during this period can also lead to reactivation of intestinal tissue, which is associated with an increased risk of non-communicable diseases in adults (Danielewicz et al., 2017). Inequality and cultural practices may limit women's ability to make decisions about non-communicable diseases. their food and care. In many countries, women have a diet that does not include fruits, vegetables, dairy products, fish and meat. During this period, malnutrition makes it difficult for mothers to shop for food and meet their additional nutritional needs (UNICEF. 2020). According to Kenya (Chimaraoke 2010), research identifies poor urban women's direct perception of the relationship between poor economic conditions and poor maternal outcomes in Kenya. countries are often affected by poor maternal outcomes. Another study showed that the female mortality rate was 706 deaths per 100,000 people (Ziraba et al., 2009).

#### **2.4 Influence of Antenatal Care Visit on Adverse Pregnancy Outcomes**

Antenatal care (ANC) is an indicator of access to and utilization of healthcare services during pregnancy. The childbearing period provides pregnant women with the opportunity to make a significant impact on the health and well-being of the mother and her child. Receiving at least four prenatal care sessions increases the likelihood of receiving maternal health care during pregnancy. This is one of the lessons of the Monitoring of the Global Strategy on Women, Children and Adolescent Health (2016-2030) and one of the global health indicators of healthcare (SDG indicator 3.8.1) (World Health Organization 2022). Antenatal Care (ANC) is the cornerstone of maternal and child health. The main goal of ANC is to have a healthy mother and a healthy baby at the end of pregnancy. Research has shown that mothers who do not receive effective ANC are at greater risk for low birth weight and that there is a strong correlation between infant death and ANC (Acharya, 2016). The health benefits of ANC for pregnant women and their fetuses are recognized and effective (Tonal et al., 2017).

Worldwide, 86% of pregnant women receive at least one program from a doctor, while only two-thirds (65%) take at least four programs to see a doctor. In regions with the highest maternal mortality rates, such as Sub-Saharan Africa and South Asia, fewer women consulted a doctor at

least four times (52% and 49% respectively) (UNICEF, 2017). According to the 2017 report of the World Health Organization, approximately 810 women die every day due to preventable diseases related to pregnancy and birth. That year alone, approximately 295,000 women died during and after pregnancy, as well as from complications during childbirth. The majority of deaths (94%) occurred in low-lying areas. Sub-Saharan Africa and South Asia account for approximately 86% (254,000) of maternal deaths worldwide. Sub-Saharan Africa alone accounted for two-thirds (196,000) of deaths. South Asia accounts for approximately one fifth (58,000) (World Health Organization, 2018).

In 2017, Kenya experienced a high maternal mortality rate, with 362 deaths per 100,000 live births (KDHS, 2015). A maternal mortality rate of 300 or more per 100,000 births is considered high (Gitonga E, 2017). More than 95% of pregnant women in Kenya receive at least one ANC service from a doctor, and only 58% receive four ANC visits. Worldwide, 64% of pregnant women attending ANC visits who experienced adverse pregnancy outcomes between 2007 and 2014 attended at least four ANC-certified visits, and 78% of births were delivered by participating health professionals (WHO, 2017). Approximately 810 women died every day from contraception and birth control in 2017. That year alone, approximately 295,000 women died during and after pregnancy, as well as from complications during childbirth. The majority of deaths (94%) occurred in low-lying areas. Sub-Saharan Africa and South Asia account for approximately 86% (254,000) of maternal deaths worldwide. Sub-Saharan Africa alone accounted for two-thirds (196,000) of deaths. South Asia accounts for approximately one fifth (58,000). In 2017, Kenya had a high maternal mortality rate, with 362 deaths per 100,000 live births. Maternal deaths of 300 or more per 100,000 births are considered high. Approximately 810 women died every day from contraception and birth control in 2017.

## **2.5 Summary of Literature Review**

In this world, factors such as maternal age, prenatal bleeding, history of miscarriage and adverse events related to gestational age are still important to the public does not have easy access. Although the use of healthcare facilities is limited in China (Muktar et al., 2020), diabetes and maternal malnutrition lead to adverse pregnancy outcomes for the mother and unborn babies. Approximately 3 million third-trimester stillbirths occur each year, and a similar number of children die within 28 days of birth (Hannah et al., 2016). However, the mother's death is not

surprising. In 2017, approximately 295,000 women died during and after pregnancy and childbirth. The majority (94%) of these occur in low-risk settings and most deaths are preventable (World Health Organization, 2019). The burden of negative outcomes is high in Ethiopia (Gedefaw et al., 2020). Each year, approximately 320,000 babies are born before the 37th week of gestation (Vogel et al., 2016). A 2014 study in Ethiopia showed that low fertility was responsible for 27,243 deaths, accounting for 4.53% of all deaths (Bililign, 2018). In Kenya, 56% of infant deaths occur in the first month of life. At the same time, the neonatal mortality rate is 22 deaths per 1000 live births, and the postnatal mortality rate is 16 deaths per 1000 live births. The infant mortality rate is 39 deaths per 1000 live births, and the under-5 mortality rate is 52 deaths per 1000 live births. This means that approximately 1 in 26 children born in Kenya will die before age 1 and 1 in 19 will not survive to age 5 (KDH, 2014).

## **2.6 Theoretical Framework**

Determinants of adverse pregnancy outcomes percentage is investigated using the theoretical framework of Fetal Programming (FP) and Life Course Healthy Development (LCHD). Fetal programming theory, also known as prenatal programming, proposes that environmental cues experienced during pregnancy or fetal development play an important role in determining lifelong health. (Nicoletto et al., 2011).

The three main types of activity resulting from changes in the maternal environment are: Developmental changes that increase the risk of infection; Genetic changes alter the risk of infection; Epigenetic changes that change not only the child's risk of disease, but also the risk of subsequent infection - for example, after starvation, offspring of pregnant women are born smaller than before, during famine, even if there is insufficient food. These changes in the maternal environment may be due to changes in diet, hormonal changes, or exposure to toxins (Fleming and Velazquez, 2012).

British epidemiologist Barker first put forward this theory, called the "Barker hypothesis", which states that changes in this important period will cause some diseases in the child's stomach after birth (Barker DJ, 1998). This critical period coincides with the time when cells differentiate rapidly (Widdowson et al., 1975). The "Barker hypothesis" proposes that many organs and functions are involved in work during embryonic and fetal life, which in turn determines the

composition of the body and the metabolic response to the individual. Therefore, any stimulus or event during the critical period of embryonic and fetal development can cause developmental changes that produce permanent physical and metabolic changes that predispose humans to cardiovascular, metabolic, and endocrine diseases in the elderly (Eun & Young, 2017).

## **2.7 Conceptual Framework**

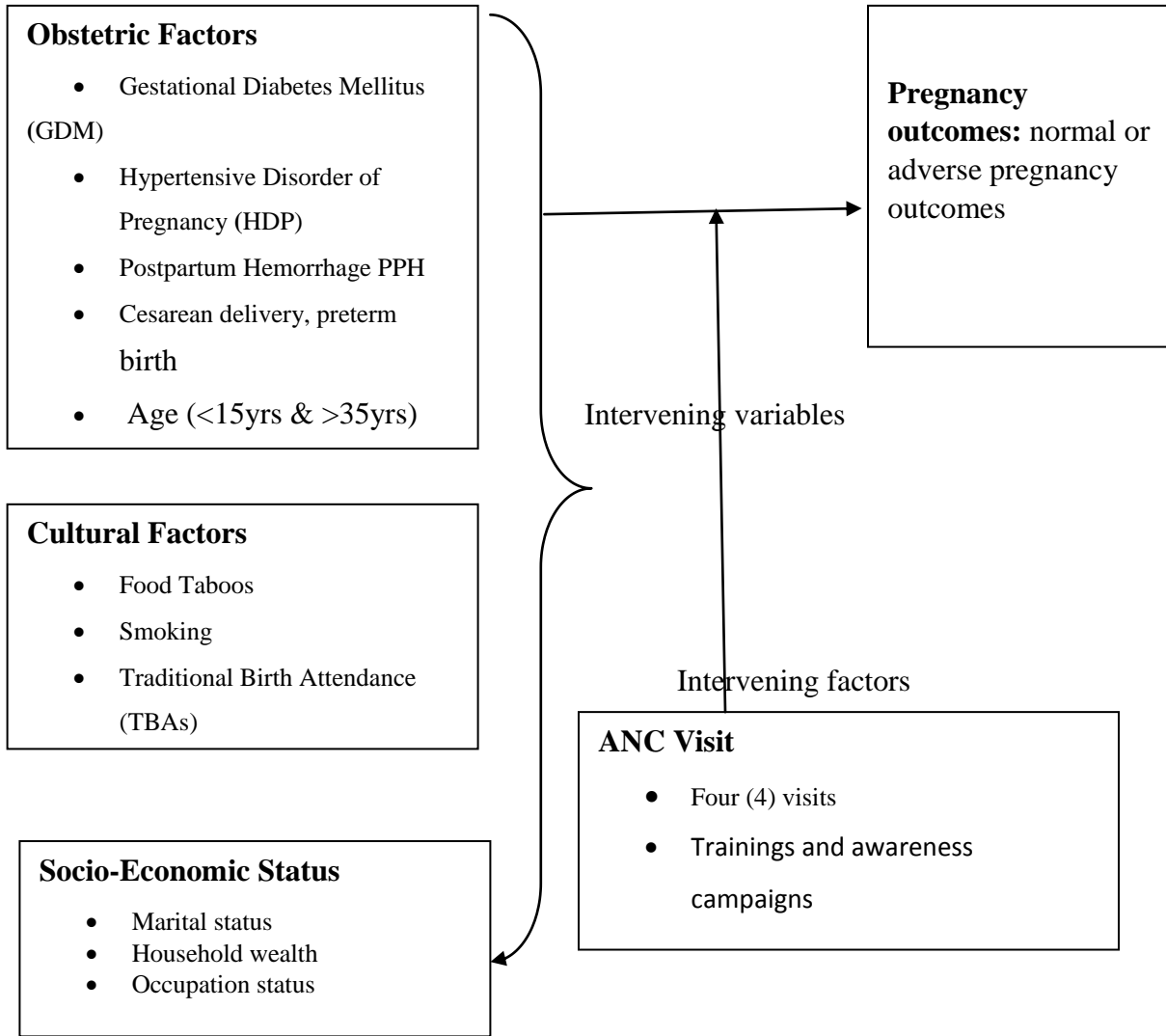
Research by the Canadian Society of Obstetrics and Gynecology Committee suggests that all pregnant women over the age of 35 should be screened for fetal aneuploidy and undergo ultrasound as their offspring are at risk. Good luck with the birth (Mais A 2015). There is an increased incidence of premature birth, preeclampsia, hypertension, gestational diabetes, increased maternal and fetal death, and cesarean section rates among older pregnant women (Usta et al., 2008). Teen pregnancy is associated with the risk of adverse pregnancy outcomes such as preterm birth, low birth weight (LBW), perinatal death, dystocia, and maternal death (Fernando et al., 2015). According to (Zureick-Brown and Chou, 2012), maternal death is considered an important indicator in terms of public health, health and economy. Social culture is recognized as an important factor in maternal mortality in sub-Saharan Africa. While major health factors include illiteracy, poverty, illiteracy, malnutrition and misuse of available maternity services, biological factors such as nutritional practices, religious practices, poor transportation and communication, age and differences are also considered important factors in pregnancy (Igberase and et al., 2009).

Maternal deaths are caused by risks associated with pregnancy and birth and inadequate accessibility and quality of health services (Freedman et al., 2005). The most common causes of maternal death in sub-Saharan Africa include hemorrhage (34%), sepsis/infection (10%), hypertension (9%), HIV/AIDS (6%), and other direct causes (5%); Other indirect causes constitute 17% (Khan et al., 2006). Experience from many countries shows that reducing maternal mortality depends on the availability and use of specialist nurses during labor and birth, as well as on the referral process. Child care or the use of child care for all births is essential to manage problems. fields. (Koblinski et al., 1999). However, in many developed countries, most births occur at home and often without the assistance of a consultant (midwife, or doctor) (AbouZahr & Wardlaw, 2001).



**Independent variables**

**Dependent variables**



**Figure 2.1: Conceptual Architecture: Adapted from Tamira Special et al. 2021**

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1 Study Area**

Nyando District is located between 33° 20' - 35° 20' East Longitude and 0° 20' - 0° 50' South Latitude. Most of the city is rural. The city covers an area of 1168.4 square kilometers. The total population is 161,508 (Kenya National Bureau of Statistics, Kisumu, 2015). There are 15 hospitals and 10 hospitals in the city (KDHS, 2014). The lower part of the Nyando River Basin includes the Nyando, Kadibo, Lower Nyakach, Muhoroni and Miwani subdivisions (Ayayo, 1976). It draws on rivers and their tributaries and covers an area of approximately 3,590 square kilometers. The area has two features: The Kano flood plain and the Nyado River wetlands. Coastal waters provide excellent services and support the livelihoods of many people on the rivers. They provide food, store carbon, regulate water flow, store energy and are important for biodiversity (Obiero et al., 2012).

#### **3.2 Research Design**

This study adopted an analytical cross-sectional research design. It allows researchers to examine and explain the distribution of one or more variables without considering causality or other assumptions (Rakesh and Priya, 2019).

#### **3.3 Target Population**

The target population were mothers who delivered within Nyando hospital and visited public ANC centre once or more. The second group were Health care providers within Nyando Sub-County, working in various public health facilities.

#### **3.4 Population of the Research**

The population of the research consists of mothers who shall visited public health facilities for antenatal care services. The mothers selected from the facilities were those who have gone through the antenatal care program and are likely to have benefited. Our expectation were those mothers to give us useful information because of their experience with antenatal care services at one time or another which they actually did.

### 3.5 Sample size determination

The Yamane formula 1967 applied, as elaborated below.

Formula

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

n = sampling size

N = general population

e = margin error.

Z = Z score corresponding to  $\alpha = 0.05$  level of significance

N= 860 population

$$(e)^2 = 0.5$$

$$n = N / 1 + N (e)^2$$

$$n = 860 / 1 + 860(0.05)^2$$

$$n = \underline{273 \text{ sample size}}$$

An additional 10% of 273 individuals to cater for the non-responses was considered (273+27.3). Therefore, the final sample size was 301 respondents.

### 3.6 Sampling Techniques

This study applied randomly generated numbers which facilitated the selection procedure using Microsoft Excel and was estimated as 301 participants according to the calculated sample size. The reproductive population of Nyando Sub-county is 46,749 that is according to (KDHS, 2014). In a simple random sampling technique, each member was having an equal chance of being selected, selection was based on lineup in the cue and with special consideration of only those who visited ANC twice or more. An interview was administered to pregnant women who have come for an ANC visit. A confidence interval of 0.5 was applied.

### **3.7 Inclusion and Exclusion**

#### **3.7.1: Inclusion Criteria**

- Pregnant women who have visited ANC clinic.
- Pregnant women who consent to participate.

#### **3.7.2 Exclusion Criteria**

- Pregnant Women who were too sick to participate or refused to participate in the research.

### **3.8 Data Collection Procedure**

#### **3.8.1 Questionnaire**

The survey was administered by a researcher and two individuals to pregnant women and healthcare workers at a center in Nyando District, Kisumu, due to the language barrier. With the participation of research assistants, the researchers developed tools to make research recommendations to help conduct a survey of obstetric factors affecting poor pregnancy outcomes in women attending the prenatal clinic at Nyando District Public Health Facility in Kisumu. Cultural reasons aggravating to poor pregnancy outcomes in women visiting Nyando County Public Health Facility in Kisumu, how health economics affects poor pregnancy outcomes of women attending antenatal care facility at Nyando County Public Health Facility in Kisumu and finally what is the impact of ANC participation in Nyando County in Kisumu On adverse pregnancy outcomes in women attending the antenatal clinic at a Public Health Facility.

#### **3.8.2 Interview Schedule**

Interviews was carried out with health practitioners on duty based on the study questions, the researchers followed the sequence of what is written on the paper. There were two participants for the interview (the department in charge and the assistant) at the health facilities of Nyando sub-county Kisumu. It was an oral interview that includes open and close-ended questions for the benefit of a clear informatory view of the finding. This process was carried out by the researcher and the two research assistants, it lasted about lessened 30minutes maximum.

### **3.9 Data Collection Process**

Information was gathered by researcher and 2 assistants that help in administering the questionnaire, due to language barriers (Kiswahili and Lou), the maximum time for the questionnaire was lessened 30 minutes. Each research assistant had a session one on one and in focus group discussion, based on the types of questions written down on the research paper. The tools applied for data collection was questionnaire and interview that lasted over three weeks working days. A questionnaire was administered to Nyando Sub-County Facilities health practitioners, especially those that were on duty, we want through study objectives mentioning how those factors contributed to adverse pregnancy outcomes and what their recommendation will be if something is to be done, while an interview was administered to only the in-charges of both departments pointing out health consequences of study topic and how the finding will be of great help to pregnant women, health practitioner and the communities around. An appointment was done one week before the data collection process commences.

#### **3.9.1 Data Collection per Objectives**

Objective 1: To find out the Obstetric factors that influence poor pregnancy status among women at the Antenatal Hospital at a public health center in Nyando District, Kisumu. To answer this objective, a questionnaire was administered to pregnant women and Health personnel by researchers and 2 assistance due to language barrier.

The selected diagnoses are:

- Gestational diabetes (GDM)
- Hypertensive disorder of pregnancy (HDP)
- Postpartum hemorrhage PPH
- Caesarean section, premature birth
- Age (< 15 years and > 35 years old)

Objective 2: To define the cultural factors that influence poor pregnancy outcomes in pregnant women participating in Antenatal Care at Nyando County Public Health Facility, Kisumu County, Kenya.

This objective was captured through focus group discussions and questionnaires, from pregnant women who attend ANC and the health personnel.

Objective 3: To find out the influence of socio-economic status on poor pregnant women attending the antenatal clinic of Nyando County Public Health Facility, Kisumu County, Kenya. We applied a questionnaire to answer this objective, there was both open and close-ended questions for clarity. Most variables that were attempted are

- Marital status
- Household wealth
- Occupational status
- Religion
- Incomes

Objective 4: To establish the influence of ANC visit on poor pregnancy outcomes in women visiting prenatal clinics at the Public Health Facility of Nyando sub-county. This objective was captured through the interview which target the head of the department with their assistant, and focus group discussion was administered to pregnant women.

### **3.10 Pre-test**

The procedure used in the pre-test is the same as the procedure used in data collection. The article is original and checked by the researcher and supervisors. For this study, 30 respondents representing 10 percent of the sample size of the targeted population were used for the pretesting study. Questionnaires were pre-tested at the selected public health facility (Wanganga Health Centre), which is a Ministry of Health basic health center located in Awasi/Onjiko (Awasi Nairobi Rd. Right Hand Side before Branching to Muhoroni.). Since it is the far-end health center and the most recently innovated public facility in 2021 that serves the deeply located individual of Nyando, we find it wise for the pretest administration.

### **3.11: Validity of Instruments**

For data collection instruments to be considered valid, the content selected and included must be relevant or gap design. Content validity can be improved by using the results of pretests to evaluate whether the study measures what it purports to measure. The data collected during the pre-test was entered, analyzed and interpreted as a result. The instrument was evaluated by competent personnel and their suggestions were taken into account to improve the appearance and content of the data collection instrument.

### **3.12 Reliability of the Instrument**

An instrument is said to measure a variable accurately. It is measurable and reliable in producing the same results over time. To evaluate the reliability of the research instrument, the researcher used the test-retest method, in which the questionnaire is given to 30 participants on two different occasions within two weeks. The reliability of the scale was checked using the test-retest method (Kothari, 2004). The correlation between the two scores was then calculated. A high test-retest correlation was an indication that the scale is more reliable. Internal consistency refers to the extent to which all items that make up a measurement measure the same behavior. Internal consistency will be measured by the Cronbach Alpha coefficient statistic. Minimum agreement for Cronbach Alpha is 0.7.

### **3.13 Data Analysis**

Data was entered using Excel and SPSS version 27 for analysis. Quantitatively, Descriptive applied binary for outcomes variables while, inferential statistics was analyzed using chi-square considering the significance of the confident interval of 95% and P-value < 0.05 through cross-tabulation.

#### **3.13.1 Data Processing and Statistical Analysis**

Objective 1: Quantitatively, Descriptive was analyzed with binary logistic regression and chi-square and use tests to assess significance plus risk Considering the significance of the confident interval of 95% and P-value < 0.05 through cross-tabulation

Objective 2: The outcome and independent variable indicators are binary and the chi-square tests to evaluate significance and risk.

Objective 3: Quantitatively, the outcome and independent variables are binary, and chi-square tests are used to assess significance and risk.

Objective 4: Qualitatively, logistic regression analysis is used to determine the impact of ANC clinics on adverse pregnancy outcomes.

#### **3.13.2 Ethical Approval**

Authorization to conduct the study was attained from Maseno University. Maseno University Scientific and Ethical Review Committee (MUSERC). The research license was requested from National Council for Science, Technology and Innovation (NACOSTI). and seek additional approval from the county Ethics and Review Board of Kisumu county.

### 3.13.3 Ethical Considerations

- ✓ Risk and/or Discomfort:
- ✓ You may feel embarrassed, anxious, or anxious when talking about your social behavior with researchers.  
Benefits: you will get medical education which will be beneficial in the future.
- ✓ Costs to you: there are no costs for being in this study.
- ✓ Confidentiality: Efforts will be made to keep your personal information confidential, by not indicating your name or phone no, the information collected will be kept locked in a cabinet and computer password.
- ✓ Research-related injury: we do not anticipate any research-related injury. There is no program of monetary compensation through this institution.
- ✓ Reimbursement.: You will not be refunded for participating in the study.
- ✓ Partaking is voluntary: before you learn about the study procedures, you must know that you do not have to be in this study if you do not want to join and you may decide not to take part in this study, or pull out from the study at any time without a break.



## CHAPTER FOUR

### RESULTS

#### 4.1 Characteristics of socio demographic of research participants

The proportion of women of the child bearing age in terms of prenatal and postnatal were comparable within the group with regard to pregnancy out come ( $p = 0.083$ ). The research shows that most of the women who visit health centers for their parents aged 16 to 35, 82% Those under 15 years old (17%) following. Finally, a minority of 1.3% are women over 35 years of age. In terms of equality, para 1-2, 3-4 and 5 or more were 75.1% 15.3% and 9.6% respectively. Notably, para 1-2 had the highest number of adverse pregnancy outcome 66.4%

In terms of marital status, 66.8% of the study participants were single while 33.2% were married. Majority 51.2% of single women had adverse pregnancy outcome. Considering family income per household, those whose family income ranged between Ksh 5,000-10,000 were 14% while those whose family income were above Ksh 10,000 were 86%. This analysis shows that majority of the house hold with better or normal obstetric outcome was that with above Kshs. 10,000 (higher) 31.9% The majority of respondents had secondary and higher education, 65.4% and 30.9% respectively. Only 1% are illiterate (Table 4.1).

**Table 4.1: Sociodemographic Characteristics of the Research Participants**

Characteristics	Pregnancy outcome		p value
	Normal n=96	Adverse n=205	
Women of child bearing age			
Prenatal (n=91)	44 (48.3)	47 (51.7)	0.083
Post-natal (n=210)	52 (24.8)	158 (75.2)	
Age			
<15	0 (0)	51(24.9)	0.001
16-35	92 (37.4)	154(62.6)	
>35	4 (100%)	0 (0)	
Parity			
Para 1-2	76(33.6)	150(66.4)	0.001
Para 3-4	16 (34.8%)	30 (65.2)	
Para 5 and above	4 (13.8)	25 (86.2)	
Marital status			
Single	96 (100)	105 (51.2)	0.001
Married	0 (0)	100 (48.8)	
Family income	n (%)	n (%)	
Ksh.5000-10,000	0 (0)	42 (42)	0.001
Above Ksh.10,000	96 (31.9)	163 (54)	
Education			
None	1(1)	2 (1)	0.04
Primary	3 (3.1)	5 (2.4)	
Secondary	71 (74)	126 (61.5)	
Tertiary	21 (21.9)	72 (31.5)	

Data are presented as the n (percentage) values unless stated otherwise. Study participants were categorized into normal pregnancy outcome and adverse pregnancy outcome (with any ant obstetric abnormality such as APH, PPH, eclampsia etc Abbreviations: APH; Antepartum haemorrhage; PPH: postpartum haemorrhage; TBA: Traditional birth attendance.

#### **4.2 Obstetric factors influencing adverse pregnancy outcomes of women in public antenatal care hospitals**

Chi-square analysis showed that <15 years of age was associated with adverse pregnancy outcomes (p=0.001) (Table 1) binary logistic regression demonstrated that pregnant women of age 16-35 were less likely to have adverse pregnancy outcomes [OR = 0.41, 95% CI = 0.260-0.670, p = 0.001]. The regression model further demonstrated that women with higher parity

(para 5 and above) were more expected to experience adverse pregnancy outcomes [OR = 1.316, 95% CI = 0.606-2.990, p = 0.080]. In this case, the odds of negative pregnancy outcomes increased with parity though this was not statistically significant. Majority of the respondents featuring 50.8% had gestation week of above 37 weeks, followed by 21.6% gestation period of 28-37 weeks, then 19.3% gestation 20-28 weeks and finally 8.3%. Therefore, most of the women were above 37 weeks who attended antenatal while minority were below 20 weeks. Majority of women with adverse pregnancy outcome 31.7% were 28-37 weeks of gestation.

**Table 4.2: Obstetric factors influencing adverse pregnancy outcomes of women in public antenatal care hospitals**

Characteristics	Pregnancy outcome		p-value
	OR	95% CI	
Age, (years)			
<15	xxx	xxx	
16-35	0.41	0.26-0.67	0.001 <sup>a</sup>
>35	Ref	-	-
Parity			
Para 1-2	Ref		
Para 3-4	1.053	0.540-2.050	
Para 5 and above	1.316	0.606-2.990	0.080 <sup>a</sup>
Gestation period			
< 20 Weeks	xxx	xxx	
Weeks 20-28	xxx	xxx	
Weeks 28-37	0.114	0.132-0.497	0.001 <sup>a</sup>
Above 37 Weeks	Ref	-	-
Family condition			
APH	Ref	-	-
Diabetes mellites	0.963	0.811-1.312	
Hypertension	0.81	0.661-0.108	0.064 <sup>a</sup>
PPH	xxx	xxx	
Others	xxx	xxx	

Participants (n=301) were grouped based on the obstetric outcome. <sup>a</sup> Statistical significance was determined by the Chi-square ( $\chi^2$ ) analysis. Odds ratios (OR) and 95% confidence intervals (CI) were determined between the groups using binary logistic regression model. Statistically significant was set at  $p < 0.05$ . The reference groups in the regression analysis were age >35-years, parity; para 1-2, gestation period; >35 weeks, Family condition; APH for each obstetric

factor. Abbreviations: APH Antepartum Hemorrhage, PPH Postpartum Hemorrhage, XXX; did not run in the regression model.

### 4.3 Cultural factors influencing the negative outcome of pregnancy in women who go to pre-natal clinics

All of the mothers interviewed in this study (301) do not believe in their own culture; This suggests that culture was not associated with poor fertility in this study. While the majority of respondents seek medicine from hospitals (93%), very few seek medicine from churches (2%) and herbalists (3%). Each participant had different reasons for seeking treatment in different locations, as shown in the table below. 4.3.

**Table 4.3: Where you normally seek medication**

Reasons for seeking medication in hospital	Number (%)
For better service in case of any complication	132(43.8%)
The drugs are available at the hospitals	88(29.2%)
Doctors are competent and can handle me well	81(26.9%)
	301(100%)

**Table 4.4 Cultural factors that influence adverse pregnancy outcomes among women attending antenatal care clinics**

Characteristics	Pregnancy outcome		OR	95% CI	p-value
	Normal n=96	Adverse n=205			
Where medication is sought					
TBA	0(0)	2 (1)	Ref.	-	-
Hospital	93 (96.9)	191(93.2)	1.200	0.73-19.631	
Church	3(3.1)	4(2)	1.127	0.100-12.649	
Herbalist	0 (0)	8(3.9)	0.583	0.050-6.754	0.297 <sup>a</sup>

Participants (n=301) were grouped based on the obstetric outcome. <sup>a</sup> Statistical significance was determined by the Chi-square ( $\chi^2$ ) analysis. Odds ratios (OR) and 95% confidence intervals (CI) were determined between the groups using binary logistic regression model Statistically significant was set at  $p < 0.05$ . The reference group in the regression was TBA; Traditional birth attendance.

#### 4.4 Socio-economic Status on Adverse Pregnancy Outcome in Women Visiting ANC Clinic

With regard to marital status, being single was associated with adverse pregnancy outcome [OR=5.32, 95% CI=03.240-8.760,  $P=0.001$ ]. Using family income of Ksh. 5,000-10,000 as the reference group, in the binary regression model, families whose income were more than Ksh. 10,000 were 4.95 times more likely to have better or normal pregnancy outcome [OR=0.495, 95% CI=3.780-9.900,  $P=0.001$ ]. Education was associated with normal or better pregnancy outcome relative to illiteracy [OR=0.583, 95% CI=0.050-0.675,  $P=0.040$ ] (Table 4.4).

**Table 4.5 Socio-economic status on adverse pregnancy outcomes among women attending antenatal care clinic**

Characteristics	Pregnancy outcome		p value
	OR	95% CI	
Marital status			
Single	Ref	-	<b>0.001<sup>a</sup></b>
Married	5.320	3.24-8.760	
Family income			
Ksh.5000-10,000	Ref	-	-
Above Ksh.10,000	4.95	3.780-9.900	<b>0.001<sup>a</sup></b>
Education			
None	xxx	xxx	-
Primary	1.200	0.73-19.631	<b>0.040<sup>a</sup></b>
Secondary	1.127	0.100-12.649	
Tertiary	Ref	-	

Participants (n=301) were grouped based on the obstetric outcome. <sup>a</sup> Statistical significance was determined by the Chi-square ( $\chi^2$ ) analysis. Odds ratios (OR) and 95% confidence intervals (CI) were determined between the groups using binary logistic regression model. Statistically significant was set at  $p<0.05$ . The reference groups in the regression were single for marital status, Ksh. 5000-10,000 for family income and tertiary for education level.

#### 4.5 The influence of ANC visit on adverse pregnancy outcomes in women attending ANC care clinics

With regard to visit of antenatal care clinic (second trimester), early visit was associated with the better or normal pregnancy outcome using chi square and odds ratio analyses ( $\chi^2=62.17$ ,  $p=0.001$ ) and women attending antenatal as the first visit in the second trimester were 0.2 times less likely to develop adverse outcome as demonstrated by binary logistic regression (Table 4.5).

According to WHO recommendations for appropriate ANC (4 or more visits) 2002 the current study compared the pregnancy outcome of 3 visits versus 4 visits to ANC. Using 3 visits as the reference group, the study did not find any association with the number of visits OR (0.36-1.26),  $p=0.314$ . Uptake of tetanus vaccine was not associated with normal or better pregnancy outcome ( $\chi^2=3.408$ ,  $p= 0.084$ ).

**Table 4.6: ANC visits on pregnancy outcome among women attending antenatal clinic**

Characteristics	Pregnancy outcome		OR	95% CI	p-value
	Normal n=96	Adverse n=205			
First trimester	68 (70.8)	48 (23.4)	Ref	-	-
Second trimester	28 (29.2)	156 (76.1)	0.221	0.142-0.927	0.001 <sup>a</sup>
Third trimester	0 (0)	1 (0.5)	xxx	xxx	
Number of visits					
3 visits	0 (0)	3(1.5)	Ref		
4 visits (All)	96(100)	202 (98.5)	0.39	0.36-1.26	0.314 <sup>a</sup>
Tetanus vaccine					
Vaccinated	2 (1)	203 (99)	Ref	-	0.084 <sup>a</sup>
Not vaccinated	4 (13.8)	92 (95.8)	0.622	0.42-0.95	

Participants (n=301) were grouped based on the obstetric outcome. <sup>a</sup> Statistical significance was determined by the Chi-square ( $\chi^2$ ) analysis. Odds ratios (OR) and 95% confidence intervals (CI) were determined between the groups using binary logistic regression model. Statistically significant was set at  $p<0.05$ . The reference groups in the regression were First visit for start of visit and 3 visits for the number of visits. *Abbreviation: XXX*; did to run in the regression model table

## CHAPTER FIVE

### DISCUSSION

#### **5.1 influence of Obstetric Factors on Pregnant Women Attending Antenatal Clinics**

Adverse obstetric outcome has been over the decades considered a major public health concern (Asefa & Ayele, 2020). Various obstetric factors such as age of the mother, parity, gestation period and chronic conditions among others have been hypothesized to be associated with obstetric outcome. However, data supporting this hypothesis has remained very scarce especially in developing countries. As such, the current study determined the influence of age, parity, gestation period and family chronic condition on the obstetric outcome among pregnant women visiting the antenatal care clinic at the Nyando County Public Health Facility in Kisumu, Kenya. Current findings show the relationship between age of the mother and obstetric outcome. Furthermore, this study demonstrated that women between the ages 16-35 are 0.41 times less likely to have reproductive problems than young women under the age of 15. This finding is consistent with the results of a previous study (Dadras et al., 2020).

This is attributable different extent in development of female reproductive organ relative to age towards child development. Additionally, the age bracket of 16-35 year falls within the active productive age where women actively give birth (Dadras et al., 2020) and within 15-49 years (UN, 2019). This finding corroborates that of Dadras and colleagues which found out that women between the age 25-35 were associated with adequate ANC visits as opposed to women above 35 year who were less likely to have adequate ANC visits (Dadras et al., 2020). This could ultimately impact on the better pregnancy outcome. This finding has been further reinforced by that of a review article by Heazell and colleagues and as well as other studies (Attali & Yogev, 2021; Heazell, Newman, Lean, & Jones, 2018; Ogawa et al., 2017) discovered maternal-fetal issues in women, he added. The risk of disease increases over the age of 35, and these risks increase with age. For example, advanced maternal age has been shown to be associated with preterm birth and other complications (Attali and Yogev, 2021).

In the current study, parity was calculated as the number of newborns a woman delivered (per trimester) or at 24 weeks or more, irrespective of whether the child was viable still birth. Though the results generated was not statistically significant, the present study demonstrated that increase in parity was associated with adverse pregnancy outcome. This was based on specific

prevalence for para1-2, para 3-4 and para 5 and above as 66.4%, 65.2% and 86.2 % relative to those women with normal pregnancy outcome for para1-2, para 3-4 and para 5 and above as 33.6%, 34.8% 13.8% respectively. This is attributed to possible inadequate prenatal care in resource limited settings as in the case of the present study area. This finding supports that of a previous study which determined grand multiparity is a risk factor and associated it with inadequate prenatal care (Farladansky-Gershnel, Levy, & Neiger, 2016). The current finding reinforces that of a study in Nigeria which demonstrated that parity significantly influence adverse pregnancy outcome (Asundep et al., 2014). The above mention study, showed that mothers per 3 or additional kids (tested as continuous variables) were more likely to have poor outcomes compared to women with <3 children ( $p= 0.0112$ ).

Additionally, another study demonstrated that women with higher parity were more likely para1-2, para 3-4 and para 5 and above to experience adverse pregnancy outcome (Dadras et al., 2021). It is unclear how parity affects fertility but has been attributed to placental and maternal age associated with chromosomal abnormalities (Aliyu, Jolly, Ehiri, & Salihu, 2005). Influence of gestational age on pregnancy outcomes was statistically significance as demonstrated in current study finding. Post-term births (after 42 weeks) have been associated with both increased complications in neonatal outcome and increased risk of labour complications, like a difficulty inducing labour or increased likelihood of caesarean section (Yim, Wong, Cabalag, Wallace, & Davies-Tuck, 2017). Optimal term births (37 to 42 weeks) have been associated with normal or better pregnancy outcomes. With reference to Preterm Births (before 37 weeks), multiple pregnancies (twins or more), pregnancies with certain risks such as infection, the mother's health and certain lifestyles are at higher risk. However, in the current study none of the participants has had multiple pregnancies. Based on individual variability, it is imperative to note that each pregnancy is unique, and the gestational period is just one factor. The overall health of the mother, access to prenatal care, lifestyle factors, and genetics also play a substantial role in determining pregnancy outcomes.

The present study equally evaluated chronic condition of the participant's relatives or family member. Lack of association between the conditions evaluated (APH, Diabetes mellites, hypertension and PPH) and adverse pregnancy outcomes because genetic alterations may occur among participants and their relatives. It worth noting that pregnant women with these conditions



(APH, gestational Diabetes, hypertension and PPH) have been associated with adverse pregnancy outcome (Dalfrà et al., 2020; Guedes-Martins, 2017; Ye et al., 2022) hence this may require further explorations.

## **5.2 Cultural Factors Affecting Adverse Pregnancy Outcomes in Women Attending ANC Care Clinics**

(Sychareun V, et al. 2009 & Frese M 2015). With many and varied regional differences, some beliefs, traditions, and religious practices may be beneficial while others may be harmful or have no effect on the health of the mother or child (Chand S. 2016). The World Health Organization (WHO) defines traditional and complementary medicine (TCM) as health systems, methods, knowledge and practices, including plants, animals and minerals; spiritual healing; opinions; and exercise; all of these can be used alone or in combination to treat, diagnose, and prevent diseases or maintain health (Qi Z., Kelley E, 2014-2023). In this study, most of the respondents (93%) sought medicine from the hospital because of better service in case of problems, availability of medicine in the hospital, and doctors being resources, while some respondents sought medicine from the church. Medicines from herbalists are included (2%), (3%), in contrast to a survey in South Africa that said more than 80% of Africans use traditional medicine and often see it as the only health option available, especially in rural areas where many medicines are available. herbal medicine used (Kasilo O.M., Trapsida J.-M, 2010, Lu Y. et al. 2011 & John L.J., Shantakumari N 2015). Herbal use during pregnancy has been reported to vary greatly depending on where you live, race, culture, and socioeconomic status (Illamola SM, et al. 2020).

## **5.3 Influence of Socio-Economic Status on Adverse Pregnancy Outcomes Among Women attending ANC Care Clinic**

This study demonstrated that socio-economic factor influence pregnancy outcome. According to this study, married women were 3.24 times more likely to have normal or better pregnancy outcome. This finding is attributable to financial and emotional support that the husband could provide to the spouse during pregnancy. Besides, child bearing is considered a blessing and during gestation period, there is a lot of anxiety from both spouses that comes with parenting after marriage in African tradition. This finding supports those of a previous study which showed that marital status is associated with better pregnancy outcome (Lurie, Zalmanovitch, Golan, & Sadan, 2010). However, this current finding opposes that of a previous retrospective

case-control study that did not find any difference in the pregnancy outcome between the married and unmarried women (Lurie et al., 2010).

With regards to family income, the current study demonstrated that family income is associated with better or normal pregnancy outcomes.

Regarding family income, current research shows that family income is associated with better or normal fertility. This finding supports previous research showing that family income is a better predictor of access to quality and appropriate healthcare (World Health Organization, 2019). The current findings confirm Singh and colleagues' hypothesis and inform healthcare decision-making in the United States (Singh et al., 2017).

In evaluating the effect of education on pregnancy outcome, the current study found out the education significantly affect the pregnancy outcome. This finding is attributable to knowledge possessed by women of different levels of education such as primary, secondary and tertiary education based on the Kenyan 844 system. This knowledge has been shown to be beneficial in understanding the need of proper antenatal care such as ANC visits which has profound effect on pregnancy outcome (Dadras et al., 2020). Additionally, education is seen as one of the most important determinants of access to health services (World Health Organization, 2019). Many studies conducted in both developed and developing countries have shown that people with education from upper social classes are more likely to receive adequate and quality healthcare (Singh et al., 2017). The same results have been reported amongst migrants (Babu, Swain, Mishra, & Kar, 2010; Kusuma, Kumari, & Kaushal, 2013). Advanced learning is also associated with increased chances of obtaining high-paying jobs and therefore high incomes, not only in Kenya but also in other parts of the world (World Health Organization, 2019). Finally, previous studies have also shown that mothers are willing to participate in their children's health and have good knowledge about the importance of prenatal care (Akowuah, Agyei-Baffour, & Awunyo-Vitor, 2018).

#### **5.4 Influence of ANC Visits on Adverse Pregnancy Outcomes**

In women attending antenatal clinics for services and interventions important to maternal and infant health (Aliyu et al., 2005).With regards to start of ANC visits, the current study demonstrated trimester of the first visit is associated with pregnancy outcome. According to the current study, majority of pregnant would prefer to begin their ANC visits in the initial trimester

rather than the subsequent trimesters. Women who visited ANC in the second trimester were 0.2 times less likely to have adverse pregnancy outcomes. This is plausible due to good antenatal care services provided at this early stage of pregnancy. These services may include iron and folic acid supplementation (IFAS), malaria screening and provision of malaria prophylaxis, detection and management of hypertension, and treatment of any possible infection that the mother might have.

In this study, 3 ANC visits were associated with adverse pregnancy outcome since none of the participants had less than 3 ANC visits. The research did not report any suggestion between 3 ANC visits and adverse pregnancy outcomes. This study did not report any association between 3 ANC visits and adverse pregnancy outcome. This could be because the current study did not control for gestation period between the 3 and 4 ANC visits and other factors related to ANC visits. Elsewhere, adequate ANC visits may vary from 8-13 which have been shown to be associated with better pregnancy outcome (Asundep et al., 2014). A survey among Afghan women in Iran where ANC visit <8 was considered to be poor; it was demonstrated that poor ANC visits could adversely impact the pregnancy outcome (Dadras et al., 2021). Whereas ANC participation is a predictor of pregnancy outcomes, it might not reproduce actual services received during pregnancy, which may require further investigation.

**CHAPTER SIX**  
**SUMMARY OF THE STUDY, LIMITATIONS, COMMENTS AND**  
**RECOMMENDATIONS**

**6.1 Summary of the Study**

The research shows that the majority of people interviewed in this study visit health centers for maternal health services. 81.7% (246/301) were between the ages of 16 and 35, followed by those under 15 with 17% (51/301). Finally, a minority of 1.3% (4/301) were women over 35 years of age. In terms of parity, the rates of expressions 1-2, 3-4 and above are 75.1% (226/301), 15.3% (46/301) and 9.6% (29/301), respectively. 1-2 of these departments had the highest pregnancy outcomes at 66.4% (150/205).

Therefore, most of the women were above 37 weeks who attended ANC while minority were below 20 weeks. Majority of women with adverse pregnancy outcome 65/205 (31.7%) were 28-37 weeks of gestation. Hospital was identified to be the health facility visited by most pregnant women 284/301 (94.4%) followed by herbal facility from herbalists 8/301 (2.7%). Great number of the respondents had secondary and higher education; 197/301 (65.4%) and 93/301 (30.9%), respectively. Only 3/301 (1%) were illiterate (Table 4.1). In terms of marital status, 66.8% (201/301) of the study participants were single while 33.2% (100/301) were married. Majority of single women 51.2% (105/205) had adverse pregnancy outcome.

Considering family income per household, those whose family income ranged between Ksh 5,000-10,000 were 14% (42/301) while those whose family income were above Ksh 10,000 were 86% (256/301). This analysis shows that majority of the house hold with better or normal obstetric outcome was that with above Kshs. 10,000 (higher) 31.9%. According to current research, most pregnant women prefer to begin their ANC visits in the initial trimester rather than the subsequent trimesters. Women who visited ANC in the second trimester were 0.2 times less likely to have adverse pregnancy outcomes.

## **6.2 Limitations**

This study had some shortcomings which should be considered while interpreting these results. The study it did not assess some factors such as spousal violence, which have been hypothesised to influence birth outcomes. The study design of the current study limits the interpretation of the relationship between relationships. Some of the data collected is recovery-based and can therefore be returned impartially. In the statistical analysis, the studies were not adjusted for all possible confounding factors, such as environmental and genetic factors. Due to few numbers of women without adverse pregnancy outcome (96) strength of association for some independent variables could not be determined as they could not run in the regression model.

## **6.3 Conclusion**

The results of this study show the relationship between maternal age and obstetric outcomes. Additionally, this study showed that women between the ages of 16 and 35 were 0.41 times less likely to have reproductive problems than young women under the age of 15. This finding is consistent with the results of a previous study (Dadras et al., 2020). Women over the age of 35 are at high risk for maternal and fetal complications, and these risks increase with increasing age. Conversely, maternal adolescent age has been found to be associated with preterm births among other complications (Attali & Yogev, 2021).

the present study demonstrated that increase in parity was associated with adverse pregnancy outcome. This was based on specific prevalence for para1-2, para 3-4 and para 5 and above as 66.4%, 65.2% and 86.2 % relative to those women with normal pregnancy outcome for para1-2, para 3-4 and para 5 and above as 33.6%, 34.8% 13.8% respectively. This is because child care may not be adequate in limited areas, such as in this study area. According to research, married women are 3.24 times to have better pregnancy outcome. This finding is attributable to financial and emotional support that the husband could provide to the spouse during pregnancy. Besides, child bearing is considered a blessing and during gestation period, there is a lot of anxiety from both spouses that comes with parenting after marriage in African tradition. With regards to family income, the current study demonstrated that family income is associated with better or normal pregnancy outcomes. This finding supports that of a prior study that demonstrated that income in an household is one of the better determinants to access to quality and adequate healthcare (WHO, 2019). In evaluating the effect of education on

pregnancy outcome, the current study found out the education significantly affect the pregnancy outcome. This finding is attributable to knowledge possessed by women of different levels of education such as primary, secondary and tertiary education based on the Kenyan 844 system. This knowledge has been shown to be beneficial in understanding the need of proper antenatal care such as ANC visits which has profound effect on pregnancy outcome (Dadras et al., 2020).

According to the current study, majority of pregnant would prefer to start visiting the ANC in the first trimester as opposed to second and third trimester. Women attending ANC visit in the second trimester were 0.2 times less likely to develop adverse pregnancy outcome. According to current research, most pregnant women prefer to begin their ANC visits early in pregnancy rather than in the second and third trimesters. Women who visited ANC in the second trimester were 0.2 times less likely to have adverse pregnancy outcomes.

#### **6.4 Recommendations**

- i. How family obstetric factors a risk of adverse pregnancy outcomes
- ii. To find out how grand parity affect birth outcomes
- iii. Relationship between economic disadvantage and poor maternal outcomes
- iv. Relationship between ANC services (iron and folic acid supplement) and adverse pregnancy outcomes.

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## APPENDICES

### APPENDIX I: Consent form

**Dear respondents,**

My name is Mary Kuir, a student at Maseno University, study master's in public health, this procedure is for studies purpose and its one of the requirements for the award of the degree am undertaking research on, **Determinants of Adverse Pregnancy Outcomes among Women Attending Antenatal Care Clinic in Public Health Facility at Nyando Sub-County, Kisumu Kenya**. The study will be treated with confidentiality and no one will get excess to it except my supervisors that will help me in data analysis, the procedures will be comparing of questions and recorded transcript to help in easy data entering and analysis.

I want to stress that your participation in this study is absolutely voluntary and you can decide to or not to participate or withdraw anytime without any negative repercussion, and by accepting to participate will need you to spare a few minutes of your time to respond to these questions which will be of great benefits on the academic purpose and to the government by making correct decision about individual and the whole country health outcomes.

I have consent form for your review. Please read the form and feel free to ask me any question about the study, it will be of great honor to answer any of your concerns and questions. And if you agree to participate, please sign, initial and indicate the date.

Thanks

Yours sincerely,

Mary Kuir Kual

Masters Student, Maseno University.

Email: marykuir.malual@gmail.com

## APPENDIX II: MASENO UNIVERSITY ETHIC CONSIDERATION



### MASENO UNIVERSITY SCIENTIFIC AND ETHICS REVIEW COMMITTEE

Tel: +254 057 351 522 Ext: 3050  
Fax: +254 057 351 221

Private Bag – 40103, Maseno, Kenya  
Email: muserc-secretariate@maseno.ac.ke

REF: MSU/DRPI/MUSERC/01241/23

Date: 1<sup>st</sup> August, 2023

TO: Mary Kuir Kuoil Malual  
ESM/0/001/019  
Department of Public Health  
School of Public Health and Community Development  
Maseno University  
P. O. Box, Private Bag, Maseno, Kenya

Dear Madam,

**RE: Determinants of Adverse Pregnancy outcomes among Women attending Antenatal Care-Clinic in Public Health Facilities in Nyando Sub-County**

This is to inform you that Maseno University Scientific and Ethics Review Committee (MUSERC) has reviewed and approved your above research proposal. Your application approval number is MUSERC/01241/23. The approval period is 1<sup>st</sup> August, 2023 – 31<sup>st</sup> July, 2024.

This approval is subject to compliance with the following requirements:

- i. Only approved documents including (informed consents, study instruments, MTA) will be used.
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by Maseno University Scientific and Ethics Review Committee (MUSERC).
- iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to Maseno University Scientific and Ethics Review Committee (MUSERC) within 24 hours of notification.
- iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to Maseno University Scientific and Ethics Review Committee (MUSERC) within 24 hours.
- v. Clearance for export of biological specimens must be obtained from relevant institutions.
- vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
- vii. Submission of an executive summary report within 30 days upon completion of the study to Maseno University Scientific and Ethics Review Committee (MUSERC).

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

Yours sincerely


Prof. Philip O. Oduor, PhD, FAAS, FKNAS  
Chairman, MUSERC




MASENO UNIVERSITY IS ISO 9001 CERTIFIED




# APPENDIX III: NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

  
REPUBLIC OF KENYA

  
**NATIONAL COMMISSION FOR  
SCIENCE, TECHNOLOGY & INNOVATION**

Ref No: **728256** Date of Issue: **23/August/2023**


**RESEARCH LICENSE**




**This is to Certify that Ms. Mary Kuir Kuir of Maseno University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kisumu on the topic: Determinants of Adverse Pregnancy Outcomes among Women Attending Antenatal Care Clinics in Public Health Facilities in Nyando Sub-County, Kisumu Kenya for the period ending : 23/August/2024.**

License No: **NACOSTI/P/23/28619**

728256  
**Applicant Identification Number**

  
**Director General  
NATIONAL COMMISSION FOR  
SCIENCE, TECHNOLOGY &  
INNOVATION**

**Verification QR Code**



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

**See overleaf for conditions**

## **APPENDIX I V: QUESTIONNAIRE**

### **SECTION I. Socio demographic characteristic**

#### **1.1.Age**

- a) <15 year [ ]
- b) 16 – 35years [ ]
- c) >35 years [ ]

#### **1.2.Sex**

- a) Male ( )
- b) Female ( )

#### **1.3.Education**

- a) Elementary ( )
- b) Secondary school ( )
- c) Tertiary ( )

#### **1.4.Religion**

- a) Which religion do you belong? .....

#### **1.5.Marital status**

- b) Single ( )
- c) Married ( )
- d) Divorce ( )
- e) Widow ( )

#### **1.6.Income**

- a) <5000 ( )
- b) 5,000 – 10,000 ( )
- c) 10,000 – 15,000 ( )
- d) 15,000 – 20,000 ( )
- e) 20,000 – 25,000 ( )

### **SECTION II: Obstetric factors information**

1.1. Have any of your family members had the following diseases

1.2. Gestational Diabetes Mellitus

- a) YES [ ]
- b) NO [ ]

1.3. Hypertensive Disorder of Pregnancy

- a) YES [ ]
- b) NO [ ]

1.4. Postpartum Hemorrhage

- a) YES [ ]
- b) NO [ ]

1.4.1. Have you ever had any of the above mentioned diseases?

- a) YES [ ]
- b) NO [ ]

1.5. Any history of twins in your family

- a) Yes [ ]
- b) No [ ]

1.6 Have you ever had any of the below

- a) Pre-term birth [ ]
- b) Still birth [ ]
- c) Low birth weight [ ]
- d) Abortion [ ]

**SECTION III: Cultural factors information**

1.1. Are there special foods for pregnant women in your society?.....  
.....

1.2. Do you smoke?

- a) YES [ ]
- b) NO [ ]

1.3. Whom do you prefer to conduct your deliveries?

- a) TBAs? [ ]
- b) Skilled Health practitioners? [ ]

1.4. Where do you prefer to give birth?

- a) Your house [ ]
- b) Health facility [ ]

1.5. Do you think there are food that harm the unborn baby?

- a) YES [ ]
- b) NO [ ]

If YES, please

explain.....  
.....

1.6. Do you drink alcohol?

- a) Yes [ ]
- b) No [ ]

1.7. Does anyone have to tell you when and when not to go hospital?

- a) Yes [ ]
- b) No [ ]

1.8. Who is to decide the number of children you suppose to have in the household?

- a) My husband [ ]
- b) Myself [ ]
- c) Both of you [ ]

**SECTION IV. Socio-economic information**

**1.1. Residential**

- a) Rental [ ]
- b) Husband/boyfriend [ ]
- c) parents [ ]

## 1.2. Household Incomes

1. What is your total household income per month in KEH?

- a) < 5,000 [ ]
- b) 5,000 – 20,000 [ ]
- c) 20,000 – 40,000 [ ]
- d) 40,000 – 60,000 [ ]
- e) 60,000 – 80,000 [ ]
- f) 80,000 – 100,000 [ ]
- g) >100,000 [ ]

2. Do you have income from any sources other than salary?

- a) YES [ ]
- b) NO [ ]

3. List all sources of your income?

.....  
.....

## 1.3. Occupational Status

1. What is your highest level of education?

- a) No Education [ ]
- b) Elementary school [ ]
- c) Primary school [ ]
- d) Secondary school [ ]
- e) Tertiary school [ ]

2. Are you working?

- a) YES [ ]
- b) NO [ ]

3. Are you a professional personnel?

- a) YES [ ]

b) NO [ ]

**SECTION V. Antenatal care visit information**

1.1. Have you ever heard of ANC?

a) YES [ ]

b) NO [ ]

1.2. How many ANC visit do you know?

a) 1<sup>st</sup> [ ]

b) 2<sup>nd</sup> [ ]

c) 3<sup>rd</sup> [ ]

d) 4<sup>th</sup> [ ]

e) All the above [ ]

f) None [ ]

1.3. How many ANC visit have you ever had?

a) 1<sup>st</sup> [ ]

b) 2<sup>nd</sup> [ ]

c) 3<sup>rd</sup> [ ]

d) 4<sup>th</sup> [ ]

e) None [ ]

**SECTION VI. Focus group discussion**

I. Why do pregnant women have to come to hospital?.....  
.....

II. Has anyone ever heard of an Obstetrics conditions and what the are?.....  
.....

III. Does age matter in pregnancy, if yes why?.....  
.....

.....  
.....

IV. How important is community decision to a pregnant woman?.....  
.....

V. Do you agree with what the community say about your ANC visit and hospital deliveries?.....  
.....

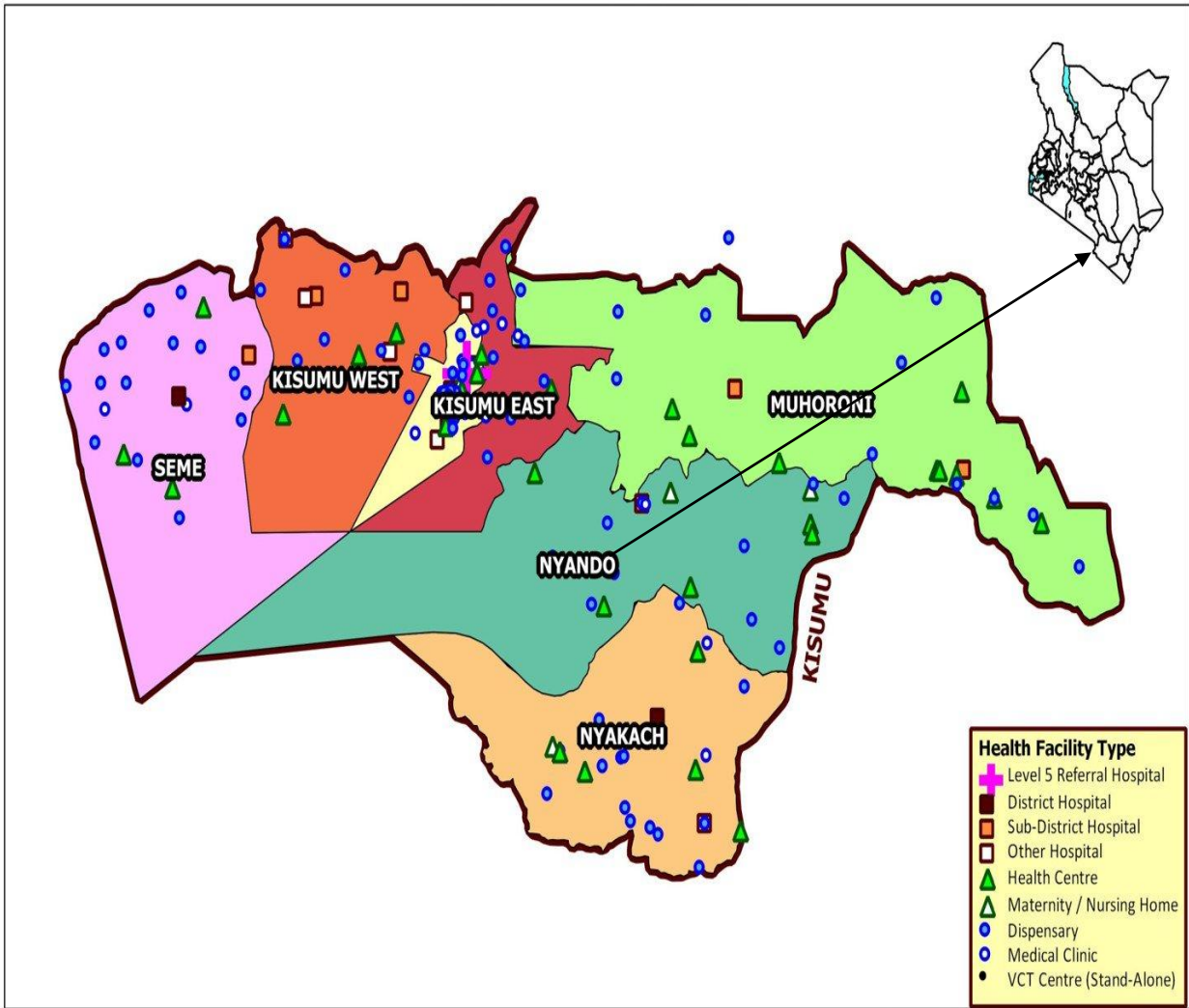
VI. How important is it, being educated and not educated?.....  
.....

VII. How does income determine safe delivering?.....  
.....  
.....

Does it make any difference with adverse pregnancy outcomes, being a single mother or married, why?.....  
.....

**APPENDIX V: Map of Nyando sub-county Kisumu, Kenya**

**County Health Facility Distribution by Type  
COUNTY OF KISUMU**



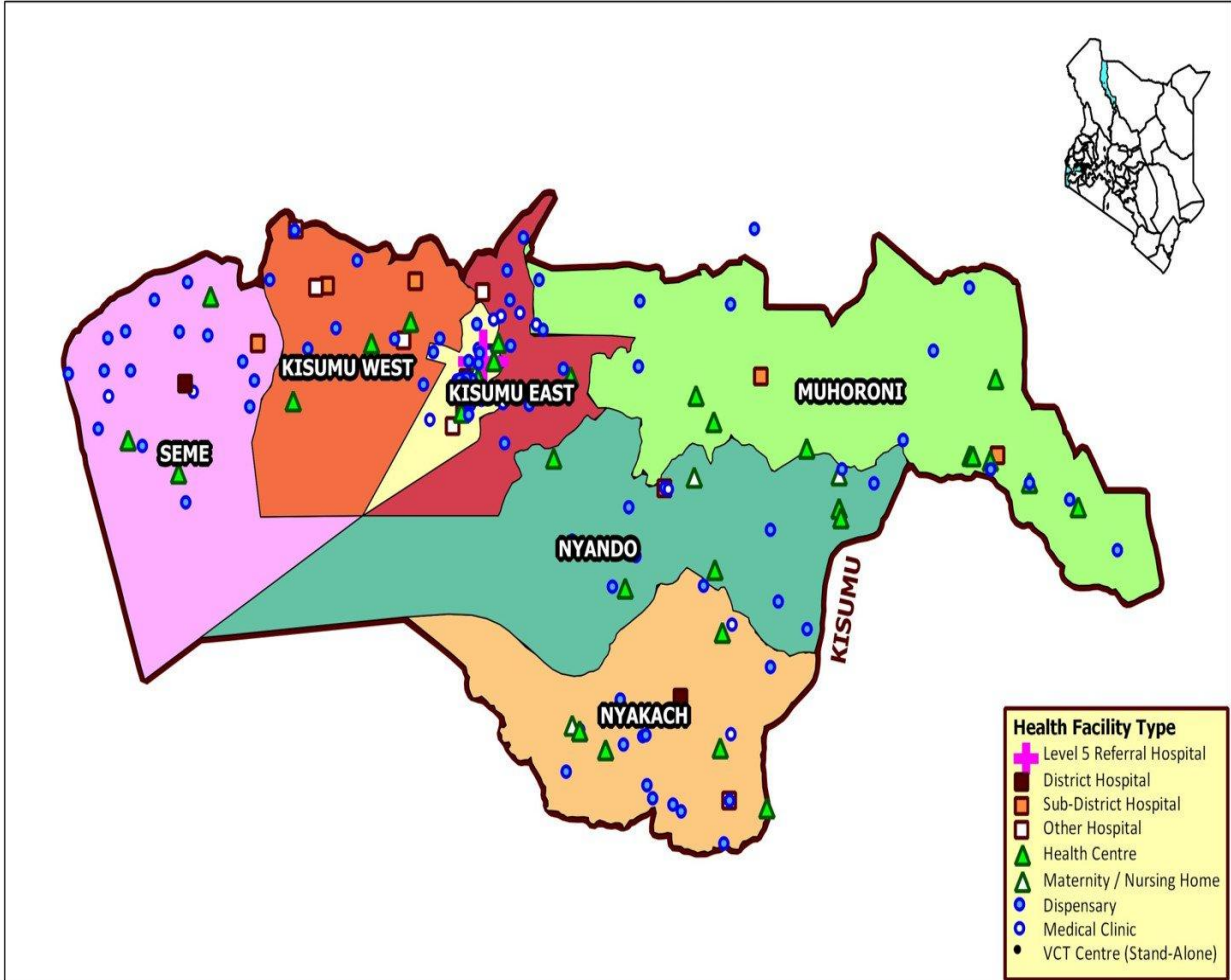
SOURCE: MASTER FACILITY LIST (MFL) [www.ehealth.go.ke](http://www.ehealth.go.ke)

Prepared by USAID AfyaInfo Project (c) 2013



APPENDIX VI: Map of Nyando District. (USAID, 2018)

County Health Facility Distribution by Type  
**COUNTY OF KISUMU**



SOURCE: MASTER FACILITY LIST (MFL) [www.ehealth.go.ke](http://www.ehealth.go.ke)

Prepared by USAID AfvaInfo Project (c) 2013