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Investigating Access to Maternal Health Services for Kenyan Women Based on Place of Residence: Nairobi and Eastern Kenya

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B.S, Biology
B.A, International Studies
University of Florida
2021

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An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health
in Global Health
2023

Abstract

Investigating Access to Maternal Health Services for Kenyan Women Based on Place of Residence: Nairobi and Eastern Kenya

By Jenny Fleuristal

Background: According to the World Health Organization, everyday approximately 800 women and girls die globally from preventable pregnancy-related complications and about 99% of all maternal deaths occur in developing nations. The large disparity concerning maternal health between developing and developed nations is indicated by the WHO's calculated maternal mortality ratio (developing countries ratio: 240 per 100,000 births; developed countries: 16 per 100,000 births). In Kenya, the lack of accessible maternal health services for women is a critical problem. In addition, women's regional positionality plays an important role in their ability to access basic health services. Kenyan women who live in remote/rural communities have less access to adequate maternal care; hence, they are less likely to receive the four recommended ANC visits while pregnant, more likely to be unassisted by a skilled professional during childbirth, and less likely to give birth in a health facility.

Objective: To investigate the influence of place of residence, particularly Nairobi and Eastern Kenya, on women's access to maternal services such as antenatal care, assistance during childbirth, and place of delivery.

Methods: The conceptual framework for this analysis was based on Kroeger's revised version of Anderson's healthcare utilization model. Data were drawn from the 2014 Kenya Demographic and Health Survey (KDHS), representing 36,430 household participants consisting of 31,079 women between 15-49 years old who have had live births five years before the study. Simple regression models and chi-square tests were fitted to analyze factors associated with maternal health service access using three main indicators: antenatal care, assistance during childbirth, and place of delivery.

Results: The assessment reveals that there is a significant difference between women residing in Nairobi versus Eastern Kenya in access to certain maternal services. 42% of women in received less than the 4 minimum antenatal care visits required by the WHO. Additionally, about 33% of the respondents reported having given birth in a government hospital and ~34% reported to have given birth in their homes. Lastly, a large majority of women were assisted during childbirth by a nurse/midwife, doctor, or traditional birth person. All reported value was compared with $(\alpha = 0.05)$ to determine statistical significance.

Conclusion: The analysis provided evidence that women's access to adequate and recommended maternal health services is dependent on regional positionality of women. It further supported Kroeger's argument that health systems in addition to predisposing characteristics such as age, sex, birth order marital status, ethnic group, education, occupation, assets, and household size may impact health outcomes.

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Table of Contents

Chapter 1. Introduction

1.1 Background

Childbirth, often portrayed as one of the most beautiful life experiences for many women, can also be one of the most traumatic experiences of their lives. For women in Kenya, the lack of maternal health services accessibility for pregnant women can lead to serious life-threatening outcomes. In many cases, maternal health resource accessibility is influenced by people's social determinants including, but not limited to place of residence, socio-economic status, education, and age. This analysis will examine associations between place of residence within Kenya and use of maternal health services for pregnant women. Anderson's model of Healthcare Utilization will serve as the key reference model to understand the use of maternal health services in Kenya.

According to the World Health Organization (WHO), maternal health falls under the umbrella of women's health and references the health of women during pregnancy including childbirth and postpartum care (WHO, 2010). Care for women does not begin at the time of pregnancy nor does it end at the time of delivery. Instead, there should be a period prior to pregnancy where women receive checkups, through which they will gain a better understanding of their current health and how/if they will be able to carry out a healthy and safe pregnancy. After childbirth, health services should continue to be available to assist women with postpartum care. Therefore, care received by a woman before/after pregnancy is crucial for the survival of the mother and infant. In many high-income nations, the previous description of the ideal care for women before, during, and after pregnancy does exist. However, in Kenya, due to the country's poor infrastructure and social/political upheaval, maternal health is limited for many women (UNFPA, 2005). Although some efforts, such as the implementation of the Millennium

Development Goals (MDGs), have been made to help alleviate the health disparity gap among pregnant women, there has not been significant positive change in the lack of accessibility and/or social barriers preventing women from accessing care while pregnant.

Throughout this analysis, it is important to note that "pregnant people" is all encompassing and does not only refer to people who identify as women. Those who identify as transgender and/or nonbinary also have pregnant-able bodies. However, for the purpose of this literature, "women" will be the primary focus due to the fact that research on transgender, nonbinary, or intersex is limited (Taylor et al., 2019, p.5).

1.2 Problem Statement

Maternal health care, especially antenatal care, skilled attendance at birth, and place of delivery, are crucial factors when addressing women's health and/or maternal mortality. Although maternal health services have slightly improved in Kenya, there should be more effort at delivering standard and adequate care for women and in an equitable manner (Machio, 2008). Women who live in rural/remote communities in Kenya may have less access to basic maternal care due to the country's poor health service distribution for women.

Across the world, maternal, neonatal, and child morbidity and mortality are undebatable healthcare matters. However, for certain countries, these preventable concerns are more pressing than others. Higher rates of maternal mortality, often rooted in lack of access to basic healthcare needs, points to the malfunctions within a country's health systems. The World Health Organization noted that the difference separating wealthy and poor countries is a reflection of considerable measures taken to advance maternal health (WHO, 2008).

In recent years, maternal health in Kenya has improved, but has not exhibited significant progress. The lack of or stagnant utilization of maternal health services is a driving factor hindering the country's progress in bettering their maternal, neonatal and childbirth health sector (Machio, 2008). Although the Kenyan government has implemented a few initiatives, such as free maternal health care, to increase the use of maternal health services throughout the country, the proportion of women using maternal care services remains inadequate (UNFPA, 2013), and questions remain about the reasons for women's lack of use of maternal care in Kenya.

1.3 Main Objective of the Thesis

The overall objective of this analysis is to investigate and understand how place of residence within Kenya influences maternal health care utilization.

1.3.1 Specific Aims of the Thesis

i. Examine the number of antenatal care visits received by pregnant women in Nairobi and Eastern Kenya
ii. Examine the place of delivery for women giving birth in Nairobi and Eastern Kenya
iii. Examine the type of skilled assistance women received during childbirth in Nairobi and Eastern Kenya

1.4 Significance of the Thesis

In hopes of influencing an increase in the rate of maternal service utilization amongst pregnant women in Kenya, the thesis aims to identify factors that limit accessibility and availability to these services. It is not that a service such as antenatal care does not exist in

Kenya, but it may not be accessible to a group, specifically those in rural areas. In addition, the thesis will bring new light to the existing health resource gap for pregnant women in rural and urban communities and lay ground for future research points. Key beneficiaries of this literature are scholars with great interests in Kenyan women's health and Kenyan policy makers.

1.5 Organization

This thesis is organized in six chapters; chapter one covers introductory information about the current situation surrounding maternal health in Kenya, the problem statement, the research question, the research aims and significance of the study. Chapter two provides a deeper analysis of the study objectives through a thorough literature review. Chapter three presents the methodology used to convey the results found on chapter four. Chapter five presents the discussion and recommendation. Lastly, chapter six presents the public health implications and conclusions.

1.6 List of Acronyms

Acronym	Definition
MMR	Maternal Mortality Ratio
GDP	Gross Domestic Product
MDG(s)	Millennium Development Goal(s)
ANC	Antenatal Care
PNC	Postnatal Care
EmOC	Emergency Obstetric Care
UHC	Universal Health Coverage
UNICEF	United Nations Children's Fund
WHO	World Health Organization
DHS	Demographic Health Survey
KDHS	Kenya Demographic and Health Survey
TBA	Traditional Birth Attendants
ABM	Anderson Behavioral Model
UDHS	Uganda Demographic Health Survey
UNFPA	

1.7 Definition of Terms

i. Maternal Mortality is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes (WHO, 2011).

ii. Maternal Morbidity is defined as chronic and persistent ill-health occurring as a consequence of complications of pregnancy and childbirth (Ogunjuyigbe & Liasu, n.d.)

iii. Antenatal care is defined as pregnancy-related healthcare checkups by a skilled health professional such as a trained doctor, midwife, or nurse at a health facility or a home

iv. Postnatal Care is healthcare provided following childbirth to both mother and infant.

v. Skilled Birth Attendance is the process by which a woman is provided with adequate care during labor, delivery and the early postpartum period (Graham et al, n.d.).

vi. Skilled Birth Attendant is an accredited health professional such as a midwife, doctor or nurse WHO has been educated and trained to proficiency in the skills needed to manage normal uncomplicated pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns (WHO, 2004).

Chapter 2. Literature Review

2.1 Introduction

Maternal mortality has always been a public health concern that affects certain populations more than others. Countries which already face serious economic, political, and social challenges often lack the necessary infrastructure to maintain basic health services, including for maternal health. Maternal mortality is inherently linked with maternal health services and disproportionately affects women in lower- and middle-income countries (Bauserman, M., Thorsten, V.R., Nolen, T.L. et al., 2020).

From 2003 to 2014, Kenya experienced a decline in fertility rate from an average of 5 to 4 children per woman, respectively. The increased distribution of information on the benefits of contraceptive use and the decline in fertility have contributed to a decline in the country's population growth rate from 2.9 percent to 2.2 percent from 2009 to 2019. However, population distribution and density along with the country's overall socio-political and economic development still cause an undeniable disparity in resource and service distribution for people across different regions of Kenya (UNFPA, 2020).

Many studies on maternal mortality in Sub-Saharan African countries like Kenya, Ethiopia and Ghana have shown that proximity and socio-demographic characteristics affect the use of health services and pregnancy outcomes (Ahmed et al., 2010). Cultural practices and socioeconomic characteristics are also key factors that influence female autonomy and the distribution of maternal health services across developing nations (Ahmed et al., 2010). Thus, using different behavioral models and characteristics affecting maternal health service distribution in Kenya, a thorough literature review was conducted to assess the trends of women receiving antenatal care, delivery care, and skilled birth attendance. The three mentioned

variables will be used to compare how access to each service throughout women's maternity journey directly impacts pregnancy outcomes.

2.2 How the Literature Search was Conducted

Maternal health services are complex because they are dependent on many different factors, from policy changes to demographics. They can also be dependent on historical events in each country. Because of this, there is a vast array of available information on the topic, especially for Kenya. The literature search was done using many different data sources that had key information related to Kenya's health systems, including maternal health resources, and neighboring countries like Uganda and Tanzania.

The Kenya Demographic and Health Survey (KDHS), the United Nations Population Fund (UNFPA), and the World Health Organization (WHO) were the primary sources used to understand the relationship between population growth, sociodemographic characteristics, and their relationship with health service distribution. In addition, Google scholar, EBSCOhost, and PubMed searches were done to find peer-reviewed articles that were of relevance to maternal health and maternal health services in Kenya.

The following search terms were used: *Kenya maternal mortality, Kenya maternal health, Kenya maternal health outcomes, Kenya maternal health services, maternal health services in Sub-Saharan Africa, Kenya health systems, socioeconomic disparities, mortality vs. morbidity rates, proximity of health service, antenatal care availability, prevalent pregnancy outcomes in Kenya, urban vs. rural areas, education/literacy rates among Kenyan women, population demographic and dynamics, postnatal care availability, and health service distribution and accessibility.*

Finally, the theoretical framework used for this study followed Anderson's model of health behavior as well as later revisions of his model. The models are described in detail below on pages 13-14.

Though many of the articles used, including the KDHS data, were more than five years old, they were all compared to current statistics to check for legitimization and accuracy. Using older information in comparison to newer data was important for this literature search to understand the trend of maternal health services in Kenya and how much contribution has already been invested towards this cause by health professionals. All data changes throughout the years, whether positive or negative, were reported and followed with contextual explanation throughout this section. All other external information used to strengthen this section including tables, graphs, maps, and other figures are cited on pages 52-58**.**

2.3 Background of the Country

2.3.1 Geography

Located in the Eastern region of Africa, Kenya is known for its diverse culture, picturesque landscapes, and unique wildlife preserves. Bordering Somalia and the Indian Ocean to the East, Ethiopia and South Sudan to the North, Uganda and Lake Victoria to the West, and Tanzania to the South *(Figure 1)*; Kenya's diverse wildlife is a catalytic factor in the increase of tourism every year. The country has a total land mass of 571,466 square kilometers with only 20 percent available arable land. It's also positioned between 5^{o} North and 5^{o} South latitude and between 24^{o} and 31^{o} East longitude. Kenya's seasonal climate is dependent on the pressure of the western Indian Ocean. Therefore, the months of December through March are fairly dry with minimal rain, late March to May are often rainy with flowing wind, and June through August

sees little precipitation. Due to recurring drought and flooding seasons, Kenya faces numerous environmental issues such as water pollution, soil erosion, desertification, and poaching throughout the year (Hongo, O.S, Mwenda, N & Kenneth, I., 2022).

Figure 1: Map of Kenya showing states and borders

2.3.2 Population Size and Distribution/Composition

According to the 2009 Population and Housing Census, Kenya's growing urban population has not only led to an exacerbation of the country's infrastructure and resources but has recently led the country into a high dependency burden with a current population estimation of 54.9 million (KNBS, 2009).

Between 1999 and 2009, the Kenyan population increased by one million annually. Per the intercensal growth rate of 2.9 percent in 1999, the Kenyan population is expected to grow up to 77 million by 2030 with an associated maternal mortality ratio *(MMR)* of 200. Since then, the Kenyan government has established several national population programs and activities aimed at attaining a higher quality of life for its population based on the following key factors: reduce population growth by 2030, reduce fertility and mortality rates, provide equitable and affordable quality reproductive health services, contribute to the planning and implementation of socio-economic development programs, and ensure the sustainability of population programs (DHS, 2014).

In terms of population composition, Kenya is divided into three main language groups known as Bantu, Nilo-Saharan, and Afro-Asiatic. Bantu language speakers, the largest language group, predominantly reside in the Southern region of Kenya and include the Kikuyu, Kamba, Meru, and Nyika peoples. Nilo-Saharan speakers, Kenya's second largest ethnic group occupies the lower Western plateau while the Afro-Asiatic peoples inhabit the arid regions of North and Northeast Kenya (Hongo, O.S, Mwenda, N & Kenneth, I., 2022).

2.3.3 Political Environment and Structure

In 1963, Kenya gained its independence from Britain. Until 2013, the country operated under a multi-party democracy system governed by a coalition government that was formed in the 2007 General Election. The current constitution, which was implemented in 2010, supports a republican political system with a ***bicameral parliament***[1] every five years (UNFPA, 2013). This constitution also agrees to a division of 47 interdependent counties, each of which is subdivided into sub-counties, wards, and villages. One of the major transitions from the old constitution is

that while counties are interdependent with the national government, respective governors of each county are elected by respected county inhabitants (UNFPA, 2013).

2.3.4 Socio-Economic Development

Since Kenya's independence, agriculture has been the backbone of the country's economy. Though the service sector has somewhat participated in Kenya's economy compared to the weakly growing manufacturing sector, agriculture accounts for 50 percent of the country's Growth Domestic Product (GDP), 65 percent of exports and 18 percent of formal employment in Kenya (UNFPA, 2013). Unfortunately, various factors pressured Kenya's economy and led the country into a period of deep poverty throughout the 1980s and 1990s. Since then, Kenya's economy has seen some improvements but has not made significant progress to meet the goal anticipated by Vision 2030, later explained in this section (UNFPA, 2013).

Kenya's continuous economic degradation directly influences the population's quality of life. Since income level is unequally distributed across different regions, poverty in Kenya has always been a complex issue reflecting the lack of access to basic needs such as food, shelter, and clothing to infrastructure and systems like healthcare, sanitation, and education. Adding to the already struggling economy, the density of the population and population dynamics worsen the socioeconomic disparity of resource and service distribution in Kenya. Thus, poverty levels tend to follow the trend of resource disparity across Kenya with rural areas experiencing the highest rates of poverty, 50 percent, compared to urban areas facing 34 percent (UNFPA, 2013; Bakibinga, P., Kisia, L et 2022).

The state of Kenya's current socioeconomic and health outcomes can be explained by Anderson's Behavioral Model. Anderson's Behavioral Model (ABM) is used in many studies

and research to determine the need and access for individual use of health services. The model includes both individual and contextual determinants of health service utilization. ABM is used by many scientists to examine potential health outcomes based on pre-existing socio-cultural and economic factors of an individual (Babitsch, B., Gohl, D., & von Lengerke, T., 2012). This model was later revised to be known as the Anderson and Davidson model which investigates the following three major components: 1) predisposing factors such as age, sex, religion, education, and other social determinants, 2) enabling factors such as income and service proximity 3) need factors which account for one's individual perceived needs *(see figure 2)* (Bakibinga, P., Kisia, L et 2022).

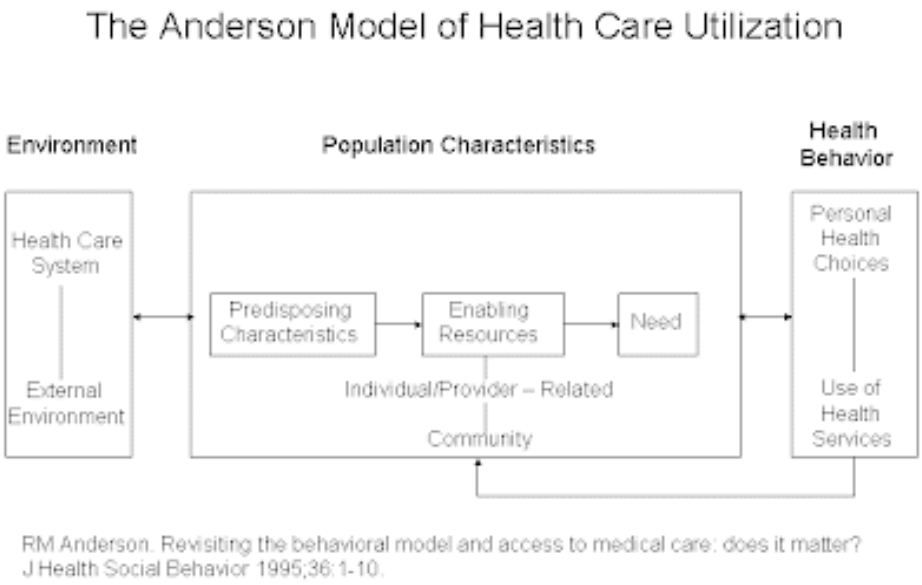


Figure 2: The Anderson Model of Health Care Utilization

Anderson's BM was further modified by Kroeger (Kroeger, 1983) (*see figure 2*). Kroeger's model is different in that it considered extended explanatory variables that are

interrelated and is affected by each individual's morbidity. In comparison to Anderson's BM's model which focused on three major component, Kroeger's model is also divided into three main category: 1) individual's predisposing characteristics (example: age, sex, marital status, ethnic group, education, occupation, assets, household size; 2) the disorder or perception of morbidity (example: chronic pain, severe, mild, treatment possibilities, 3) service characteristics (example: accessibility, quality of care, costs, communications) (Kroeger, 1983). The extension of explanatory variables, in addition to Kroeger argument in considering health systems *(example 3)* as part of the resources that may influence health outcomes differentiate its version from Anderson's BM.

In considerably descriptive literature, the author discussed the limitations of many empirical studies of health-seeking behaviors, especially in developing countries. Kroeger's revision of ABM also directly explains how the use and accessibility of maternal health services in developing countries, like Ethiopia, can be influenced by the populations' sociodemographic characteristics; socioeconomic means of women; culture; and availability of resources (Mekonnen & Mekonnen, 2002). The findings of this study were applicable to Kenya based on the similarity between the demographic, socioeconomic, and overall positionality of both Ethiopia and Kenya. Previous studies have shown that education, economic status, proximity to resources, and other beneficial social factors are very impactful measures for health outcomes (Mekonnen & Mekonnen, 2002; Kroeger, 1983). Thus, it is wise to hypothesize that sociodemographic and socioeconomic factors are among the driving forces behind existing and distributing maternal services across different populations, reflective of their cultures and population health beliefs/model.

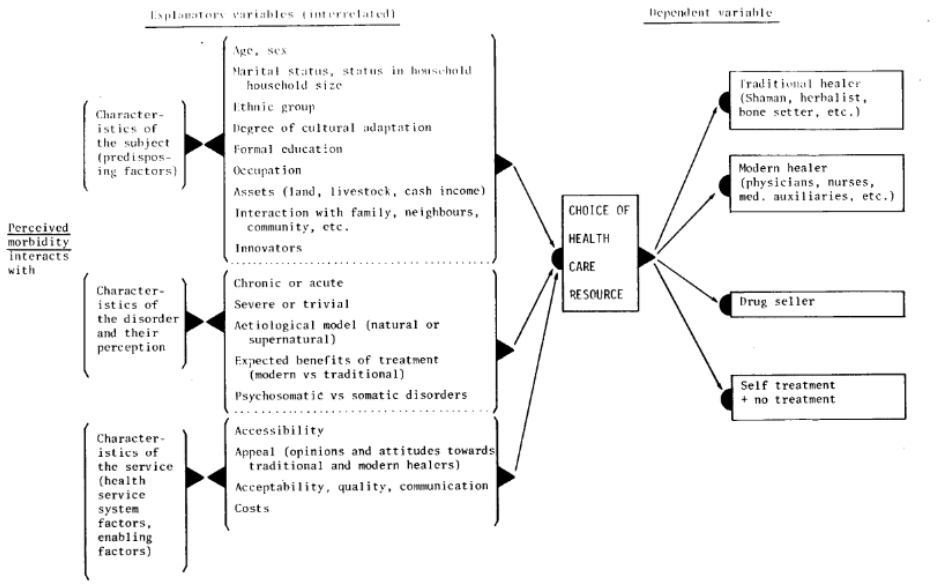


Figure 3: The Anderson Model of Health Care Utilization modified by Kroeger

The Kenya Demographic and Health Survey (2014) analyzed whether women's demographic and socioeconomic characteristics shared a direct correlation with assumed outcomes based on trends associated with antenatal care, skilled birth attendance, and postnatal care. Indeed, it was reported that women in urban settings who were more financially independent were more likely to have received antenatal care compared to others (KDHS, 2014). This finding along with previously conducted studies based on socioeconomic impacts on populations' health helps to explain the trend of pregnancy outcomes in Kenya.

2.4 Health and Health Systems Development in Kenya

In the mid-1940s, the World Health Organization (WHO) partnered with many other influential humanitarian organizations and demanded efforts towards improving health and

health systems globally, labeling this movement as health being *"a human right for every human".* Since then, the Kenyan government has sought different ways to improve the country's health systems and services but has continuously faced hindering structural challenges. In low- and middle-income countries such as Kenya, public health services and research have historically been focused on disease prevention and eradication (KPSA, 2013). This narrow focus along with the country's high population density drives the rise of poverty, supports a cost-ineffective healthcare delivery system, and a continuous lack of government support in Kenya. Consequently, these public health services have forced Kenya into adopting certain policy frameworks in hopes of implementing improvements in both health infrastructure and health outcomes. For example, the Kenya Health Policy Framework (KHPF), developed in 1994, resulted in some improvements to services such as maternal education and safe water but showed little improvements in maternal and child health.

The complexity of the health system in Kenya is still an ongoing issue. With only half of the population living within a five-kilometer proximity to a health facility, health service is inaccessible to the majority of the population. Furthermore, the lack of operational equipment and essential medical resources within those available health facilities contributes to the inadequate healthcare delivery services in Kenya (KPSA, 2013).

The evolving changes in the Kenyan government bring substantial modification and moderation in health policies. Under the recently drafted constitution in 2010, officials have entrusted national and county governments with particular tasks related to enforcing health systems development laws and advancements such as policy development, management of infrastructure, meeting capacity needs, and development of health standardization and guidelines (KPSA, 2013). This means that health services such as pharmacies, hospitals, health promotion,

and more are governed by individual county officials. Therefore, each county official must advocate in favor of their population's needs because individual counties face different health challenges.

As the socioeconomic status of Kenya continues to burden the population, the challenges of inaccessible healthcare have become an undeniable plight for many Kenyans. The Kenya Health Policy 2014-2030 was developed in support of the goals of the Kenya Vision 2030 to alleviate the health obstacles forcing Kenya into further destitution. This newly formed policy includes objectives like eliminating communicable diseases while reducing non-communicable ones, providing equitable health distribution and health interventions, increasing access to health care, minimizing health-related risks, and creating a stronger collaboration with health sectors (DHS, 2014). These objectives are aimed to be achieved through equitable strategic processes across different Kenyan counties. The 2014 Kenya Demographic and Health Survey (KDHS), a monitoring and evaluation tool for population and health situations including childhood, maternal, and adult mortality at the county level in Kenya, was developed as a result of the 2014-2030 health policy reform.

2.5 Maternal Health Service Accessibility in Kenya

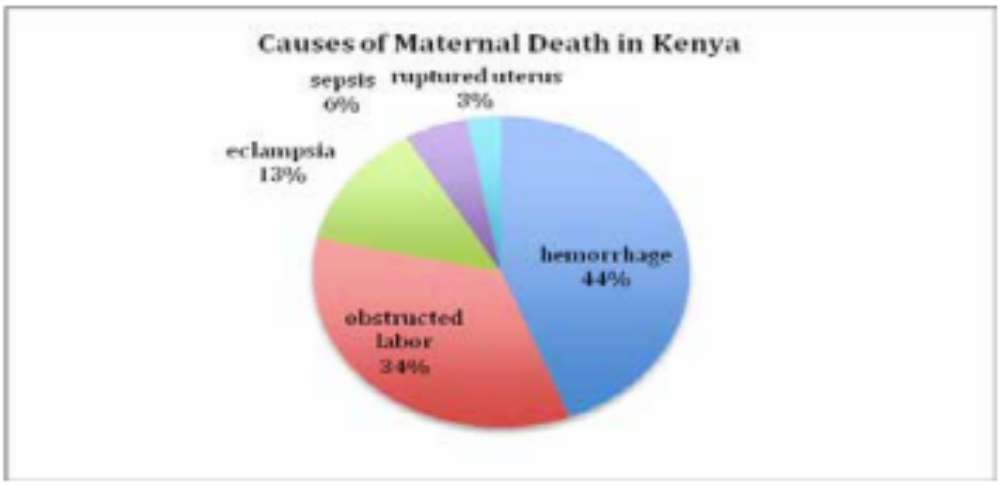
Although new policies and humanitarian services have provided improved access to health facility deliveries rather than home deliveries with the assistance of Traditional Birth Attendants (TBA), these changes have not provided enough substantial outcomes to decrease the high levels of maternal and infant mortality and morbidity rates in Kenya (Lusambili AM, Naanyu V. et al., 2020). Like other low and middle-income countries, barriers imposed on health and healthcare access/services stem from the social and economic characteristics of the country.

Therefore, certain aspects of some countries' health systems such as availability, affordability, and acceptability of care may vary across its population. Although external factors such as culture and recently the COVID-19 pandemic adds pressure to already health-challenged communities, the health disparity due to accessibility factors continue to rise exponentially in vulnerable communities (Bakibinga, P., Kisia, L et 2022).

Recently, Kenya has developed many initiatives aimed at alleviating health inequities and improving access to healthcare for all. Universal Health Coverage (UHC) is a primary example of such initiative. UHC was created to support government efforts by investing in decreasing health disparities throughout Kenya's growing urban population. This effort was challenged by the numerous health, social, and financial vulnerabilities faced by disadvantaged community members. Later, the Reproductive Health Voucher (RH-OBA) and free maternity care policy was created to help catalyze the outcome of UHC. Altogether, these efforts were able to help increase facility-based deliveries in public hospitals closer to slum communities near Nairobi, the capital of Kenya. However, many women indicated that the cost of services was a critical barrier for them (Bakibinga, P., Kisia, L et 2022).

Though Kenyan officials have made several efforts at creating opportunities to relieve health inequalities throughout Kenya which have slightly improved the rates of health service distribution, especially for those closer to populated urban areas, high rates of maternal mortality persist in Kenya (Ziraba, A. K., Mills, S., Madise, N., Saliku, T., & Fotso, J. C., 2009). According to the WHO/UNICEF/UNFPA, the maternal mortality ratio in Kenya was estimated at 1000 deaths per 100000 live births in 2000. According to UNFPA, the five leading causes of maternal deaths in Kenya are hemorrhage, obstructed labor, eclampsia, sepsis, and ruptured uterus *(percentages are outlined in the figure 4)* (UNFPA, 2013).

Figure 5.10 Causes of Maternal Death in Kenya



Source: KNBS and ICF Macro (2010).

Figure 4: Distribution of Maternal Death Causes in Kenya

External factors such as lack of a supportive environment, insufficient supplies and equipment, and inappropriate referral and communication systems were some of the major factors inhibiting provision of maternal health services in health facilities. Therefore, it was recommended that health facilities provide basic or comprehensive emergency obstetric care (EmOC) for slum communities in Nairobi. Administration of parenteral antibiotics, parenteral oxytocic drugs, parenteral anticonvulsants for pre-eclampsia, manual removal of retained placenta, removal of retained products of conception including cesarean section and blood transfusion, and assisted vaginal delivery are six of the basic services EmOCs are expected to provide to pregnant women (Ziraba, A. K., Mills, S., Madise, N., Saliku, T., & Fotso, J. C., 2009).

Before the recommendation of EmOC application in health facilities, the Kenya Service Provision Assessment (KSPA) conducted a transregional survey to determine whether

emergency obstetric care and quality delivery services are provided to pregnant women in health facilities. Both basic EmOC and comprehensive EmOC were categorized as “minus 1” being that assisted vaginal delivery was an excluded service. The “minus 1” variable explains the existing limiting dichotomy in health facilities at delivering one or another service, but not both simultaneously (KSPA, 2004). For example, some facilities either offered cesarean delivery or assisted vaginal delivery which plays a role in the classification of such facilities. This could pose a challenge for pregnant women because services in privately classified health facilities are typically unaffordable.

Among the 1,882 existing health facilities during the time of the survey, including hospitals, maternity clinics, and health centers, 25 health facilities were surveyed with 14 facilities being located within Korogocho and Viwandani, two known slums in Nairobi, and 11 facilities being located outside of those two mentioned communities, but within the city of Nairobi. Per the KSPA survey outcomes, 9% of facilities were estimated to have offered basic EmOC and categorized as “minus 1” and 6% were estimated to have offered comprehensive EmOC and categorized as “minus 1”. Additionally, the survey results showcased a noticeable geographical difference between the 8 sampled provinces with Nairobi province being associated with a lower number of comprehensive EmOC “minus 1” per 500,000 population (KSPA, 2004). The literature suggests that this huge difference signification is due to the city’s growing urban slum with an inverse correlation of health service distribution.

Along with other studies, data from the KDHS and KSPA provided insightful information on the negative health outcomes and accessibility of health services for the growing urban population in Nairobi. Being that underdeveloped slum communities in Nairobi like Korogocho and Viwandani are subject to high unemployment rates, poor access to social

services like water, housing, education, and health, the growing and continuous inaccessibility to health services, including maternal health services, is of great concern for women in these communities.

2.6 Trends of Antenatal Care in Kenya

According to the World Health Organization, antenatal care (ANC) is defined as pregnancy-related healthcare checkups by a skilled health professional such as a trained doctor, midwife, or nurse at a health facility or a home (WHO, 2016). A minimum of four ANC visits is recommended by the WHO. Antenatal care services are important because they allow healthcare providers with a critical set of knowledge to understand the different needs of the patient (DHS, 2014). ANC is a form of preventative care for early detectable factors that can reduce avoidable maternal deaths. Common examples of conditions found in pregnant women during ANC visits are anemia, pre-eclampsia, pregnancy-induced hypertension, and infections. Therefore, one ANC visit is not sufficient for health providers to provide effective and quality care to pregnant women.

In some studies, the rate of antenatal care access and usage is mentioned to be associated with many factors previously explained by the Anderson-Kroeger behavior health model. Education levels, socio-economic and demographic characteristics, and costs of ANC were recurring themes around heightened pregnancy risks and complications stemming from a low number of ANC visits. Data obtained by KDHS further strengthens the theoretical framework of ABM because it suggests that antenatal care service is disproportionately distributed across different regions in Kenya (Aksünger, N., De Sanctis, T., Waiyaiya, E., van Doeveren, R., van der Graaf, M., & Janssens, W., 2022). Only 37% of pregnant women in Northeastern Kenya

complete 4 or more ANC visits compared to 73% of pregnant women in Nairobi. Table 1 provides percentages of women aged 15-49 who completed 4 or more ANC visits and have had a live birth by place of residence (DHS, 2014). The table shows that rural women were almost three times more likely than urban women to not have completed any ANC visits.

	Residence	
Number of ANC visits	Urban	Rural
None	1.8	5.3
1	2.1	4.1
2-3	27.9	39.1
4+	67.6	51.3
Total	100.0	100.0

Table 1: Table Indicating the Breakdown of ANC visits per Residence in Kenya

Nevertheless, recent studies have shown that the use of transportation vouchers could help in alleviating the barriers to accessing antenatal care for women who live in rural areas. This intervention, which covers transportation for the mother and one companion, was provided to women who are in their third trimester and has proven to reduce financial barriers associated with transportation costs. Additionally, the termination of maternity care fees, executed by the 2016 government, has also played an essential role in eliminating social and structural healthcare hurdles in Kenya. These interventions, along with other humanitarian services from nonprofit organizations and government efforts have also been seen to have a positive impact on the

quality of ANC received today (Ochieng, B. M., Lattanzi, G., Choge, M., Kaseje, D. C. O., & Thind, A. S, 2022).

2.7 Trends of Delivery of Care in Kenya

Other than antenatal care, the place of delivery is another very important predictor of birth outcomes. Two similar studies have pointed out that lower rates of maternal morbidity and mortality are strongly linked to the place in which the mother is giving birth. Although, many demographic factors such as employment, marital status, age, and level of autonomy influence whether women seek to give birth at home or a health facility. More than demographic factors, socioeconomic factors like occupation, household income, and living conditions are the second leading determinants for children's place of delivery with education being the most consistent determinant among women (Becker et al., 1993, Fosu, G. B., 1994). These findings strengthen the notion that certain low and middle-income countries with somewhat progressive health systems, stable national income, low-income inequality, and controlled urbanization/population often experience lower mortality rates associated with delivery. Hence, more pregnant women utilize health facilities for safer and supervised delivery (Kifle, M.M., Kesete, H.F., Gaim, H.T. et al., 2018).

In Kenya, women in urban areas are more likely than women in rural areas to give birth in a health facility. Additionally, KDHS data shows that rates of health facility deliveries are proportional to the number of ANC visits. The figure below explains that 75% of women who completed the recommended number of ANC visits proposed by WHO gave birth in a health facility compared to 18% who did not complete any ANC visits *(See figure 6)* (KDH, 2014).

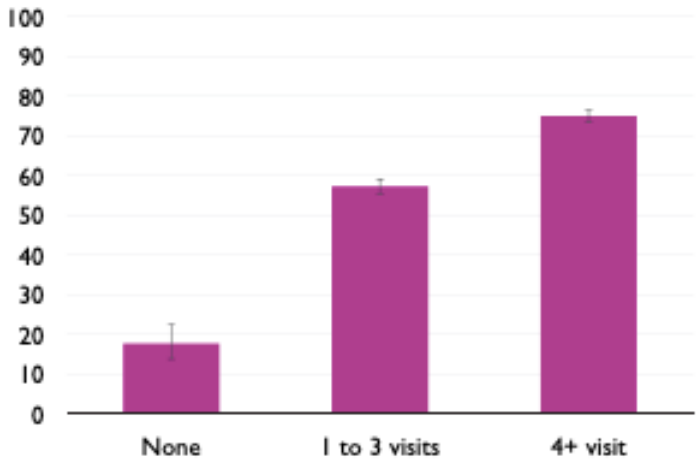


Figure 5: Percentage of Women who Delivered in a Health Facility, by Number of ANC visits

Uganda, an East African country, shares similar characteristics with Kenya from geographical proximity to maternal health services and outcomes. In an article by (Rutaremwa, G., Wandera, S.O., Jhamba, T. *et al.*, 2015), the authors described how the country's current infrastructure affects its maternal health indicators in terms of access to quality family planning, skilled birth attendance, emergency obstetric care, and postnatal care for mothers and newborn (Rutaremwa, G., Wandera, S.O., Jhamba, T. *et al.*, 2015). Like Uganda, a surrounding country like Tanzania, it was found that health workers in rural areas faced great difficulties to perform all, if not any, procedures recommended for an acceptable ANC. Some factors associated with low ANC and PNC in Uganda have included women's level of awareness of service availabilities, occupation, ethnicity, number of pregnancies and children, education, and the husband's socioeconomic status and occupation. As previously mentioned, to establish a valid

framework for Kenya's maternal health status, Anderson's behavioral model of health services was used once again to understand how socioeconomic status and demographic factors influence maternal health services in Uganda (Rutaremwa, G., Wandera, S.O., Jhamba, T. *et al.*, 2015).

Most incidents resulting in maternal mortality such as hemorrhage and hypertension stem from low ANC visits, but such deaths occur at the time of delivery and can be difficult to assess Survey (UDHS), 95% of pregnant Ugandan women received ANC from a skilled provider in 2011; however, less than 50% of pregnant Ugandan women made four or more ANC visits throughout their pregnancies, and since 2006 and only 42% of pregnant Ugandan women delivered under supervised health professionals in health facilities (Rutaremwa, G., Wandera, S.O., Jhamba, T. *et al.*, 2015). Although the statistic of women receiving care by skilled health professionals is higher in Uganda than Kenya, the percentage of women meeting the recommended ANC visit during their pregnancies is much higher in Kenya than Uganda (DHS, 2014). Similar to Kenya, socio-demographic factors associated with usage of maternal health services in Uganda absolutely impacts maternal health outcomes; however, Ugandan cultural values and norms far more influence delivery outcomes because place of delivery is mostly driven by traditional birthing practices (Rutaremwa, G., Wandera, S.O., Jhamba, T. *et al.*,2015). Currently, there is a strong motivation to improve overall maternal health services and outcomes in Uganda. Being that Kenya's current statistics on delivery of care slightly models that of Uganda's, should Kenya continue to follow through and improve on its current EmOC initiative in Nairobi, the use of maternal health services, regardless of geographical location, can be expected to increase, which will negatively influence the country's current MMR. Hence, there will be an increase in health facility childbirth, ANC, and skilled birth assistance to eliminate or prevent pregnancy related deaths.

2.8 Delivery by Skilled Professionals in Kenya

The WHO defined a skilled birth attendant as "an accredited health professional - such as a midwife, doctor or nurse - who has been educated and trained to proficiency in the skills needed to manage normal pregnancies, childbirth and the immediate postnatal period and in the identification, management, and referral of women and neonates for complications." Having previously explained the importance of ANC and the choice of delivery of care, one of the most directly impactful turning points in pregnancy is being cared for and assisted by a skilled professional who can make reliable and thoughtful decisions for the health benefits of the mother and child. Under certain unfortunate life-or-death situations, skilled professionals are trained to provide quick solutions to ensure safe delivery, if possible.

According to the KDHS, the percentage of women receiving skilled assistance during delivery has increased from 42 percent in 2003 to 62 percent in 2014 proportional to the increased rates of ANC in Kenya (KDHS, 2014). The previously mentioned structural barriers limiting women's access to ANC and influencing their choice of delivery of care during childbirth also impact the care that women receive from skilled professionals. The more women have access to health services throughout their ANC journey, the more likely they are to give birth in a health facility with a skilled health professional, thus decreasing the chances of childbirth complications and maternal mortality. This correlation is especially burdensome for women living in rural areas in Kenya due to the regional disparities associated with coverage of deliveries by skilled professionals. Urban areas like Nairobi and counties in Central Kenya experience the most deliveries made by skilled professionals compared to rural counties in Northeastern and Western Kenya *(See figure 7 (KDHS, 2014 & DHS, 2014).*

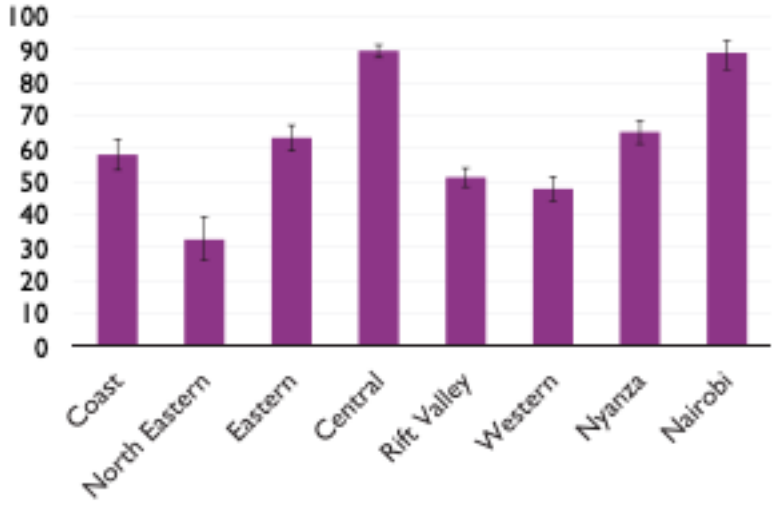


Figure 6: Percentage of Deliveries Made by Skilled Professionals, by Region of Kenya

Although demographic factors play a huge role in health service accessibility, skilled attendance during childbirth for Kenyan women is mostly dependent on costs and administration fees associated with the service. In a 2018 health survey conducted by Nyongesa, et al., evidence showed that 94.8% of pregnant Kenyan women had intended to be attended by a skilled health professional during delivery, but service costs served as an inaccessible barrier for these women (Nyongesa, C., Xu, X., Hall, J.J. et al., 2018*)*. This evidence further supports the notion that the proportion of children born at home seems to decrease inversely as familial wealth increases (DHS, 2014). Since the collection of the KDHS 2014 data, Kenya has implemented free maternal service policies to increase access to maternal care regardless of women's socioeconomic status, increase ANC use, increase health facility deliveries and professional assistance during childbirth. Though this new policy has brought on new institutional challenges such as hospitals and health facilities maintaining stock supplies to meet the needs of women and having enough

staff to avoid burnout, the free maternity service policy in Kenya showed significant increase in ANC and skilled birth assistance (Lang'at, E., Mwanri, L. & Temmerman, M., 2019).

2.10 Overview of Literature

The literature suggests that socioeconomic and demographic characteristics like age, family structure, occupation, income level, education, and health service accessibility are all essential key factors influencing maternal mortality rates.

Sub-Saharan Africa has the highest burden of maternal mortality, much of which can be attributed to structural barriers and insufficiency. Out of 287,000 maternal deaths that occurred globally in 2010, 56 percent took place in Sub-Saharan Africa. Of this data, Kenyan women were reported to have the most attributable risk of facing death during childbirth (WHO, UNFPA, UNICEF, World Bank, 2012). Maternal mortality can be prevented through various health measures like increased access to ANC, eliminating costs associated with the delivery of care, and redelegating the number of skilled professionals equipped to assist mothers during childbirth. Early ANC allows for safer and better-monitored birth attendance which has statistically led to effective interventions in reducing maternal deaths. Studies show that 60 percent of maternal deaths occur during a brief period between labor or the first 24 hours after delivery which is mainly due to obstetric complications (Li et al., 1996). These unfortunate complications are sudden and cannot be determined antenatally but can be assessed during or after labor which is why the place of delivery and skilled birth attendance is crucial during childbirth.

Though Kenya has been making some progress in establishing policies that will allow social and health services to meet the demands of their ever-increasing population by 2030; some

recent studies have highlighted that community and national-level structural barriers continue to limit healthcare access in many densely populated areas in Nairobi and those in rural outskirts outside of the capital. Therefore, since 2030 is less than 10 years away, Kenya should reevaluate and reprioritize its goals in order to alleviate the ongoing health inequities among its population.

Chapter 3. Methodology

3.1 Purpose of Analysis

This study will be a secondary analysis of data from the 2014 Kenya Demographic and Health Survey (KDHS), to examine factors determining trends of maternal health services in Kenya.

3.2 General Objective

To identify the extent to which maternal health service utilization is associated with geographical region of residence in Kenya.

3.3 Specific Objectives

i. To explore associations between appropriate and timely antenatal care service use and women's geographical location of residence. Antenatal care is an especially important service during pregnancy because it foreshadows possible pregnancy outcomes and provides key expectations for maternal health during pregnancy. Certain health complications and risks for adverse birth outcomes like obstetric fistula, hypertension, infection, and anemia could be detected in the first stage of pregnancy through ANC. Therefore, it's vital to investigate whether women's place of residence predicts the number of ANC visits.

ii. To explore associations between place of birth (facility delivery) and women's geographical location of residence. In Kenya, access to certain facilities is based on community availability because resources are unevenly distributed regionally. Therefore, this disparity often strains pregnant women and limits their options of delivery of care.

iii. To show the relationship between women who gave birth in a health facility and the likelihood of being assisted by skilled health professionals during childbirth. There are many risks associated with childbirth and the effects of both ANC and delivery of care play critical roles in how health professionals approach childbirth which in turn dictate delivery outcomes.

ANC, facility delivery, and skilled birth attendance are three key factors in ensuring safe and successful pregnancy outcomes for many women. However, in Kenya, these factors often align with Kenya's complex multidimensional determinants like socioeconomic status, demographic characteristics, female autonomy, education, and more. These determinants influence the cross-regional distribution of maternal health services in Kenya. Consequently, many women who live in rural areas or economically disadvantaged communities face the unfortunate reality of health service deprivation leading to other morbidity complications. The reason these external variables (age, education, etc.,) were chosen stems from the level of influence they each have women's health outcomes in Kenya. Based on previous studies, older women have more in-hospital births or skilled birth assistance than younger mothers. Depending on the woman's health, those who have had previous complicated childbirths tends to receive higher antenatal care visits and/or deliver in a health facility (Atuoye, K.N., Barnes, E., Lee,

M. *et al.*, 2020). Wealth index pertains to women's economic means, whether they have a job or a stable income. Previous articles have also found that women with higher socioeconomic status are more likely to receive maternal health services because they have the means to afford such services. More economically stable women are also found to be more educated (Fosu, G.B., 1994., Costello et al., 1996). Lastly, in some cultures, marital status is driven by men which can indeed impact how much decision a women can make for her own reproductive life (Vouking, M. Z., Evina, C. D., & Tadenfok, C. N. (2014).

3.4 Study Population and Sample

From the designed sample of 40,300 household, the KDHS had an interview response rate consisting of 36,430 households from which 31,079 women between 15-49 years old who have had a live birth five years before the study and 12,819 men between 15-54 years old were interviewed. This accounts for a 97% and 90% response rate from women and men, respectively (KDHS, 2014). However, for the purpose of this analysis, only data from women will be utilized.

3.5 Data Source

The DHS is a data collection system that was established by the United States Agency for International Development (USAID) in 1984. Since then, household-based surveys completed by DHS have been representative of about 70 countries, including Kenya. The DHS questionnaire includes the following topics: fertility, childhood assessment, maternal and child health, family planning methods, breastfeeding practices, autonomy, education, marriage, HIV/AIDS and nutritional status of women and children. Many of these surveys have served as primary data sources for several studies because they provide vital information about socioeconomic and

demographic indicators that impact population livelihood, as well as health outcomes. The KDHS provides specific information related to health status in Kenya. This data is the nation's first survey that seeks health information at the county-level and the sixth demographic and health survey conducted in Kenya since 1989.

3.6 Study Design and Data Collection

The 2014 KDHS data was collected using two subsamples from previous study analysis completed by the Fifth National Sample Survey and Evaluation Programme (NASSEP) which conducts household-based surveys throughout Kenya. From then, the two subsamples were divided into 1612 clusters which were independently selected using a two-stage sample design. In addition, 995 clusters included households in rural areas and 617 clusters included households in urban areas. Through this process, a target sample of 40,300 household was identified. Of these, as described above, a total of 36,430 households participated in the KDHS survey.

3.7 Procedures and Instruments

The data collection instrument used for the 2014 KDHS analysis included a set of five questionnaires geared towards men and women in both rural and urban areas. Since the households were divided into a sample of two halves, interviews were conducted using the following questionnaires: a full household questionnaire, the full woman's questionnaire, and the man's questionnaire or the short household questionnaire and the short woman's questionnaire. The questionnaires shared similar characteristics with previous DHS questionnaires, but it was revised to represent the country's current need, at the time of the survey. More information on

the specificity of household-level subsample selection is available in the official final report of the 2014 KDHS (KDHS, 2014).

All questionnaires included an assessment of men and women's eligibility to complete individual interviews. Additionally, all questionnaires were translated into 16 other languages in order to account for all ethnic groups which have language differences across Kenya. These translated questionnaires were pretested from January 17th to February 15th before data collection.

3.8 Study Variables and Definitions

i. *Independent Variable:* Place of Residence by region

This variable describes women's current place of residence in Kenya. In both the long and short questionnaire used to interview women, there is an identification section at the beginning that allows each participant to provide background information about their current county, district, and location/town of residence. Therefore, place of residence by region, a categorical variable, will be measured based on each participants' response. For this thesis, 'place of residence' is subject to two distinct geographical regions of Kenya, Eastern and Nairobi. Hence, the utilization of maternal services for women in Nairobi will be compared to women living in the Eastern region. This independent variable was selected in order to examine how women's place of residence affects their utilization of health services such as ANC, place of delivery, and skilled attendance during delivery.

ii. *Dependent variable 1:* Antenatal Care

In the questionnaire, antenatal care, a continuous variable, was measured by asking women whether they saw anyone for antenatal care during a specified pregnancy. This question

was followed by a discrete numerical variable measuring the number of times women received antenatal care during their specified pregnancy. Hence, the question was, "how many times did you receive antenatal care during this pregnancy?". Therefore, this variable will help in understanding how likely women were able to receive at least one ANC during their pregnancy.

iii. *Dependent variable 2:* Place of Delivery

Place of delivery is a categorical (nominal) variable that was measured by asking women to identify where she gave birth. The answer options were as follows: "Home (your home/other home), public sector (govt. hospital, govt. health center, govt. dispensary, other public sector), private med. sector/mission hospital clinic, pvt. hospital/clinic, nursing/maternity home, other private med. sector." If the interviewer had difficulty with determining whether a participant had delivered at a public or private sector, they had the option to mark participants' answer as "other" and specify the name of the place of birth. That way, during data entry, the correct variable code could be chosen. This variable is important to investigate how place of delivery differed based on women's place of residence by region.

iv. *Dependent variable 3:* Skilled Birth Attendance

Like the previous independent variable, skilled birth attendance is also a categorical (nominal) variable that was measured by asking women "who assisted with the delivery of (name)?" (name meaning a specified child which had been previously established during the interview process). The answer options were as followed: "health professional, doctor, nurse, midwife, other person community health worker, traditional birth attendant, relative/friend, other (specify), and no one assisted." Each answer choice was coded appropriately. This variable will be used to explore whether women from certain areas are more likely to be assisted by skilled professionals during childbirth.

v. *Covariates*

The demographic characteristics that were captures included residential area, place of residence by region, wealth quintile, education level, age, birth order, and marital status. Beside place of residence by region being the independent variable, the other demographic characteristics were chosen in terms of confounding variables because they follow underlying principles and basis previously established secondary by the secondary revision of Anderson's theoretical framework.

3.9 Strengths and Limitations of the Study

Though not every household in Kenya was interviewed, a primary strength of this study is based on the fact that the data collection and results are representative of Kenya's population. Thus, the result of this data is comparable to other countries that share similar sociodemographic features with Kenya. Though the population sample was quite large, it generated high response rates, especially in urban areas. This allowed for greater results variability. Furthermore, the influence of other globally respected organization such as UNFPA and the WHO in addition to KDHS's valued reputation in the Kenyan community has made this data reliable and trusted. One very important aspect that was followed through in the pre-collection of data stage is the emphasis on trainings for trainers and pre-testing of the instruments prior to the start of the interviews. This not only allowed for trainers to gain confidence in their ability to lead interviews, but also gave them a chance to ask questions and prevent any misleading or inappropriate information in the questionnaire. Lastly, the development of the final questionnaires was translated into 16 other languages associated with different ethnic groups in

Kenya. This strategy not only accounted for cultural sensitivity and appreciation but facilitated interview flow and understanding between the interviewer and the interviewee.

Although many aspects of the study strengthened the overall outcome of the data, some limitations can be considered for better understanding of the findings. Structural barriers leading to ineligible participants stood as a great concern because many people were eligible to be interviewed but could not be contacted, even after several attempts, due to long absences from their households. Therefore, some data points were missing. Furthermore, some geographical matters influenced the abundance of data collection. Since Nairobi is more populous than other Kenyan provinces, a vast majority of the participants from Kenya were more easily accessible to be interviewed than others in the outskirt of the capital.

3.10 Ethical Considerations

All study protocols, including research instrument and field trainer selections used to conduct the 2014 KDHS survey were completed in partnership with many other organizations and from the support various institutions and concerning agencies like the Ministry of Health (MOH), the National AIDS Control Council (NACC), National Council for Population and Development (NCPD), Kenya Medical Research Institute (KEMRI), and more. All field workers received training on confidentiality and interview techniques in order for interviewees to feel safe and seen while sharing their experiences. All respondents provided written consent to participate in the survey.

3.11 Data Analysis

For the purposes of this study, the data analyses were done through a computer-based software, SAS, and Microsoft Excel which considered all weighting factors appropriate to the previously chosen independent variables and dependent variable. Percentage distribution of each category within predictor variables were described in associated frequency tables. The statistical summary includes univariate analyses which was performed on all demographic and behavioral predictors *(see table 1)*.

Secondly, to examine the patterns associated between ANC and place of residence by region, since ANC is a continuous variable, a simple regression was used to analyze the association between number of ANC visits and place of residence (Nairobi compared to Mombasa) *(see table 2)*. Cross tabulations were compiled to explain variations and assess the relationship between place of delivery versus place of residence by region and skilled birth attendance versus place of residence by region *(see table 3, 4, & 5)*.

Cross tabulations for place of delivery during childbirth were completed for the following answers: respondent's home, other home, government hospital, government health center, government dispensary, mission hospital/clinic, private hospital/clinic, other private sector, and other. For the statistical analysis of place of delivery and skilled birth attendance in relation to place of residence by region, Pearson chi-square tests were used to show whether there exists a statistical relationship between those two specific dependent categorical variables with the independent variable being 'place of residence' by region. All chi-square tests were analyzed using expected observations from the compiled tabulations. Unlike the data used for the simple regression analysis which included data from all participants from Nairobi and Eastern, the cross tabulations were completed using participants from Nairobi and Eastern Kenya. Furthermore, the

two regions considered for the 'place of residence' variable were Nairobi and Eastern Kenya. The yes/no answers to skilled birth assistance only considered assistance by doctors, traditional birth assistance, and no one, in order to examine differences between access to the most skilled attendants compared to the least skilled. The answers choices, yes and no, were recoded as 1 and 0, respectively. The recoded variables followed the following formula:

$$Y_i = \alpha + \beta X_i + \gamma Di + \varepsilon_i$$

D_{i1} = {1 for Yes; 0 for No}

Thus, for yes (assistance by doctor) the model becomes

$$Y_{i1} = \alpha + \beta X_{i1} + \gamma\ (1) + \varepsilon_{i1}$$

Thus, for no (no assistance by doctor) the model becomes

$$Y_{i1} = \alpha + \beta X_{i1} + \gamma\ (0) + \varepsilon_{i1}$$

D_{i2} = {1 for Yes; 0 for No}

Thus, for yes (assistance by traditional birth person) the model becomes

$$Y_{i2} = \alpha + \beta X_{i2} + \gamma\ (1) + \varepsilon_{i2}$$

Thus, for no (no assistance by traditional birth person) the model becomes

$$Y_{i2} = \alpha + \beta X_{i} + \gamma\ (0) + \varepsilon_{i\ 2}$$

D_{i3} = {1 for Yes; 0 for No}

Thus, for yes (assistance by no one) the model becomes

$$Y_{i3} = \alpha + \beta X_{i3} + \gamma\ (1) + \varepsilon_{i3}$$

Thus, for no (no assistance by no one) the model becomes

$Y_{i\,3} = \alpha + \beta X_{i3} + \gamma\,(0) + \varepsilon_{i3}$

Chapter 4. Results

4.1 Introduction

The contents of this chapter represent the findings of the univariate and bivariate analyses of the independent and dependent variables. Discussions of this chapter will explain both expected and significant results of observed data patterns and relationships between the chosen variables.

4.2 Characteristics of the Study Population

Demographic characteristics of the study population, including age, birth order, wealth index, education, and marital status, are shown in table 1a *(see Table 1a. Frequency Demographics of the Study Population)*.

Of those surveyed in the East, 35% had received between 0-3 ANC visits, compared to 19.5% in Nairobi. Most of the pregnancies occurred before age 30, with only 4.32% and 3.71% of women 15 and 16 years of age, respectively, reporting to have already been pregnant in the five years prior to the survey. Birth order followed a similar decreasing pattern. For nearly half of respondents, the birth order of the index child was 1 (21.94%) or 2 (23.57%). Overall, based on the frequency of birth order, most women in Kenya had between 1-4 pregnancies.

On the contrary, education levels were not evenly distributed among women in Kenya. Only 50.62% of women reached a primary education level, compared to 11.42% reported to have received no education. The survey also concluded that more than half of women (~ 58%) were

married at the time of the survey and 28.5% amongst them were never in union. Lastly, 19% of all survey women fell into the poorest category of wealth index and the remaining participants were evenly distributed across the following categories: poorer (20%), middle (17.8%), richer (19%), and richest (23.5%).

Of the nine regions included in the survey, Coast, North-Eastern, Eastern, Central, Rift Valley, Western, Nyanza, and Nairobi, 29% and 16% of the respondents resided in the Rift Valley and Eastern regions, respectively. For the purpose of this analysis, the subsample only includes participants from Eastern Kenya (84%) and from Nairobi (16%). The outcome variables, ANC visits, place of delivery, and skilled birth assistance varied in terms of frequency. Between both regions, about ~ 42% of women in received less than the 4 minimum antenatal care visits required by the WHO. Additionally, about 33% of the respondents reported having given birth in a government hospital and ~34% reported to have given birth in their homes. Lastly, a large majority of women were assisted during childbirth by a nurse/midwife, doctor, or traditional birth person. Although there were few reports of people being assisted by friends/relatives (10.6) or in other cases, there were no assistance (2.53%) during childbirth.

4.3 Research Questions and Hypotheses Analysis Plan A

Research Question (RQ) 1: Does the number of antenatal care visits received by a woman living either in Nairobi or Eastern Kenya depend on their place of residence?

H01a: There is no significant statistical association between a woman's place of residence (whether Nairobi or Eastern Kenya) with the number of ANC visit they receive.

Ha1a: There is a significant statistical association between a woman's place of residence (whether Nairobi or Eastern Kenya) and the number of ANC visit they receive.

4.3.1 Bivariate Association Between Place of Residence and Antenatal Care Visits

Table 2 represents a regression analysis between place of residence, specifically Nairobi and Eastern Kenya, and ANC visits. This regression summary *(see table 2a)* describes the overall statistical summary of these variables. Results from the linear regression indicates a significant association between ANC and place of residence, **b** = 0.005, t (6247) = 4.661, $p < 0.001$. Place of residence also explains a significant variance in ANC, $R^2 = 0.003$. Based on the findings of this summary, women in Eastern Kenya were less likely to receive the minimum of four ANC than women in Nairobi.

4.4 Adjusted vs. Unadjusted Bivariate Association: Place of Residence and Confounding Variables

The previously reported statistical associations between place of residence and antenatal care, the bivariate association significance *(i.e., coefficient, t-statistics, p-value)* were all unadjusted data to understand basic statistical information on the association between women receiving ANC and place of residence *(Nairobi vs. Eastern).* Following the first category of predisposing characteristic factors that may influence health outcomes argued by Kroeger (Kroeger, 1983), the model was adjusted to investigate whether confounding variables are also influenced by place of residence. All p-values were less than α indicating a significance in the model and ensure that there is a difference in education levels *($p = 3.84\ e\text{-}99$)*, birth order *($p = 1.95\ e\text{-}33$)*, marital status *($p = 1.23\ e\text{-}5$)*, and wealth index *($p = 0$)* between women in Nairobi and Eastern Kenya. Based on these findings, it is possible to conclude that place of residence does not only affect the confounding variables but impacts health outcomes of women.

4.5 Research Questions and Hypotheses Analysis Plan B

Research Question (RQ) 2: Does skilled attendance during childbirth differ based on place of residence (Nairobi vs. Eastern)?

H02b: There is no significant statistical association between a woman's place of residence (whether Nairobi or Eastern Kenya) and whether they are attended by skilled personnel during childbirth.

Ha2b: There is a significant statistical association between a woman's place of residence (whether Nairobi or Eastern Kenya) whether they are attended by skilled personnel during childbirth.

Table 3a *(see table 3a)* corresponds to research question number 2. The tabulations results are based on the survey respondents living in both Nairobi and Eastern region of Kenya (N = 6247). Cross tabulations for skilled attendance during childbirth were completed for the following categories "assistance by doctor", "assistance by nurse/midwife", "assistance by traditional birth person", and "assistance by no one" "assistance by community health worker" and "assistance by friend/relative". Since skilled assistance at birth is a categorical variable, answers were recoded and analyzed in Microsoft Excel as "0" (No) and "1" (Yes). 499/2298 (~22%) women living in Eastern Kenya was assisted by a doctor during childbirth compared to 238/428 (~56%) women living in Nairobi. However, 1107/2298 (~48% of women were assisted by a nurse or midwife in Eastern Kenya compared to 215/428 (~50%) in Nairobi. The low percentage of assistance by doctors in Eastern Kenya could be due to many structural factors, but there is significant increase in percentage of assistance by a nurse/midwife which is slightly lower than Nairobi. 620/2298 (~27%) of women in Eastern Kenya was assisted by a traditional birth attendant compared to 20/428 (~8%) of women in Nairobi *(see table 5a).* Additionally,

whereas as 5/428 in Nairobi reported to have been assisted by no one during childbirth, there were 64/2298 reports of Eastern Kenyan women being assisted by no one during delivery; although the fraction seems high, it only accounts for 2% of Eastern Kenyan women *(see table 5a)*. Lastly, 12% of women in Eastern Kenya were assisted by friends/relatives during childbirth in comparison to 2% in Nairobi.

Using these tabulation tables, expectation values were calculated to facilitate the examination of whether each dependent variable is associated with the independent variable using Pearson Chi-square tests in Microsoft Excel. Each statistical value was compared to the significant p-value of α ($\alpha = 0.05$). Assistance at birth by a doctor is a statistically significant variable because its p-value of 1.303e ^-47 is less than α ($\alpha > p$) which rejects the null hypothesis *H02b (see table 3Aii)*. This results indicates that women in Nairobi are more likely to be assisted by a doctor during childbirth than women in Eastern Kenya. Similarly, assistance at birth by traditional birth person also rejects the null hypothesis *H02b* due to having a p-value of 1.576 e -23 ($\alpha > p$) making this finding statistically significant *(see table 4Aii)*. This result indicates that women located in Eastern Kenya are more likely to be assisted by a traditional birth person during childbirth than pregnant women in Nairobi. However, assistance at birth by nurse/midwife was not statistically significant because its p-value is 0.43 ($\alpha < p$) thereby accepting the null hypothesis *H02b (see table 5Aii)*. This results indicates that women in both regions, Nairobi and Eastern, had equal likelihood of assistance by a nurse/midwife during childbirth.

4.6 Research Questions and Hypotheses Analysis Plan C

Research Question (RQ) 3: Does place of delivery during childbirth differ based on place of residence (Nairobi vs. Eastern)?

H03c: There is no significant statistical association between a woman's place of residence (whether Nairobi or Eastern Kenya) and the place they choose and/or are able to deliver at during childbirth.

Ha3c: There is a significant statistical association between a woman's place of residence (whether Nairobi or Eastern Kenya) and the place they choose and/or are able to deliver at during childbirth.

Like assistance during childbirth, cross tabulations for place of delivery are also based on women living in Kenya and the Eastern region (N = 6247). 894/923 pregnant women in Eastern Kenya gave birth at home compared to 29/923 pregnant women in Kenya. Government hospitals had the highest percentage of birth among women living in Nairobi, 170/981, compared to Eastern Kenyan women (721/981) *(see table 7a)*. Though it appears that the conclusion for the comparison between government hospital births in Eastern Kenya and Nairobi is numerically skewed, this appearance is only because there were more participants from Eastern Kenya than Nairobi. This means that even though, Eastern Kenya had higher number of participants giving birth in government hospitals, its highest number of participants gave birth at home. The Chi-square test following the calculated expected observations value was $p = 5.746 \text{ e } -13$. This means that there was a statistically significant difference in place of delivery between regions, with a p-value less than α ($\alpha > p$) rejecting the null hypothesis *H03c*. This result indicates that women in Nairobi are more likely than women in Eastern Kenya to deliver in private hospitals/clinic, government hospitals, or government health centers.

Chapter 5. Discussion, Conclusion, Recommendations

5.1 Introduction

The objective of this study was to conduct an analysis of the 2014 Kenya Demographic Health Survey based on three outcome variables: antenatal care, skilled attendance at birth, and place of delivery, in hopes of examining how these factors are associated with women's place of residence, whether in Nairobi or Eastern Kenya. Several contextual factors were found to be significantly associated with maternal health services accessibility and availability in those two mentioned Kenyan areas. The framework of this literature followed the Anderson model which accounted for socioeconomic impacts on populations health, particularly pregnant women in Kenya.

5.2 Discussion of the Study Results

The analysis revealed that antenatal care is associated with place of residence. The reason for this significance could be due to the lack of clinics, hospitals, or health centers available based on proximity. Therefore, living in Eastern Kenya is negatively associated with receiving antenatal care services. The longer pregnant women hold without having received the appropriate number of antenatal care, the more vulnerable these women become to certain pregnancy related health issues. This outcome further provides strong evidence that antenatal care services being disproportionately distributed across different regions explained by external factors summed up by the ABM model also reinforces the low percentage (37%) of women in Northeastern Kenya to have completed the number of recommended ANC visits by WHO.

Like ANC, both skilled birth attendance and place of delivery had statistical evidence less than the p-value ($\alpha = 0.05$) which rejected the null hypothesis. Although the percent comparison

between Eastern Kenya and Nairobi shows that less women are not being assisted by doctors and/or traditional birth persons, it was still surprising to see such large percentage of women lacking health professional assistance in Nairobi due to the city's size and population density. In a study article by Oluoch-Aridi, J., et al., found that maltreatment including disrespect, negligence, understaffing, and abuse as standing challenges reported by women in Kenya during childbirth (Oluoch-Aridi, J., et al., 2021). Further analysis found that many health workers in Kenya lack sufficient training to properly diagnose patients further threatening the country's health system (Bourbonnais, N., 2013). In response, nurses and health professionals argued on the basis of overworking while understaff and unchanging salary despite promises made by the Kenyan government. In addition, many women in North-Eastern Kenya admitted favoring the use of traditional birth attendants rather than the free maternity care program imposed by the administration in all public health facilities because they feared that free maternity services equate to poorer quality services (Bourbonnais, N., 2013). Therefore, it is safe to assume that the difference between assistance by health professionals during childbirth for women in Eastern Kenya compared to Nairobi is dependent on changing social and political dogma.

The univariate analysis which provided descriptive analysis of the confounding variables, age, marital status, birth order, wealth quintile, and education level played significant roles in providing contextual reasonings behind the lack of utilization of maternal health services throughout Kenya. These results are comparable with the findings of (Govindasamy, P., & Bm, R. (1997). In Govindasamy and Ramesh's study, they investigated factors that influence the uptake of maternal health services in Zimbabwe and found that region of residence, insurance cover, educational level, employment status, maternal age, birth order, place of residence, number of living children, maternal age and household income all influence whether maternal

health services are utilized by pregnant women in Zimbabwe. Therefore, although place of residence is the only variable used to investigate possible association with the three mentioned dependent variables, the confounding variables help to understand how external factors can influence women's decisions as well. Much like the results found in Elo's (Elo, I.T., 2009) study which indicated that older mothers were more likely to deliver in hospitals due to possible complications during earlier pregnancy or overall effects of birthing children at certain critical age.

5.3 Conclusions

Although this analysis only included women respondents from the Nairobi and Eastern province, it was quite clear based on the findings that each dependent variable was statistically significant thereby rejecting the null hypothesis that there were no association with place of residence. The predictor variables including other confounding variables influence pregnant women's livelihoods and are associated with their place of residence. Thus, confirming the impact of socioeconomic status on health outcomes established by the Anderson model, as previously described. Additionally, the millennium goal and vision for 2030 foreshadowed by the Kenyan government hoped to decrease maternal mortality by 200 per 100,000 live births. In order for policy makers to achieve this goal, this analysis suggests that there needs to be a dramatic increase in maternal health service uptake regardless of women's place of residence. Therefore, the creation of social and physical structures is essential in establishing access and availability of these services.

5.4 Recommendations

Based on the finding and health implications of this ongoing circumstance regarding inaccessibility of maternal health services for Kenyan pregnant women, especially those in rural areas, it is crucial that the Kenyan government, women's health activists, and other stakeholders facilitate accessibility, whether financial or physical, for women who wants to receive maternal health services during pregnancy but faces any sort of structural barrier. Furthermore, concerned officials from the Kenya Ministry of Health ought to commit to run a strong social campaign that will aid pregnant women in understanding the importance of receiving prenatal care during pregnancy as well as helping them find resources in close proximity to them. This will ensure that even in cases where women are economically challenged and cannot travel to a hospital or health facility with better more advanced equipment, they will be able to receive a basic level of care by a trained and skilled professional. Lastly, political leaders and social advocates in collaboration with women's health activists should consider the idea of mobile health clinics. In a case such as this where services are accessible to some, but not others due to structural barriers, mobile health clinics could help change the narrative because if women are not able to reach financially afford the costs associated with receiving care from a health facility that more than 20-50 miles from them, then mobile clinics could bring the services to them. For example, through the services offered by the mobile clinics, if a woman is high risks during pregnancy, health professionals from the mobile clinics can monitor this woman's health and refer them to a health facility that's better equipped to help them. Altogether, it is without a doubt that these changes could help bridge the health equity gap for women in Kenya and increase maternal health service usage despite their place of residence.

Chapter 6. Public Health Implications

6.1 Introduction

Overall, the predictor variable, place of residence by region, viewed in association with antenatal care, place of delivery and skilled attendance at birth showed evidence of strong public health implications which requires the strengthening of social and political services such as better stakeholder cooperation, frequent and more cost-effective transportation services, and strategic development of health services.

6.2 Public Health Implications

Maternal health services access and availability is a significant global, regional, and local public health issue. In many resource-poor countries like Kenya, provision of services for to women's health remains a challenge that needs to be addressed by stakeholders, particularly those within the Kenyan health and health policy sector. Many studies like (Bauserman, M., Thorsten, V.R., Nolen, T.L. et al., 2020) and (Ahmed et al., 2010) described the undeniable need to address maternal health services in Kenya. These articles also highlighted the structural determinants which continues to influence the state of maternal health service accessibility for pregnant women in Kenya. Therefore, this thesis focused on investigating whether access to certain services was associated with their place of residence.

This thesis, which relied heavily on the Demographic and Health Survey completed in Kenya in 2014, highlighted the trends associated with the three mentioned dependent variables with the predictor variable 'place of residence' for women residing in Nairobi and Eastern Kenya who were pregnant five years before the completion of the survey.

The results show the influence of women's place of residence on the level of service accessible to them during pregnancy. It further showed how other social determinants like levels of education, birth order, and marital status can further dictate how much of these maternal health services are attainable for women in Nairobi and Eastern Kenya.

Based on these findings, it is undeniable to ignore how maternal health services access can vary regionally and how this may impact pregnancy outcomes for women in more remote areas. Therefore, it is imperative for policy makers and stakeholders to firstly collaborate on, evaluate, and monitor the health impact of this scenario to understand how to create the best approach that is going to serve women in rural/remote communities. These interventions ought to be cost-effective for the policy makers and made to be affordable for the community. The goal of this initiative should consider the Kenya SDG goal to reduce maternal mortality rates and incorporate maternal health recommendations from the WHO on the appropriate number of certain services women are required to receive to help meet the Kenya SDG goal. Furthermore, this initiative should also consider and address the current and ongoing inequitable health gap, including social determinants directly tied to poor health outcomes, to alleviate the challenges faced by pregnant women in Kenya.

Although lobbyists and activists for women's health are going to be the backbone of this intervention, the support from strong financial and political advisors from the Kenyan government is crucial to ensure that the project is achievable because their support holds a lot of weighs in terms of access to resources and benefits.

The findings of the study emphasized the importance of service distribution and health service accessibility for women, particularly in Kenya. They also proved that utilization of maternal health services such as antenatal care, skilled birth attendance, and place of delivery

should be supported and encouraged by healthcare professionals and women's health advocates. Although many women who have obtained more education and are more economically stable follow a positive trend in terms of committing and obtaining prenatal health services, others who have received less education and lack economic stability are less likely to receive maternal health services. This trend was seen in both Nairobi and Eastern Kenya. Therefore, finding ways to scale up the utilization of maternal health services is necessary for the advancement of women's health and public health.

Tables and Figures

Table 1: Frequency Demographics of the Study Population

Characteristics	**N = 6247**	**%**
Region		
Eastern	5247	84.01
Nairobi	999	15.99
Wealth Quintile*		
Poorest	1206	19.31
Poorer	1252	20.04
Middle	1113	17.82
Richer	1205	19.29
Richest	1470	23.54
Education level*		
No education	713	11.42
Primary	3162	50.62
Secondary	1729	27.68
Higher	642	10.28
Age*		
15-19	1157	18.52
20-24	1067	17.08
25-29	1249	20
30-34	941	15.06
35-39	747	11.96
40-44	596	9.55
45-49	489	7.82
Birth order*		
1	1010	21.94
2	1085	23.57
3	898	19.51
4	607	13.19
5	372	8.08
6+	631	13.71
Marital status*		
Never in union	1782	28.53
Married	3638	58.25
Living with partner	115	1.84
Widowed	210	3.36
Divorced	161	2.58
Separated	340	5.44
Antenatal visit		

0	123	4.51
1	85	3.12
2	261	9.57
3	687	25.20
4	684	25.09
5	437	16.03
6	233	8.55
7	103	3.78
8+	113	4.16
Place of delivery*		
Respondent's home (11)	923	33.86
Other home (12)	31	1.14
Government hospital (21)	891	32.69
Govt health center (22)	196	7.19
Govt dispensary (23)	92	3.37
Other public sector (26)	3	0.11
Mission hospital/clinic (31)	347	12.73
Private hospital/clinic (32)	170	6.24
Nursing/maternity home (33)	28	1.03
Other private sector (36)	4	0.15
Other (96)	41	1.50
Attendance at birth*		
Assistance: doctor	737	27.04
Assistance: nurse/midwife	1322	48.50
Assistance: no one	69	2.53
Assistance: community health	5	0.18
Assistance: Relative/friend	289	10.6
Assistance: traditional	640	23.48

Table 2: Simple Regression Summary of Nairobi Vs. Eastern Region and Number of Antenatal Visit

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.05889028
R Square	0.00346806
Adjusted R Square	0.00330844
Standard Error	0.36585039
Observations	6245

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2.90801325	2.90801325	21.7264781	3.2096E-06
Residual	6243	835.603756	0.13384651		
Total	6244	838.511769			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.1373747	0.00667798	20.5713053	4.9011E-91	0.12428357	0.15046584	0.12428357	0.15046584
4	0.00545414	0.00117012	4.66116703	3.2096E-06	0.00316029	0.00774798	0.00316029	0.00774798

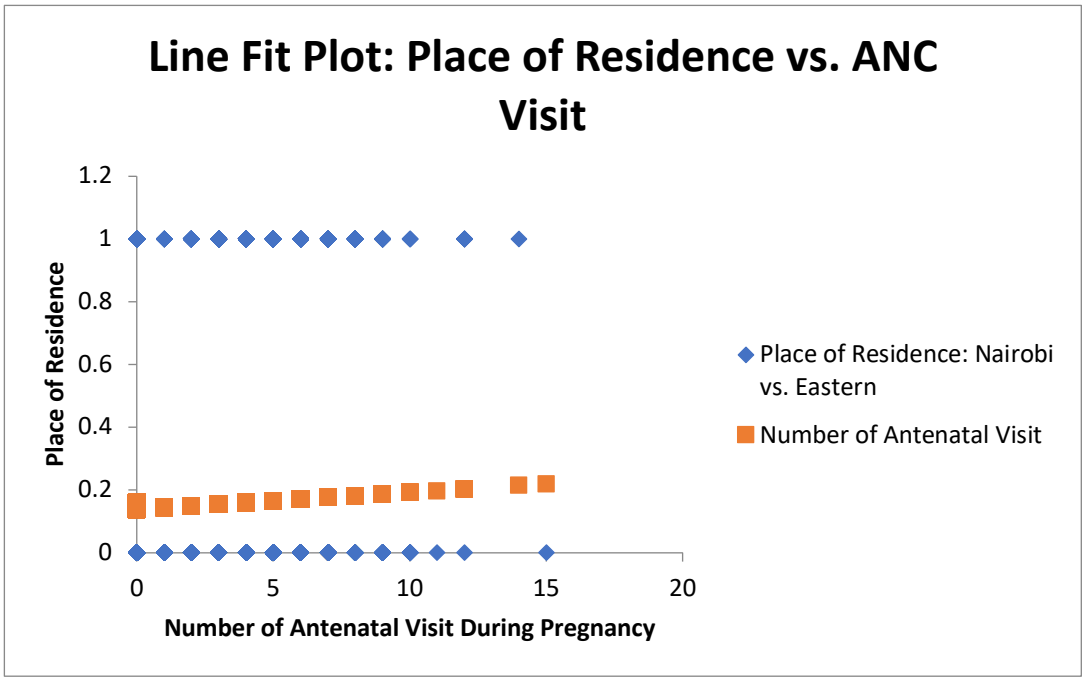


Table 3A: Cross tabulations: Nairobi and Eastern Kenya and Assistance by Doctor

Assistance by Doctor	Eastern	Nairobi	Total
0 (No)	1799	190	1989
1 (Yes)	499	238	737
Total	**2298**	**428**	**2726**

Table 3AI: Expectation table of Nairobi and Eastern Kenya and Assistance by Doctor

Assistance by Doctor	Eastern	Nairobi	Total
0 (No)	1676.71	312.286	1989
1 (Yes)	621.286	115.714	737
Total	**2298**	**428**	**2726**

Table 3AII: Chi-square Test

$\alpha = 0.05$	P = 1.303 E-47

Table 3B: Cross tabulations: Nairobi and Eastern Kenya and Assistance by Nurse/Midwife

Assistance by Doctor	Eastern	Nairobi	Total
0 (No)	1191	213	1404
1 (Yes)	1107	215	1322
Total	**2298**	**428**	**2726**

Table 3BI: Expectation table of Nairobi and Eastern Kenya and Assistance by Nurse/Midwife

Assistance by Doctor	Eastern	Nairobi	Total
0 (No)	1183.563	220.437	1404
1 (Yes)	1114.437	207.56	1322
Total	**2298**	**428**	**2726**

Table 3BII: Chi-square Test

$\alpha = 0.05$	P = 0.43336

Table 4A: Cross tab: Nairobi and Eastern Kenya and Assistance by Traditional Birth Person

Assistance by Traditional Birth Person	Eastern	Nairobi	Total
0 (No)	1678	408	2086
1 (Yes)	620	20	640
Total	2298	428	2726

Table 4AI: Expectations table of Nairobi and Eastern Kenya and Assistance by Traditional Birth Person

Assistance by Traditional Birth Person	Eastern	Nairobi	Total
0 (No)	1758.484	327.516	208
1 (Yes)	539.51	100.484	640
Total	2298	428	2726

Table 3AII: Chi-square Test

$\alpha = 0.05$	P = 1.576 E -23

Table 4A: Cross tab: Nairobi and Eastern Kenya and Assistance by Community Health Worker

Assistance by Traditional Birth Person	Eastern	Nairobi	Total
0 (No)	2294	427	2721
1 (Yes)	4	1	5
Total	2298	428	2726

Table 4AI: Expectations table of Nairobi and Eastern Kenya and Assistance by Community Health Worker

Assistance by Traditional Birth Person	Eastern	Nairobi	Total
0 (No)	2293.785	427.215	2721
1 (Yes)	4.215	0.785	5
Total	2298	428	2726

Table 4AII: Chi-square Test

$\alpha = 0.05$	P = 0.79139

Table 5A: Cross tabulations: Nairobi and Eastern Kenya and Assistance by No One

Assistance by Traditional Birth Person	Eastern	Nairobi	Total
0 (No)	2234	423	2657
1 (Yes)	64	5	69
Total	2298	428	2726

Table 5AI: Expectations table of Nairobi and Eastern Kenya and Assistance by No One

Assistance by No one	Eastern	Nairobi	Total
0 (No)	2239.833	417.167	2657
1 (Yes)	58.167	10.833	69
Total	2298	428	2726

Table 5AII: Chi-square Test

$\alpha = 0.05$	P = 0.05055

Table 6A: Cross tab: Nairobi and Eastern Kenya and Assistance by Friends/Relatives

Assistance by Traditional Birth Person	Eastern	Nairobi	Total
0 (No)	2021	416	2437
1 (Yes)	277	12	289
Total	2298	428	2726

Table 6AI: Expectations table of Nairobi and Eastern Kenya and Assistance by Friends/Relatives

Assistance by Traditional Birth Person	Eastern	Nairobi	Total
0 (No)	2054.375	382.625	2437
1 (Yes)	243.625	45.3749	289
Total	2298	428	2726

Table 6AII: Chi-square Test

$\alpha = 0.05$	P = 1.147 E - 8

Table 7A: Cross Tabulations between Place of Residence and Place of Delivery

	11	12	21	22	23	26	31	32	33	36	96	Total
Eastern	894	24	721	160	84	2	255	101	22		35	2298
Nairobi	29	7	170	36	8	1	92	69	6	4	6	428
Total	923	31	981	196	92	3	347	170	28	4	41	2726

Table 7AI: Expectations table between Place of Residence and Place of Delivery

	11	12	21	22	23	26	31	32	33	36	96	Total
Eastern	778.1	26.1	751.1	165.2	77.6	2.5	292.5	143.3	23.6	3.4	34.6	2298
Nairobi	144.9	4.9	139.9	30.8	14.4	0.5	26.7	26.7	4.4	0.6	6.4	428
Total	923	31	981	196	92	3	347	170	28	4	41	2726

Table 7AII: Chi-square Test

$\alpha = 0.05$	P = 1.274 E -48

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